

CURRICULUM
POSTGRADUATE – MD/MS

2008-09



**JAWAHARLAL INSTITUTE OF POSTGRADUATE MEDICAL
EDUCATION & RESEARCH (JIPMER),**

PUDUCHERRY-605 006

**Academic Affairs
Concerned Officials**

Dr. K.S.V.K. Subba Rao	...	Director
Dr. K.S. Reddy	...	Dean
Dr. S. Mahadevan	...	Professor (Academics)
Dr. M.G. Sridhar	...	Professor (Examinations)

**Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER),
Puducherry-605 006.**

SYLLABUS COMMITTEE

1. Dr. K.S.V.K. Subba Rao, Director	...	Chairperson
2. Dr. K.S. Reddy, Dean	...	Member
3. Head of the Department of Anatomy	...	Member
4. Head of the Department of Biochemistry	...	Member
5. Head of the Department of Physiology	...	Member
6. Head of the Department of Pathology	...	Member
7. Head of the Department of Microbiology	...	Member
8. Head of the Department of Forensic Medicine	...	Member
9. Head of the Department of Pharmacology	...	Member
10. Head of the Department of Medicine	...	Member
11. Head of the Department of Paediatrics	...	Member
12. Head of the Department of Surgery	...	Member
13. Head of the Department of Obst. & Gyn.	...	Member
14. Head of the Department of Community Medicine	...	Member
15. Head of the Department of Psychiatry	...	Member
16. Head of the Department of Dermat. & Vener.	...	Member
17. Head of the Department of Orthopaedics	...	Member
18. Head of the Department of ENT	...	Member
19. Head of the Department of Ophthalmology	...	Member
20. Head of the Department of Anaesthesiology	...	Member
21. Professor (Examinations)	...	Member
22. Professor (Academics)	...	Member-Secretary

POSTGRADUATE – MD/MS

CONTENTS

S. No.	Text	Pages
1.	Regulations	5
2.	Goals and General Objectives	5
	Basic Medical Sciences – M.D. (Doctor of Medicine)	
3.	Anatomy	22
4.	Biochemistry	32
5.	Microbiology	41
6.	Pathology	53
7.	Pharmacology	75
8.	Physiology	86
	Clinical Disciplines – M.D. (Doctor of Medicine)	
9.	Anaesthesiology	95
10.	Community Medicine	131
11.	Dermatology, Venerology & Leprosy	147
12.	General Medicine	155
13.	Paediatrics	161
14.	Psychiatry	173
15.	Radiodiagnosis	184
16.	Radiotherapy	203
17.	Tuberculosis and Respiratory Medicine	215
	Clinical Disciplines - M.S. (Master of Surgery)	
18.	General Surgery	228
19.	Obstetrics & Gynaecology	246
20.	Ophthalmology	256
21.	Orthopaedics	260
22.	Oto-rhino-laryngology	263

**JAWAHARLAL INSTITUTE OF POSTGRADUATE MEDICAL
EDUCATION & RESEARCH
(JIPMER), PONDICHERRY-6**

**SALIENT FEATURES OF POSTGRADUATE MEDICAL EDUCATION
(AMENDMENT) REGULATIONS, 2008**

1. SHORT TITLE AND COMMENCEMENT:-

1. These regulations may be called "The Postgraduate Medical Education Regulations 2008".
2. They shall come into force from the current year.

2. GENERAL CONDITIONS TO BE OBSERVED BY POSTGRADUATE TEACHING INSTITUTIONS:

- i) Postgraduate Medical Education in broad specialities shall be of three years duration in the case of degree course and two years in the case of Diploma course after MBBS and in the case of super specialities the duration shall be of three years after MD/MS.
- ii) Postgraduate curriculum shall be competency based.
- iii) Learning in postgraduate programme shall be essentially autonomous and self directed.
- iv) A combination of both formative and summative assessment is vital for the successful completion of the PG programme.
- v) A modular approach to the course curriculum is essential for achieving a systematic exposure to the various areas concerned with the discipline.
- vi) The training of PG students shall involve learning experience 'derived from' or 'targeted to' the needs of the community. It shall, therefore, be necessary to expose the students to community based activities.

3. GOALS AND GENERAL OBJECTIVES OF POSTGRADUATE MEDICAL EDUCATION PROGRAMME TO BE OBSERVED BY POSTGRADUATE TEACHING INSTITUTION.

3.1 GOAL

The goal of postgraduate medical education shall be to produce competent specialists and/or Medical teachers.

- i) who shall recognize the health needs of the community, and carry out professional obligations ethically and in keeping with the objectives of the national health policy
- ii) who shall have mastered most of the competencies, pertaining to the speciality, that are required to be practiced at the secondary and the tertiary levels of the health care delivery system;
- iii) who shall be aware of the contemporary advance and developments in the discipline concerned;
- iv) who shall have acquired a spirit of scientific inquiry and is oriented to the principles of research methodology and epidemiology; and
- v) who shall have acquired the basic skills in teaching of the medical and paramedical professionals;

3.2 GENERAL OBJECTIVES OF POST-GRADUATE TRAINING EXPECTED FROM STUDENTS AT THE END OF POST-GRADUATE TRAINING

At the end of the postgraduate training in the discipline concerned the student shall be able to;

- i) Recognize the importance to the concerned speciality in the context of the health needs of the community and the national priorities in the health section.
- ii) Practice the speciality concerned ethically and in step with the principles of primary health care.
- iii) Demonstrate sufficient understanding of the basic sciences relevant to the concerned speciality.
- iv) Identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning therapeutic, rehabilitative, preventive and primitive measure/strategies.
- v) Diagnose and manage majority of the conditions in the speciality concerned on the basis of clinical assessment, and appropriately selected and conducted investigations.
- vi) Plan and advise measures for the prevention and rehabilitation of patients suffering from disease and disability related to the speciality.
- vii) Demonstrate skills in documentation of individual case details as well as morbidity and mortality rate relevant to the assigned situation.
- viii) Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behaviour in accordance with the societal norms and expectations.
- ix) Play the assigned role in the implementation of national health programme, effectively and responsibly.
- x) Organize and supervise the chosen/assigned health care services demonstrating adequate managerial skills in the clinic/hospital or the field situation.
- xi) Develop skills as a self-directed learner, recognize continuing education needs; select and use appropriate learning resources.
- xii) Demonstrate competence in basic concepts of research methodology and epidemiology, and be able to critically analyze relevant published research literature.
- xiii) Develop skills in using educational methods and techniques as applicable to the teaching of medical/nursing students, general physicians and paramedical health workers.
- xiv) Function as an effective leader of a health team engaged in health care, research or training.

4. STATEMENT OF THE COMPETENCIES :

Keeping in view the general objectives of postgraduate training, each discipline shall aim at development of specific competencies which shall be defined and spelt out in clear terms. Each department shall produce a statement and bring it to the notice of the trainees in the beginning of the programme so that he or she can direct the efforts towards the attainment of these competencies.

5. COMPONENTS OF THE POSTGRADUATE CURRICULUM :

The major components of the Postgraduate curriculum shall be:

- Theoretical knowledge
- Practical and clinical skills

- Writing Thesis / Research articles
- Attitudes including communication skills.
- Training in Research Methodology, Medical Ethics and Medicolegal aspects.

6. STARTING OF POSTGRADUATE MEDICAL COURSES AND THEIR RECOGNITION.

(1) An institution intending to start a Postgraduate Medical Education course or to increase the admission capacity shall obtain permission of the Central Government under Section 10A of the Act.

(2) The institution shall apply for recognition of the Postgraduate medical qualification to the Central Government.

7. NOMENCLATURE OF POSTGRADUATE COURSES.

The nomenclature of postgraduate medical courses shall be as provided in the Schedule annexed to these Regulations:

Provided that in the case of postgraduate medical degree and diploma courses instituted prior to the commencement of these Regulations with the approval of the Medical Council of India and which have not been included in these regulations, the institutions concerned shall continue such course till the students admitted complete the said courses.

8. GENERAL

(1) The institutions recognised by the Medical Council of India for running Postgraduate courses prior to the commencement of the Indian Medical Council (Amendment) Act, 1993 and those medical colleges recognised for running Bachelor of Medicine and Bachelor of Surgery (MBBS) course or institutions established by the Central Government for the purpose of imparting postgraduate medical education shall be eligible for starting any postgraduate degree or diploma and higher specialty course.

(1A) The Central Government shall exempt any such existing/proposed non-teaching institutions or specialist institution or autonomous body owned and managed by the Central Government/State Government from fulfilling the prescribed provision of having an undergraduate teaching facility, and allow starting Postgraduate medical course.

(2) The maximum number of students for a postgraduate medical course, who can be registered in any recognised department, for training for the award of postgraduate degree or diploma by the Institute, shall be determined by the facilities available in the department in terms of infrastructure, teaching staff and clinical teaching material.

(3) Every student, selected for admission to a Post Graduate medical course in any of the medical institutions on acquiring MBBS Degree or an equivalent qualification thereto shall have obtained permanent registration with the Medical Council of India, or any of the State Medical Council(s) or should obtain the same within a period of one month from the date of his / her admission, failing which his / her admission shall stand cancelled;

Provided that in the case of a foreign national, the Medical Council of India may, on payment of the prescribed fee for registration, grant temporary Registration for the duration

of the postgraduate course limited to the Medical College / Institution to which he / she is admitted for the time being exclusively for pursuing the Post Graduate studies; Provided further that temporary registration to such foreign national shall be subject to the condition that such person is duly registered with appropriate registering authority in his own country wherefrom he has obtained his Basic Medical qualification and is duly recognized by the corresponding Medical Council or concerned authority.

(4) The students undergoing postgraduate courses shall be exposed to the following:-

- a) Basics of statistics to understand and critically evaluate published research paper.
- b) Exposure to Human Behavior studies.

9. SELECTION OF POSTGRADUATE STUDENTS.

1. Students for Postgraduate medical courses shall be selected strictly on the basis of their academic merit.
2. For determining the academic merit, the institution may adopt any one of the following procedures both for degree and diploma courses :-
 - i) On the basis of merit as determined by the competitive test conducted by JIPMER
 - or
 - ii) On the basis of merit as determined by a centralized competitive test held at the national level; or

Provided that wherever entrance test for Postgraduate admission is held by JIPMER the minimum percentage of marks for eligibility for admission to postgraduate medical courses shall be fifty per cent for general category candidates and 40 per cent for the candidate belonging to Scheduled Castes, Scheduled Tribes and Other Backward classes.

Provided further that in non-Governmental institutions fifty percent of the total seats shall be filled by the competent authority and the remaining fifty per cent by the management of the institution on the basis of merit.

10. PERIOD OF TRAINING

The period of training for the award of various postgraduate degrees or diplomas shall be as follows:

(1) Doctor of Medicine (M.D.) / Master of Surgery (M.S.)

The period of training for obtaining these degrees shall be three completed years including the period of examination.

Provided that in the case of students possessing a recognised two year postgraduate diploma course in the same subject, the period of training, including the period of examination, shall be two years.

(2) Doctor of Medicine (D.M.) / Master Chirurgiae (M.Ch.)

The period of training for obtaining these Degrees shall be three completed year including the examination period.

Provided that where an institution on the date of commencement for these Regulation, is imparting five year training in Neurology and Neuro-Surgery, such institution shall continue to have five year training course.

(3) Diplomas

The period of training for obtaining a postgraduate Diploma shall be two completed years including the examination period.

MIGRATION

Under no circumstance, Migration/transfer of student undergoing any Post Graduate Degree / Diploma / Super speciality course shall be permitted by JIPMER.

EXAMINATIONS

The examinations shall be organised on the basis of marking system to evaluate and certify candidate's level of knowledge, skill and competence at the end of the training and obtaining a minimum of 50% marks in theory as well as practical separately shall be mandatory for passing the whole examination. The examination for M.S., M.D., D.M., M.Ch., shall be held at the end of 3 academic years (six academic terms) and for diploma at the end of 2 academic years (four academic terms). The academic terms shall mean six months training period. For other details please refer to Regulations.

11. Departmental training Facilities:-

A department having an independent academic identity in a teaching institution, comprising of one or more units, having prescribed strength of faculty, staff and teaching beds shall be recognised for Post Graduate training.

11.1 Staff – Faculty

- (a) A clinical department or its unit training candidates for Broad or Super Specialities, shall have a minimum of three full time faculty members belonging to the concerned disciplines of whom one shall be a Professor, one Associate Professor/ Reader and one Asst. Professor/ Lecturer, possessing requisite qualification and teaching experience prescribed by the Medical Council of India;

Provided that the second or subsequent unit may be headed by an Associate Professor along with two Assistant Professors / Lecturers.

Of these faculty members only those who possess a total of eight years teaching experience, of which at least five years teaching experience is as Assistant Professor gained after obtaining Post Graduate Degree, shall be recognised as Post Graduate teachers.

- (b) In a department, training candidates for Super Speciality, there shall be a minimum of three faculty members with requisite Post Graduate qualification

and experience, one shall be Professor, one Associate Professor / Reader and one Assistant Professor / Lecturer.

Provided that the second or subsequent unit may be headed by an Associate Professor along with two Assistant Professors / Lecturers.

Of these only those faculty members who possess eight years teaching experience of which at least five years teaching experience is as Assistant Professor or above gained after obtaining the Post Graduate degree shall be recognised as Post Graduate teachers;

Provided that in the case of super speciality courses which are newly instituted, relaxation of qualification and experience for recognition as Post Graduate teachers, may be granted by the Medical Council of India for sufficient cause.

- (c) In addition to the faculty staff, the strength of Residents / Registrars / Tutors / Demonstrators, as well as technical and other para medical staff shall be as per the staff strength prescribed for 50 or 100 or 150 students in the 'Minimum Requirements for 50/100/150 MBBS Admissions Annually Regulations.'

11.2 Minimum requirements for a Post Graduate institution :

- (a) An institution conducting both Undergraduate and Post Graduate teaching shall fulfill the prescribed minimum requirement for undergraduate training and also additional requirements for Post Graduate training depending on the type of work being carried out in the Department. The additional staff required to be provided in following departments shall be as under:-
- | | | |
|------------------------------------|---|---|
| 1) Department of Pathology | | |
| i) Associate Professor / Reader | - | 1 |
| ii) Assistant Professor / Lecturer | - | 1 |
| iii) Tutor / Demonstrator | - | 1 |
| 2) Department of Radiodiagnosis | | |
| i) Associate Professor / Reader | - | 1 |
| ii) Assistant Professor / Lecturer | - | 1 |
| iii) Tutor / Demonstrator | - | 1 |
| 3) Department of Anaesthesiology | | |
| i) Associate Professor / Reader | - | 1 |
| ii) Assistant Professor / Lecturer | - | 1 |
| iii) Tutor / Demonstrator | - | 1 |
- b) A Department imparting only Post Graduate training shall:-
- (i) Provide facilities consistent with the all round training including training in basic medical science and other departments related to the subject of training as recommended by the Medical Council of India.
- (ii) Have as many autopsies, biopsies and cytopsies as possible for teaching purposes; and

- (iii) Make available facilities of ancillary department for coordination of Training.

11.3 Bed Strength in Clinical Departments

A Department to be recognised for training of Post Graduate students, shall have at least 60 (Sixty) beds each of General Medicine, General Surgery, Obstetrics and Gynecology, 30 (thirty) beds each for Degree and Diploma courses and 20 (twenty) beds each in case of Super Speciality courses.

Explanation: - A unit shall consist of not less than 30 and more than 40 beds for Degree / Diploma Courses and not less than 20 and more than 30 beds for Super Speciality courses respectively.

11.4 Out – patient departments

There shall be adequate space and sufficient number of examination cubicles available in the out – patient Department. Besides the general outpatient services, Speciality Clinics shall also be available for the training of post-graduate students in the relevant broad and super speciality;

To determine the number of students who may be admitted for training, outpatient attendance, work turnover and ambulatory care also have to be taken into consideration.

11.5 Laboratory Facilities

The institution shall have adequate laboratory facilities for the training of the Post Graduate students, and such laboratories shall provide all the investigative facilities required and shall be regularly updated keeping in view the advancement of knowledge and technology and research requirements, and for training of students in non-clinical departments, proper and contemporary laboratory facilities shall be made available.

11.6 Equipment

The department shall have adequate number of all such equipments including the latest ones necessary for training and as may be prescribed by the Council for each speciality from time to time.

12. Number of Post Graduate Students to be admitted.

(1) The ratio of recognised Post Graduate teacher to number of students to be admitted for the degree and diploma courses shall be 1:1 each for degree and diploma courses in each unit per year, to the extent that in no circumstances more than two students for degree and one for Diploma shall be registered in a unit in one academic year.

(2) In case the institution is having only Post Graduate diploma courses in any subject then it shall have a unit of 30 beds with three full time teachers. The ratio of number of students and recognised Post Graduate teachers shall be 1:1 and in no circumstances more than three students can be admitted in a unit per year.

(3) The requirement of units and beds shall not apply in the case of Post Graduate degree or diploma courses in Basic and para-clinical departments. The ratio of recognised Post Graduate teacher to students shall, however be maintained at 1:1 both at degree as well as diploma level.

(4) The number of students to be admitted in case of Post Graduate degree (Super speciality) courses shall be one student per year per recognised Post Graduate teacher in a department having a minimum of three faculty members (one Professor, one Associate Professor/Reader & one Asstt. Professor/Lecturer) and twenty beds. If the number of Post Graduate teachers in the unit is more than one then the number of students may be increased proportionately but not more than two in a unit per year in any circumstances. For this purpose one student should associate with one Post Graduate teacher:

Provided that no Post Graduate seats left unfilled in an academic year, shall be carried forward to the next or subsequent academic years, being from 1st January to 31st December of any calendar year.

13. TRAINING PROGRAMME

13.1 The training given with due care to the Post Graduate students in the recognised institutions for the award of various Post Graduate medical degrees / diplomas shall determine the expertise of the specialist and / or medical teachers produced as a result of the educational programme during the period of stay in the institution.

13.2 All candidates joining the Post Graduate training programme shall work as 'Full Time Residents' during the period of training and shall attend not less than 80% (Eighty percent) of the imparted training during each academic year including assignments, assessed full time responsibilities and participation in all facets of the educational process.

13.3 The Post Graduate students undergoing Post Graduate Degree / Diploma / Super Speciality Course shall be paid stipend on par with the stipend being paid to the Post Graduate students of State Government Medical Institutions / Central Government Medical Institutions, in the State/Union Territory where the institution is located. Similarly, the matter of grant of leave to Post Graduate students shall be regulated as per the respective State Government rules.

13.4 (a) Every institution undertaking Post Graduate training programme shall set up an Academic cell or a curriculum committee, under the chairmanship of a senior faculty member, which shall work out the details of the training programme in each speciality in consultation with other department faculty staff and also coordinate and monitor the implementation of these training Programmes.

(b) The training programmes shall be updated as and when required. The structured training programme shall be written up and strictly followed, to enable the examiners to determine the training undergone by the candidates and the Medical Council of India inspectors to assess the same at the time of inspection.

(c) Post Graduate students shall maintain a record (log) book of the work carried out by them and the training programme undergone during the period of training including details of procedures, surgical operations assisted or done independently by M.S. / M.Ch. candidates.

(d) The Record (Log) Books shall be checked and assessed periodically by the faculty members imparting the training.

- 13.5 During the training for award of Degree / Super Speciality / Diploma in clinical disciplines, there shall be proper training in Basic medical sciences related to the disciplines concerned; so also in the applied aspects of the subject; and allied subjects related to the disciplines concerned. In the Post Graduate training programmes including both Clinical and Basic medical sciences, emphasis has to be laid on Preventive and Social aspects. Emergency care, facilities for Autopsies, Biopsies, Cytopses, Endoscopy and Imaging etc. shall also be made available for training purposes.
- 13.6 The Post Graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- 13.7 Training in Medical Audit, Management, Health Economics, Health Information System, basics of statistics, exposure to human behaviour studies, knowledge of pharmaco – economics and introduction to non- linear mathematics shall be imparted to the Post Graduate students.
- 13.8 Implementation of the training programmes for the award of various Post Graduate Degree and Diplomas shall include the following:-

(a) **Doctor of Medical (M.D.) / Master of Surgery (M.S.)**

(i) **Basic Medical Sciences** – The teaching and training of the students shall be through Lectures, Seminars, Journal Clubs, Group Discussions, Participation in laboratory and experimental work, and involvement in Research Studies in the concerned speciality and exposure to the ‘Applied aspects’ of the subject relevant to clinical specialities.

(ii) **Clinical disciplines**

The teaching and training of the students shall include responsibility in the management and treatment of patients entrusted to their care; participation in Seminars, Journal clubs, Group Discussions, Clinical Meetings, Grand Rounds and Clinico - Pathological Conferences; practical training in Diagnosis and Medical and Surgical treatment; training in the Basic Medical Sciences, as well as in allied clinical specialities.

(b) **Doctor of Medicine (D.M.) / Magister Chirurgiae (M.Ch.)**

The training programme shall be on the same pattern as for M.D. / M.S. in clinical disciplines; with practical training including advanced Diagnostic, Therapeutic and Laboratory techniques, relevant to the subject of specialization. Post Graduate Degree / Diploma / Super Speciality Residents in Surgical specialities shall participate in surgical operations as well.

(c) **Diplomas**

The teaching and training of the students shall include graded clinical responsibility; Lectures, Seminars, Journal Clubs, Group Discussions and participation in Clinical and Clinico-Pathological Conferences, practical training to manage independently common problems in the speciality; and training in the Basic Medical Sciences.

14. EXAMINATIONS

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify candidate's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D. / M.S., D.M., M.Ch shall be held at the end of 3rd academic year and for Diploma at the end of 2nd academic year. An academic term shall mean six month's training period.

(1) EXAMINERS

(a) All the Post Graduate Examiners shall be recognised Post Graduate Teachers holding recognised Post Graduate qualifications in the subject concerned.

(b) For all Post Graduate Examinations, the minimum number of Examiners shall be four, out of which at least two (50%) shall be External Examiners, who shall be invited from other recognised universities from outside the State. Two sets of internal examiners may be appointed one for M.D. / M.S. and one for diploma.

(c) Under exceptional circumstances, examinations may be held with 3 (three) examiners provided two of them are external and Medical Council of India is intimated the justification of such action prior to publication of result for approval. Under no circumstances, result shall be published in such cases without the approval of Medical Council of India.

(d) The examining authorities may follow the guidelines regarding appointment of examiners given in Appendix-II.

(2) Number of candidates

The maximum number of candidates to be examined in Clinical / practical and Oral on any day shall not exceed six for M.D./M.S. degree, eight for diploma and two for D.M./M.Ch examinations.

(3) Number of examinations

JIPMER shall conduct not more than two examinations in a year, for any subject, with an interval of not less than 4 and not more than 6 months between the two examinations.

(4) I. Doctor of Medicine (M.D.)/Master of Surgery (M.S.)

M.D. / M.S. examinations, in any subject shall consist of Thesis, Theory Papers, and clinical/Practical and Oral examinations.

(a) THESIS

Every candidate shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination.

The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical Examination. A candidate shall be allowed to appear for the Theory and Practical / Clinical examination only after the acceptance of the Thesis by the examiners.

Objectives

1. The student would be able to demonstrate capability in research by planning and conducting systematic scientific inquiry & data analysis and deriving conclusion.
2. Communicate scientific information for health planning.

Guide for thesis:

1. Chief guide will be from the concerned department.
2. Co-guide will be from the department or from other disciplines related to the thesis.

Submission of thesis protocol:

It should be submitted at the end of six months after admission to the course.

- 1) Protocol in essence should consist of:
 - a) Introduction and objectives of the research project.
 - b) Brief review of literature
 - c) Suggested materials and methods, and (scheme of work)
 - d) Statistician should be consulted at the time of selection of groups, number of cases and method of study. He should also be consulted during the study.
 - e) Bibliography
- 2) The protocol must be presented in the concerned department before being forwarded to the Research Committee of the Institute.
- 3) Protocol will be approved by the research committee appointed by the Dean / Principal to scrutinise the thesis protocol with reference to its feasibility, statistical validity, ethical (human/animal) aspects, etc.

Submission of thesis

1. The thesis shall relate to the candidate's own work on a specific research problem or a series of clinical case studies in accordance with the approved plan.
2. The thesis shall be written in English, printed or typed double line spacing, on white bond paper 22x28 cm with a margin of 3.5 cm, bearing the matter on one side of paper only and neatly bound with the title, the name of the Institute printed on the front cover.

3. The thesis shall contain: Introduction, review of literature, material and methods, observations, discussion, conclusion and summary and reference as per index medicus.

Each candidate shall submit to the Dean four copies of thesis, through their respective Heads of the Department not later than six months prior to the date of commencement of theory examination in the subject.

Evaluation of Thesis:

1. The thesis shall be referred by JIPMER for Evaluation, to at least a minimum of three examiners – one internal and two external. The examiners will report independently to the Controller of Examinations and recommend whether the thesis is
 - a) approved
 - b) returned for improvements as suggested or
 - c) rejected (Reasons for rejection should be detailed)
2. The thesis shall be deemed to have been accepted when it has been approved by at least two examiners.
3. Where improvements have been suggested by two or more of the examiners, the candidate shall be required to re-submit the thesis, after making the requisite improvements for evaluation.
4. When a thesis is rejected by the examiners, it shall be returned to the candidate who shall have to write it again. The second thesis, as and when submitted shall be treated as a fresh thesis and processed.
5. Acceptance of thesis submitted by the candidate shall be a pre-condition for his / her admission to the written, oral and practical / clinical part of the examination.
6. There shall be no separate marks allotted for thesis.

Provided that under special circumstances if the report from one or more examiners is not received by the time the Post-Graduate examination is due, the candidate may be permitted provisionally to sit for the examination but the result be kept with held till the receipt of the report subject to the condition that if the thesis is rejected then the candidate in addition to writing a fresh thesis, shall have to appear in the entire examination again.

6. A candidate whose thesis stands approved by the examiners but fails in the examination, shall not be required to submit a fresh one if he / she appears in the examination in the same branch on a subsequent occasion.

(b) Theory

- (i) There shall be four theory papers.

In case of M.D. / M.S. Courses in Basic Medical Sciences, the syllabus will be as per distribution (Given in curriculum). Each paper will have 2 essay type questions (25 x 2 marks) and 5 short answer questions (10 x 5 marks). Model question papers are given for each speciality.

In case of M.D., M.S. in Clinical disciplines, Paper I shall be Basic Medical Sciences and Paper IV will be Recent Advances in the concerned subjects (Given in curriculum).

Paper I of Clinical subjects will have 10 short answer questions (10 x 10 marks) and Paper II to IV will have 2 essay type questions (25 x 2 marks) and 5 short answer questions (10 x 5 marks) in each paper. Model question papers are given for each speciality.

(ii) Basic Medical Sciences

(iii) The theory examinations shall be held well in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the Clinical/Practical and Oral examination.

(c) Clinical / Practical and Oral

(i) Clinical examination for the subjects in Clinical Sciences shall be conducted to test the knowledge and competence of the candidates for undertaking independent work as a specialist/Teacher, for which candidates shall examine a minimum one long case and two short cases.

(ii) Practical examination for the subjects in Basic Medical Sciences shall be conducted to test the knowledge and competence of the candidates for making valid and relevant observations based on the experimental/Laboratory studies and his ability to perform such studies as are relevant to his subject.

1. The Oral examination shall be thorough and shall aim at assessing the candidate knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the speciality, which form a part of the examination.

II. Doctor of Medicine (D.M.)/Magister of Chirurgiae (M.Ch.)

The Examination consists of: (i) Theory and (ii) Clinical/Practical and Oral.

(a) Theory

There shall be four theory papers; one paper out of these shall be on 'Basic Medical Sciences' and another paper on 'Recent Advances'. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical / Practical and Oral examination.

(b) Clinical / Practical and Oral

Examination is conducted for a period of one day (not exceeding two candidates per day), shall consist of carrying out special investigative techniques for Diagnosis and Therapy. M.Ch candidates shall also be examined in surgical procedures.

Oral examination shall be comprehensive to test the candidate's overall knowledge of the subject.

CRITERIA FOR EVALUATION OF M.S./M.D./M.Ch./DM COURSES

S. No.	Description	M.S./M.D./M.Ch./DM Courses
1.	THEORY	
	No. of Theory Papers	4
	Marks for each Theory Paper	100
	Total marks for Theory Paper	400
	Passing Minimum for Theory	200/400 (40% minimum in each paper)
2.	PRACTICAL/CLINICAL	300
3.	Oral	100
	Passing minimum for Practical/Clinical including Oral	200/400
	<u>Passing Minimum:</u> The candidate shall secure not less than 50% marks in each head of passing which shall include (1) Theory – aggregate 50% (In addition, in each Theory paper a candidate has to secure minimum of 40%) (2) Practical/Clinical/Viva - aggregate 50% (3) If any candidate fails even under one head, he/she has to re-appear for both Theory and Practical/Clinical/Viva examination.	

III Post Graduate Diploma

Diploma examination in any subject shall consist of Theory, Practical / Clinical and Oral.

(a) Theory

There shall be three 'Theory' papers; one paper out of these shall be on 'Basic Medical Sciences'. The theory examination will be held well in advance before the clinical examination, so that the answer books can be assessed before the commencement of the Practical / Clinical and Viva-Voce examination.

(b) Clinical and Oral

Clinical examination for the subject in clinical Science shall be conducted to test / aimed at assessing the knowledge and competence of the candidate for undertaking independent work as a Specialist / Teacher for which a candidate shall examine a minimum of one long case and two short cases.

The oral examination shall be thorough and shall aim at assessing the candidate's knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the speciality, which shall form a part of the examination.

The candidate shall secure not less than 50% marks in each head of passing which shall include (1) Theory (2) Practical including clinical and viva voce examinations.

CRITERIA FOR EVALUATION OF P.G. DIPLOMA COURSES

S. No.	Description	P.G. Diploma Courses
1.	THEORY	
	No. of Theory Papers	3
	Marks for each Theory Paper	100
	Total marks for Theory Paper	300
	Passing Minimum for Theory	150/300 (40% minimum in each paper)
2.	PRACTICAL/CLINICAL	200
3.	Oral	100
	Passing minimum for Practical/Clinical including Oral	150/300
	<u>Passing Minimum:</u> The candidate shall secure not less than 50% marks in each head of passing which shall include (1) Theory – aggregate 50% (In addition, in each Theory paper a candidate has to secure minimum of 40%) (2) Practical/Clinical/Viva - aggregate 50% (3) If any candidate fails even under one head, he/she has to re-appear for both Theory and Practical/Clinical/Viva examination.	

P.S.: Practical / Clinical examination is usually conducted for a period of one day only except in the following basic sciences:

Pathology	– 2 days
Anatomy	– 2 days
Biochemistry	– 2 days
Physiology	– 2 days
Pharmacology	– 2 days
Microbiology	– 3 days

P.S.: No of candidates that can be examined in Clinical / Practical / Viva

M.D. / M.S.	-	6 candidates per day
D.M. / M.Ch.	-	2 candidates per day
P.G. Diploma	-	8 candidates per day

APPENDIX-II

POST GRADUATE EXAMINATION

GUIDELINES ON APPOINTMENT OF POST GRADUATE EXAMINERS

1. No person shall be appointed as an internal examiner in any subject unless he / she has three years experience as recognized Post Graduate teacher in the concerned subject. For external examiners, he / she should have minimum six years experience as recognized Post Graduate diploma in the concerned subject.
2. There shall be at least four examiners in each subject at an examination out of which at least 50% (Fifty percent) shall be external examiners. The external examiner who fulfils the condition laid down in clause – 1 above shall ordinarily be invited from another recognised university, from outside the State: provided that in exceptional circumstances examinations may be held with 3 (three) examiners if two of them are external
3. An examiner shall ordinarily be appointed for not more than two consecutive terms.
4. The same set of examiners shall ordinarily be responsible for the written, practical or part of examination.
5. Where there is more than one centre of examination, there shall be Co-ordinator appointed by JIPMER who shall supervise and Co-ordinate the examination on behalf of JIPMER with independent authority.
6. Where there is more than one centre of examination, there shall be Co-ordinator / Convenor / Chairman who shall be the senior most internal Examiner, appointed by JIPMER and shall supervise and Co-ordinate the examination on behalf of JIPMER with independent authority.

SCHEDULE

Specialities / Subjects in which Postgraduate Degree and Diploma can be awarded by JIPMER and the eligibility requirements of candidates for registration for the same.

- A. **BASIC MEDICAL SCIENCES - M.D. (DOCTOR OF MEDICINE)** for which candidates must possess recognised degree of MBBS (or its equivalent recognised degree)
 - 1) Anatomy
 - 2) Biochemistry
 - 3) Microbiology
 - 4) Pathology
 - 5) Pharmacology
 - 6) Physiology
- B. **CLINICAL DISCIPLINES - M.D. (DOCTOR OF MEDICINE)** for which candidates must possess recognised degree of MBBS (or its equivalent recognised degree)

- 1) Anaesthesiology
- 2) Community Medicine
- 3) Dermatology, Venerology and Leprosy
- 4) General Medicine
- 5) Paediatrics
- 6) Psychiatry
- 7) Radio-diagnosis
- 8) Radio-therapy
- 9) Tuberculosis & Respiratory Medicine or Pulmonary Medicine.

C. CLINICAL DISCIPLINES - M.S. (MASTER OF SURGERY) for which candidates must possess recognised degree of MBBS (or its equivalent recognised degree).

- 1) General Surgery
- 2) Obstetrics & Gynecology
- 3) Ophthalmology
- 4) Orthopedics
- 5) Otorhinolaryngology

D. D.M. (DOCTOR OF MEDICINE) for which candidates must possess recognised degree of M.D. (or its equivalent recognised degree) in the subject shown against them.

Sl. No.	Area of Specialisation	Prior Requirement
1.	Cardiology	MD(Medicine) MD (Paediatrics)

E. M.Ch. (MASTER OF CHIRURGIE) for which candidates must possess recognised degree of M.S. (or its equivalent recognised degree) in the subjects shown against them.

Sl. No.	Area of Specialisation	Prior Requirement
1.	Cardio vascular & Thoracic Surgery	MS (Surgery)
2.	Urology	MS (Surgery)

F. DIPLOMAS for which candidates must possess recognised degree of MBBS (or its equivalent recognised degree).

1. Dermatology, Venerology and Leprosy (DDVL)
2. Ophthalmology (D.O.)
3. Orthopedics (D.Ortho.)
4. Paediatrics (D.C.H.)
5. Radio-diagnosis (D.M.R.D.)

BASIC MEDICAL SCIENCES (M.D. Doctor of Medicine)

ANATOMY

COURSE CONTENT

Paper – I	: Regional Anatomy, Gross Anatomy & Surgical Anatomy
Paper – II	: Histology, Histochemistry & histological Techniques
Paper – III	: Embryology & Genetics
Paper – IV	: Neuro Anatomy, Recent advances & Biostatistics & Basic principles of Research

GROSS ANATOMY

Osteology	–	Skeletal connective tissue – cartilage and bone Ossification of bones, appendicular & axial skeleton and skull
Arthrology	–	Movements and mechanisms of joints Joints of upper and lower limbs. Vertebral and thoracic articulations Joints of skull, Temporomandibular joint
Myology	–	Structure and functions of various muscles Muscles of Head & neck, Trunk and limbs
Angiology	–	Vascular patterns, Heart, Vessels of Head, neck, brain, Trunk and limbs. Regional lymph nodes vessels
Neurology	–	Divisions – Central & peripheral, Spinal cord, Brainstem, Cerebellum and Cerebrum
Splanchnology	–	Respiratory, Alimentary, Urogenital & Endocrine.

HISTOLOGY

Cell biology	–	Cell structure, Cell cycle, Cell divisions and differentiation
Histology	–	General histology – Tissues of the body structure and function. Systemic histology – Histology of all organ systems, with function and histogenesis Immune system and cell types involved in defense mechanism. Clinical significance of major histocompatibility complex. Immunohistochemical techniques
Practical	–	Preparation and processing of tissues for histological study Staining – Special stains for identification of various components Histomorphometry Electron micrographs - Identification of cell and cell organelles Museum and Embalming techniques

EMBRYOLOGY & GENETICS

1. General Embryology
2. Systemic Embryology - Stem cell Applications, Cloning & Molecular biology.
Gametogenesis, Fertilization, Implantation,
Early development of embryo and development of various organ systems,
Congenital malformations and molecular basis of congenital malformations.
3. Basics of Medical Genetics, Clinical genetics Genomics and DNA analysis

Human chromosomes – Structure, Aberrations, Syndromes & Molecular Cytogenetics
Gene – Structure, Function, disorders and gene therapy.
Patterns of inheritance, Mutations
Prenatal diagnosis, Genetic Counseling

Practical- Identification of slides of various stages of development of embryo-human/chick/pig. Cell culture, harvesting of chromosomes, identification and interpretation.

NEUROANATOMY

Structure and function of various tracts of spinal cord and its blood supply – arterial and venous drainage with clinical significance.

Parts of brain and its blood supply – arterial and venous drainage with clinical significance.

Cross section of brain at various levels – normal structure and clinical significance

Various neurological disorders – somatic and sensory

Ventricles of brain, CSF secretion and drainage and Barriers of the brain tissue.

Cranial nerves – connections, functions and distribution

Practical

Identification of neurons and nerve fibers – routine and special stains.

Cross section of spinal cord at various levels

Cross section of Parts of Brain stem at various levels.

Cross section of Cerebrum and cerebellum, both coronal and horizontal at different levels for the identification of various nuclei, their structure and function to correlate with various neurological disorders.

STATISTICS

Biostatistics - Basic principles and concepts of biostatistics applied to health sciences

Parametric & Non parametric data, Mean, Median, Mode, Standard deviation, Standard error, Analysis of variance, coefficient correlation, Chi-square test, t-test.

POSTGRADUATE TRAINING PROGRAMME
M.D. Anatomy

FIRST YEAR OF TRAINING

Teaching	Should get involved in teaching of Gross Anatomy/applied to first year MBBS students during dissection hours on all working days	12 hrs /week
	Should get involved in small group teaching session – teaching of bones and microscopic slides of histology – demonstration classes	Osteology 4hrs/week Histology 4hrs/week
Learning	Should be posted in clinical departments like Orthopedics, Plastic surgery, Radio Diagnosis and General surgery as per the guidelines of MCI to acquire surgical anatomy skills and knowledge of clinically oriented problems	one month in each departments
Laboratory Skill	Should assist and guide first year MBBS students in the dissections of the cadaver. Should assist and guide in identification of general & systemic histology slides of various tissues and organs for MBBS students Should acquire and acquaint the knowledge of various types of microscopes their configuration and applications. Should acquaint him/herself with and necessary training in computer operations for data retrieval and power point presentations etc. for teaching & research.	12 hrs /week Histology 4hrs/week
Research	Should get involved in preparation of research protocol for PG dissertation work – selection of problem, literature search, application of methods, selection of material, methods of analysis of data and hypothesis. Discussion with Supervisor/Guides & Co guides	2 hrs/week

SECOND YEAR OF TRAINING

Teaching	Should get involved in teaching of Gross Anatomy/applied to first year MBBS students during dissection hours on all working days	12 hrs /week
	Should get involved in small group teaching session – teaching of bones and microscopic slides of histology – demonstration classes	Osteology 4hrs/week Histology 4hrs/week
	Should be involved in correction work/evaluation process of Periodic Notified Test conducted for the first year MBBS students – both in theory and practical including viva voce.	

Learning	Communication skills and knowledge through seminars and journal clubs	2 hrs /week
Laboratory Skill	<p>In addition to the above said, candidate should acquire the necessary training in</p> <ul style="list-style-type: none"> • embalming of cadavers of all types • tissue processing viz. fixation, dehydration, clearing and embedding • staining – routine hematoxiline and eosine <ul style="list-style-type: none"> – special for epithelium, connective tissue, muscle, gland & nervous tissue • museum technique – mounting of specimens for museum both wet and dry, making of various type of models, injection corrosion cast & plastination techniques. <p><i>Optional (If facilities available)</i> Cytogenetics techniques – cell culture, harvesting and processing blood samples for karyotyping. Various type of banding techniques. Automated karyotyping using software</p>	
Research	<p>Maintenance of work book/log book pertaining to dissertation work undertaken and the same to be documented in electronic format.</p> <p>Discussion with Supervisor/Guides & Co guides</p>	2 hrs/week

THIRD YEAR OF TRAINING

Teaching	Should get involved in teaching of Gross Anatomy/applied to first year MBBS students during dissection hours on all working days	12 hrs /week
	Should get involved in small group teaching session – teaching of bones and microscopic slides of histology – demonstration classes	Osteology 4hrs/week Histology 4hrs/week
	Should be involved in correction work/evaluation process of Periodic Notified Test conducted for the first year MBBS students – both in theory and practicals including viva voce.	
	<p>Should be involved in organizing/delivering lectures for first year MBBS students on selected topics of interest in Gross Anatomy, Human Embryology & Medical Genetics</p> <p>Should get associated/involved in the integrated teaching programmes*.</p> <p>* Programmes like ‘<u>post natal growth and development</u>’ in collaboration with Department of Pediatrics and Preventive Medicine.</p>	12 hrs /week

Learning	Should obtain the necessary skills in delivering lectures through computer assisted teaching – power point presentation as per the guidelines of NTTC.	
Laboratory Skill	<p>Should have equipped appropriately with the guidelines required to undertake and perform embalming procedures.</p> <p>Should be aware of “Anatomy Act”</p> <p>Other Techniques</p> <ul style="list-style-type: none"> tissue processing viz. fixation, dehydration, clearing and embedding staining – routine hematoxiline and eosine <ul style="list-style-type: none"> special for epithelium, connective tissue, muscle, gland & nervous tissue museum technique – injection corrosion cast, resin cast of organs and plastination technique. 	<p>Minimum five cadavers</p> <p>Should submit routine and special stain slides of minimum number of five for each tissue</p> <p>Should submit at least one model of any one among the procedures stated.</p>
Research	<p>Analyze the data of dissertation work and present it comprehensively in the required format</p> <p>Should attend and present the work done on dissertation in Scientific bodies – either in the regional or at national conferences.</p> <p>At the end of the third year, the candidate should have published the data of his/her dissertation work in an indexed journal.</p> <p>Should be aware of ethical issues related to human and animal investigative procedures.</p> <p>Discussion with Supervisor/Guides & Co guides to achieve the above</p>	<p>In the scheduled time</p> <p>Minimum one paper</p> <p>2 hrs/week</p>

SCHEME FOR PRACTICAL EXAMINATION –DAY I

Forenoon:

Dissection Examination

Duration: 3 hours.

Marks: 150

Model Question:

- Dissect out the contents of the Orbit and trace the connections of ciliary ganglion

Dissection Skill	:	75 marks
Discussion	:	25 marks
- Dissect and display the distribution of superficial peroneal nerve on dorsum of foot.

Dissection Skill	:	30 marks
Discussion	:	20 marks

Afternoon:

HISTOLOGY

Duration: 3 hours.

Marks: 150

Spotters (20 slides)	:	40 marks
Discussion (5 slides)	:	60 marks
Tissue Processing & Microtomy	:	50 marks

SCHEME FOR ORAL EXAMINATION –DAY II

Duration: 3 hour.		Marks: 100
Dissected body/Parts & Organs	:	30 marks
Bones & Joints	:	15 marks
Embryology Specimens & Models	:	10 marks
Surface Anatomy	:	5 marks
Radiological Anatomy (X rays, MRI & CT)	:	5 marks
Anthropometry	:	5 marks
Viva-Voce on Dissertation = 15 Minutes.	:	15 marks
Pedagogy – Micro Teaching	:	15 marks

GUIDELINES FOR QUESTION PAPER SETTERS:

1. The question may be set strictly according to the course content which has been provided in a classified manner for each paper.
2. Each paper should have three questions. The first two questions should be of long answer type and the third question with five components, which will be of short answer type.
3. At least one of the questions may be of problem solving type.

The model Question paper has been provided for reference.

MODEL QUESTION PAPERS

M.D. DEGREE EXAMINATION IN ANATOMY

PAPER –I : GROSS ANATOMY & APPLIED ANATOMY

Time : 3 hours

Maximum Marks : 100

(The answers to be illustrated with suitable diagram)

1. Describe the fibrous skeleton of heart and discuss its applied significance.
(25 marks)
2. Describe the position function and surgical relevance of perineal muscles in females.
(25 marks)

3. Write briefly on : (5 x 10 = 50 marks)
- a) Scapulo-humeral rhythm.
 - b) Vascular segmentation of Liver
 - c) Pharyngeal constrictors.
 - d) Neck shaft angle and blood supply of femur
 - e) Sub diaphragmatic spaces

M.D. DEGREE EXAMINATION IN ANATOMY
PAPER – II : HISTOLOGY, HISTOCHEMISTRY & HISTOLOGICAL
TECHNIQUES

Time : 3 hours

Maximum Marks : 100

(The answers to be illustrated with suitable diagram)

1. Describe and discuss the ultra structure of Retina. (25 marks)
2. Describe and discuss the methods involved in Immunohistochemistry. (25 marks)
3. Write briefly on : (5 x 10 = 50 marks)
 - a) Ultra structure of conducting tissues of heart.
 - b) Cell surface receptors.
 - c) Diagnostic applications of enzyme histochemical technique.
 - d) Histomorphometry
 - e) Fluorescence microscopy

M.D. DEGREE EXAMINATION IN ANATOMY
PAPER – III : EMBRYOLOGY & GENETICS

Time : 3 hours

Maximum Marks : 100

(The answers to be illustrated with suitable diagram)

1. Describe the rotation of mid gut in normal conditions and discuss the congenital anomalies associated in different types of errors of rotation. (25 marks)
2. Discuss 'X chromosome inactivation' and its clinical significance. Add a note on methylation assay. (25 marks)
3. Write briefly on : (5 x 10 = 50 marks)
 - a) Genetic engineering.
 - b) Ectopic thyroid gland and thyroglossal cyst
 - c) Stem cell isolation and application.
 - d) Congenital anomalies of Uterus and Vagina
 - e) Steps involved in in-vitro fertilisation

M.D. DEGREE EXAMINATION IN ANATOMY
PAPER –IV :
NEURO ANATOMY, RECENT ADVANCES IN ANATOMY
& BASIC PRINCIPLES OF RESEARCH

Time : 3 hours

Maximum Marks : 100

(The answers to be illustrated with suitable diagrams, charts & graphs)

1. Describe the structure, functions and connections of Lateral Geniculate body.
Mention its arterial supply. (25 marks)
2. Describe sources of human stem cells. Mention its therapeutic relevance and ethical issues. (25 marks)
3. Write briefly on : (5 x 10 = 50 marks)
 - a) Selection of an appropriate statistical test for a Case Control study
 - b) Methods available for the literature search in research.
 - c) Reticular formation in brain stem.
 - d) Afferent connections of cerebellum.
 - e) Arterial supply to basal nuclei.

TEXT BOOKS RECOMMENDED

	Title	Author
Gross Anatomy	Grays Anatomy 39th Ed	
	Cunningham's manual of Practical Anatomy (in 3 volumes)	
	Clinically oriented Anatomy	Moore & Dalley
	Last's Anatomy 11th	Sinnathamby
	Surgical Anatomy	McGregor
	Clinical Anatomy by Regions	Richard Snell
	Grants Method of Anatomy, 11th Edition	Basmajian
	Anatomy for Surgeons (in 3 volumes)	W.Henry Hollinshed
Histology	Wheater Functional Histology 5thEd	Young's
	Basic Histology Text & Atlas, 10th Edition	Junqueira
	Cell biology & Histology 5th	Gartner
	Histology	Hams
	Di Fiors Atlas of Histology	
Embryology		
	Medical embryology	Jan Langman
	Developing Human	Moore
	Before we are born: Essentials of Embryology & Birth Defects. 6th Edition	Moore
	Human Embryology	Hamilton, Boyd & Mossman
Neuro Anatomy		
	Neuro anatomy	Carpenter
	Clinical Neuro Anatomy 6th Ed	Snell
Genetics	Genetics in Medicine 6thEd	Thompson & Thompson
	Emery's Elements of Medical Genetics, 11th Ed	Mueller
	Medical Genetics 3rd Ed	Jorde

List of Journal recommended for seminars & Journal Club

S.No.	Name of journal
1.	Journal of Anatomy
2.	Anatomical Record
3.	Developmental Dynamics
4.	Cells, Tissue and Organs (Acta Anatomica)
5.	Biology of Reproduction
6.	Genetical Research
7.	Journal of Pineal Research
8.	Mutation research & Environmental mutagenesis
9.	American Journal of Medical Genetics
10.	Journal of Medical Genetics

BIOCHEMISTRY

GOAL

The goals of post-graduate education in Biochemistry is to enable a student to conceptualize and explain biochemical events of life processes in health and disease and apply biochemical knowledge and skills for problem solving in clinical situations and in scientific research to help further understanding of life processes at the molecular level.

OBJECTIVES

KNOWLEDGE:

At the end of three year training in Biochemistry, the MD student should be able to describe and explain concepts and principles of biochemical processes related to the human system.

1. Apply the principles of Biochemistry to explain molecular processes in health and disease states in clinical situations.
2. Apply basic principles of Biostatistics for research work.

SKILLS

At the end of three year training in Biochemistry, the MD student should be able to:

1. Perform biochemical laboratory investigations and experiments relevant to clinical management and biochemical research.
2. Analyze, interpret and evaluate laboratory data.
3. Rationalize the application in clinical management and experimental research.
4. Organize a laboratory set up to deliver optimum investigative support for patient care services.
5. Plan and conduct lectures, practical demonstrations, tutorial classes and small group discussion on various biochemical topics for undergraduate students of medical and Para-medical courses.
6. Be familiar with literature search and computer skills.
7. Critically review and comment on research papers and make oral presentations.
8. Prepare research protocols, conduct experimental studies analyze and solve clinical and experimental problems.

COURSE CONTENT:

- I. Physical and organic aspects of biochemistry, Biostatistics and General Principles of biochemical techniques.
- II. Cell and Molecular biology, Endocrinology and Immunology.
- III. Enzymology, Macro and Micronutrients, Intermediary metabolism, Inborn errors of metabolism, Human nutrition.
- IV. Clinical biochemistry, Laboratory management and Recent advances in Biochemistry

I. (A) PHYSICAL AND ORGANIC ASPECTS OF BIOCHEMISTRY

Electrolytic dissociation, mass law, acids, bases, buffers, indicators and pH and their applied aspects.

1. Surface tension, osmosis, viscosity, diffusion colloidal system, membrane phenomena, adsorption, Donnan equilibrium and their applications in biological system.
2. Principles of isolation and purification of biomolecules.

3. Ribose, Xylose, glucose, mannose, galactose, fructose, Deoxy sugars, amino sugars, uronic acids, lactose, maltose, sucrose starch, insulin, glycogen, cellulose, glycoaminoglycans, Blood group Antigens – Basic chemistry, Structure function relationships.
4. Saturated and unsaturated fatty acids, their derivatives, triacylglycerols, phospholipids, glycolipids, sterols, lipoproteins –Basic chemistry, structure function relationships.
5. Amino acids, peptides, polypeptides, hemoglobins, immunoglobins, collagen and proteoglycans, levels of organization of proteins with reference to insulin, hemoglobin and collagen – Basic chemistry, structure function relationships.
6. Purines, pyrimidines, their derivatives, nucleic acids, nucleotides and poly nucleotides – Basic chemistry, structure function relationships.

(NOTE: Only the description of accepted structures of common biomolecules is required. While structure, physical and chemical properties of the following are included structural elucidation is **NOT** required.)

I. (B) BIOSTATISTICS:

Basic principles and concepts of biostatistics as applied to health sciences - basic concepts of probability, mean, standard deviation, binomial expression, Analysis of variance, Co-efficient of correlation, Chi square test, Parametric data, Non parametric data, Regression Analysis, ROC curve, evaluation of a new diagnostic procedure etc.,

I. (C) PRINCIPLES OF BIOCHEMICAL TECHNIQUES.

1. Principles, types and applications of photometry- colorimetry, spectrophotometry, Reflectance, flame photometry, absorption spectroscopy and fluorimetry, mass spectrometry, fluorescence and Chemiluminescence, spectroscopy, etc.
2. Ion selective electrodes.
3. Principles, types and applications of Centrifugation.
4. Principles, types and applications of electrophoresis (incl. isoelectric focusing, isotachopheresis, immunoelectrophoresis in details also).
5. Radioactivity, isotopes, detection and measurement of radioactivity, tracer techniques, counters, radiation hazards and their prevention, radioimmunoassay, radiation in food preservation.
6. Principles and applications of chromatography (paper, column, affinity, ion exchange, adsorption and partition, GLC, TLC, HPLC) Gel filtration.

II. (A) CELL BIOLOGY:

Structure- function of cell, cytoskeleton, nucleus, nucleolus, mitochondria and plasmic reticulum, ribosome, golgi complex, lysosomes, plasma membranes, gap junctions, cell division – mitosis and meiosis, cell cycle.

1. Cell fractionation and differentiation of cellular and sub cellular organelles, Cell sorting.
2. Biomembranes, receptors, membrane bound biomolecules, mechanisms of transport across the cell membranes.
3. Cell culture – Principles and applications.

II. (B) MOLECULAR BIOLOGY AND HUMAN GENTICS:

1. Structural organization of DNA and RNA, Replication of DNA, mutation and mechanisms of DNA repair, Transcription, its regulation and post-transcriptional processing, Translation, its regulation and posttranslational modifications; regulation and expression of genes, Genetic engineering- Various processes and techniques, Blotting techniques, Recombinant DNA technology, PCR, DNA sequencing, Cloning, Monoclonal antibodies, Concepts of genomics, proteomics and array techniques, Basic concepts in bioinformatics. Role of reverse transcriptase, Gene therapy, Apoptosis, Basics of inheritance of Genetic disorders; Molecular basis of cancer, Tumour Markers.
2. Mechanism of action of cytotoxic drugs and antibiotics.
Concept of genetic counseling, medical ethics.

II. (C) ENDOCRINOLOGY:

1. Classification and general mechanism of action of hormones. Biogenesis, secretion, regulation, transport, mode of action and disorders of the following – hypothalamic peptides, adenohypophyseal and neurohypophyseal hormones, thyroid hormones, parathyroid hormones, calcitonin, pancreatic hormones, adenocortical and medullary hormones, gonadal hormones, gastrointestinal hormones, opioid peptides, Para hormones. Endorphins and enkephalins.
2. Biochemistry of conception, reproduction and contraception.

II. (D) IMMUNOLOGY

1. Concepts, mechanisms and role of Innate and acquired immunity, humoral and cell mediated immunity, antigen and antibodies, MHC.
2. Recognition of antigens: Primary interaction, antigen processing and presentation
Immune response : Lymphocyte maturation, activation of T and B lymphocytes, cytokines, regulation of immune response, immunologic tolerance, hypersensitivity, autoimmunity and autoimmune diseases, immunodeficiency, tumor immunity, transplantation, immunosuppression and immunopotentialization including vaccination

III. (A) ENZYMOLOGY:

1. General properties, classification and nomenclature, coenzymes; Mechanism of enzyme activity, K_m value, Enzyme kinetics, Equilibrium, Thermodynamics of Enzyme catalysed reactions; Factors influencing enzyme kinetics, Enzyme inhibition, Regulation of enzyme action, Isoenzymes, Clinical enzymology,
2. Biological oxidation, Electron transport chain, Oxidative phosphorylation and Bioenergetics.
3. Metabolism of Xenobiotics, Free Radical Biology, Environmental Biochemistry.

III. (B) INTERMEDIARY METABOLISM:

1. Digestion and absorption of food and other nutrients.
2. Methods of studying intermediary metabolism.
3. Intermediary metabolism of carbohydrates, lipids and amino acids,
4. Metabolism of nucleic acids and heme.
5. Muscular contraction, nerve conduction, coagulation of blood.
6. Metabolism in specialized tissues like erythrocytes, lens, nervous tissue etc.
7. Metabolic interrelationships and metabolism in starvation and well-fed state, Role of hormones in regulation of metabolism.

III. (C) MICRONUTRIENTS:

1. Vitamins - structure, sources, metabolism, biochemical role, RDA, deficiency manifestations of vitamins, hyper vitaminoses, and antivitaminases.
2. Mineral metabolism Sources, Metabolism, Functions, Daily requirement / RDA, deficiency manifestation, toxicity of minerals and trace elements.

III. (D) INBORN ERRORS OF METABOLISM

Inborn errors of carbohydrate, lipid, amino acid, nucleic acids, mineral metabolism and Hemoglobin metabolism; Biochemical basis of Management of disorders.

III. (E) HUMAN NUTRITION

Principal food constituents, general nutritional requirements, energy requirements, biological value of proteins, specific dynamic action, balanced diet, diet formulation in health and disease, mixed diet, nutritional supplements, food toxins and additives, parenteral nutrition, disorders of nutrition, obesity, protein and protein energy - malnutrition, dietary fibers, laboratory diagnosis of nutritional disorders.

IV. (A) CLINICAL BIOCHEMISTRY

Definition, types, clinical features, biochemical basis of disease, complications and laboratory diagnoses of

- a) Diabetes mellitus, Hypoglycemia, Ketosis, Glycogenoses, Galactosemia, Hyper lipoproteinemias, Fatty liver, Alcoholic liver disease, Hepatic failure, Malabsorption syndrome, Malnutrition, Aminoaciduria, Hemoglobinopathies, Immunoglobulinopathies, Porphyrias,
 - b) Atherosclerosis, laboratory diagnosis of Myocardial Infarction.
 - c) Digestive systems and related organs; Gastric and pancreatic function tests, hepatobiliary function tests, Jaundice.
 - d) Endocrines; Thyroid function tests, Adrenal and Gonadal function tests.
1. Acid base balance, fluid and electrolyte balance and related disorders, Renal function tests, principles of dialysis.
 2. CSF in health and disease.
 3. Pleural and peritoneal fluid analysis.
 4. Diseases of central nervous system, Alzheimer's disease.
 5. Immunological disorders, diseases of clotting, Biochemistry of AIDS, Prion Diseases.
 6. Laboratory workup of a patient with any organ disease.

(B) LAB MANAGEMENT

- (1) METHOD EVALUATION: Analytical goals, precision and accuracy, bias, sensitivity and specificity, selection of method and evaluation.
- (2) TOTAL QUALITY MANAGEMENT: Fundamental concepts, control of preanalytical, analytical and post analytical variables, internal and external quality control programs, Accreditation programmes.
- (3) AUTOMATION: Definition, instrumental concepts, types of analyzers, Trends in automation in Biochemistry laboratory Laboratory information systems.

IV. (C) RECENT ADVANCES IN BIOCHEMISTRY.

Recent biochemical concepts in health and disease, newer analytical methods - As discussed in recent/current Medical/Biochemical journals and recent editions of text books of Biochemistry.

PRACTICALS

Course content

1. General reactions of carbohydrates, lipids, proteins and amino acids, hemoglobin and its derivatives.
2. Chromatographic separation of sugars, amino acids, lipids and proteins.
3. Analysis of common food stuffs for Carbohydrates, Proteins, Lipids, Vitamins and Minerals.
4. Blood Glucose estimation and GTT.
5. Estimation of cholesterol and triacylglycerol in plasma.
6. Estimation of Ca^{++} , inorganic phosphate, electrolytes, pH and blood gas analysis.
7. Estimation of urea, creatinine, uric acid and clearance tests.
8. Estimation of bilirubins, total proteins, albumin, serum enzymes like AST, ALT, Alkaline phosphatase, Prothrombin time determination as hepatobiliary function tests.
9. Estimation of copper, ceruloplasmin activity, lithium, iron, iron binding capacity, magnesium in plasma/serum.
10. Thyroid function tests like T3, T4, and TSH Assays.
11. Complete urinalysis for normal and abnormal constituents.
12. Analyses of gastric juice.
13. Analysis of renal and biliary calculi.
14. Estimation of α -amylase, acid phosphatase and CK activities in serum.
15. Separation of isoenzymes by polyacrylamide gel electrophoresis.
16. Estimation of ethyl alcohol in urine and blood.
17. CSF analysis. Analyses of pleural and peritoneal fluids.
18. Electrophoretic separation of - plasma/serum total proteins and Lipoproteins and Hemoglobins.
19. Estimation of glycated hemoglobin.
20. Use of techniques/instrumentation:-
ELISA, Immunodiffusion, Spectrophotometry, Spectrofluorometric analysis, Western blotting, Southern blotting, PCR, Automated Clinical Chemistry Analysers.
21. Interpretation of laboratory data on biochemical parameters and correlations with clinical profile.
22. Planning and organization of biochemical experiments in the laboratory.

TEACHING LEARNING METHODS

The following are the TL methods suggested to be adopted during the MD biochemistry course.

1. Post graduate Interactive Lectures, Presentations, Seminars, Group discussions, Clinical Case discussions -Three to four a week
2. Journal club meetings- Departmental and Inter departmental, Once a week.
3. Practical Exercises- at least twice a week.
4. Micro Teaching sessions.
5. Dissertation under guidance of Guide (and Co-guide if any).
6. Specialised Training in various sections of Clinical Biochemistry laboratories under supervision - Two months a year.
7. Participation in UG laboratory exercises and Tutorials as a team member under supervision.
8. Assignments.

Evaluation

1. Formative Evaluation

There shall be formative evaluation of the candidate in both theoretical and practical aspects of Biochemistry – at least once a year. These will help the candidate in improvement of his knowledge, skills and attitude.

Practical examination:

Practical examination will be held over two days and the total marks will be 300. Practical examination will be on (a) case oriented and clinical investigative approach; (b) general aspects of biochemistry techniques.

This includes a clinical exercise on presentation of a case history and general examination of a patient, after which the candidate is asked to offer a provisional diagnosis of the case and to suggest relevant laboratory investigations to diagnose the disease justify or refute the therapeutic approach.

The candidate will be asked to perform laboratory experiments and estimations and report results. This will be followed by detailed discussion on the results, procedures and biochemical aspects of the disease, rationale of therapy, interpretation of values and other related matters.

Allocation of marks:	Marks	Percentages
Case discussion	45	15%
One quantitative investigation with standardization graph	75	25%
Two other quantitative estimations	75	25%
One common technique performed (E.g. serum protein electrophoresis to be assessed)	75	25%
One minor investigation-Analysis, (E.g. Analytes in urine, fluids etc.)	30	10%

	300	

Oral examination / Viva voce

80 Marks

Viva voce shall comprise theoretical and practical knowledge of the candidate related to biochemistry, wherein in depth knowledge can be assessed. This includes the discussion on case presentation as well as the dissertation work carried out by the candidate.

Pedagogy:

20 Marks

The candidate will be given a choice of at least two topics in Biochemistry on day one of the examination of which one topic will have to be presented by the candidate to the examiners in the form of class room teaching for a period of 10 – 15 minutes only.

JOURNALS RECOMMENDED FOR M.D BIOCHEMISTRY COURSE

1. Clinica Chimica Acta
2. British Journal of Nutrition
3. American Journal Nutrition
4. Journal of Lipid Research
5. Clinical Chemistry
6. Clinical Biochemistry
7. Journal of Laboratory Investigation
8. Biochemical Journal
9. Metabolism
10. Nature
11. Nature Medicine

12. Science
13. Lancet
14. Journal of Endocrinology
15. Trends in Biochemical Sciences
16. Federation of American Societies for Experimental Biology (FASEB)
17. Annual reviews of Biochemistry.
18. Immunology
19. Indian Journal Clinical Chemistry
20. Indian Journal of Biophysics and Biochemistry

LIST OF BOOKS - RECOMMENDED FOR MD CURRICULUM

(All the books are to be recent editions).

1. Tietz – Textbook of Clinical Chemistry and Molecular Diagnostics. Burtis, Ashwood, Bruns.
2. Harper's Illustrated Biochemistry. Robert K. Murray.
3. Lehninger's Principles of Biochemistry. David L. Nelson and Michael M. Cox.
4. Practical Biochemistry – Principles and Techniques. Keith Wilson and John Walker.
5. Biochemistry. Lubert Stryer and Jeremy M. Berg.
6. Metabolic and Molecular Basis of Inherited Diseases. Scriver et al.
7. Devlin's Text Book of Biochemistry with Clinical Correlations. Parslow GP, Wood EJ.
8. Biochemistry. Donald Voet and Judith Voet.
9. William's Text book of Endocrinology. P. Reed Larsen, Henry M. Kronenberg, Shlomo Melmed, and Kenneth S. Polonsky
10. Harrison's Principles of Internal Medicine. Dennis L. Kasper, Eugene Braunwald, Stephen Hauser, Dan Longo, J. Larry Jameson, Anthony S.
11. Molecular Cell Biology – Lodish H, Berk A, Baltimore D.
12. Kubly Immunology. Thomas J. Kindt, Barbara A. Osborne, Richard A. Goldsby
13. Principles and Techniques of Biochemistry and Molecular Biology. Keith Wilson, John Walker.
14. Clinical Diagnosis and Management by Laboratory Methods. Todd, Stanford, Davidson, John Bernhard.
15. Modern Nutrition in Health and Disease. Maurice E. Shills, Moshe Shike.
16. Practical Physiological Chemistry. Hawk and Philip B.
17. Enzymes, Biochemistry, Biotechnology, Clinical Chemistry. Trevor Palmer.
18. Methods in Enzymology. M. Dickson and EC Webb.
19. Modern Experimental Biochemistry. Rodney Boyer.
20. Human Nutrition and dietetics. Leybourne Stanley, Patrick Davidson, R. Passmore, MA Eastwood.
21. Practical Biochemistry. Harold Varley.
22. Cell and Molecular biology. De Robertis.
23. Methods in Biostatistics. B.K. Mahajan.
24. Practical Immunology. Talvar.
25. Text book of Biochemistry. West and Todd.
26. Comparative Biochemistry and Physiology. Reaven.
27. Essentials of Clinical Immunology. Chappel.

MODEL QUESTION PAPERS

M.D. DEGREE EXAMINATION BRANCH-XIII: BIOCHEMISTRY

PAPER-I

Physical and Organic aspects of Biochemistry, Biostatistics and general principles of biochemical techniques.

Time: 3 hours.

Max. Marks: 100

1. Describe the various levels of organization of adult hemoglobin at the molecular level. Explain the molecular events taking place during oxygenation. How is HbA better suited than HbF for oxygen transport after birth? (10+10+5)
2. Describe the various uses of radio isotopes in biochemical investigations. Explain the measurement of radioactivity in a laboratory. (20+5)
3. Write briefly on : (5 X 10)
 - a. principles and applications of affinity chromatography
 - b. Blood group antigens.
 - c. Isolation and purification of proteins.
 - d. Regression analysis.
 - e. Organization of proteoglycans.

M.D. DEGREE EXAMINATION BRANCH-XIII: BIOCHEMISTRY

PAPER-II

Cell and Molecular Biology, Endocrinology and Immunology.

Time: 3 hours.

Max. Marks: 100

1. Describe the mechanisms of transport across cell membranes. Add a note on Na⁺/K⁺ ATPase. (20 + 5)
2. Describe the various mechanisms involved in regulation of gene expression with suitable examples. Add a note on drugs which inhibit protein synthesis. (20 + 5)
3. Write briefly on: (5 X 10)
 - a) Mechanism of action of insulin.
 - b) Class switching of Immunoglobins.
 - c) Endorphins.
 - d) Human Leukocyte Antigens (HLA).
 - e) Gut hormones.

M.D. DEGREE EXAMINATION BRANCH-XIII: BIOCHEMISTRY

PAPER-III

Enzymology, macro and micronutrients, intermediary metabolism, inborn errors of metabolism, human nutrition.

Time: 3 hours.

Max. Marks: 100

1. Describe the various metabolic processes which are activated during starvation. (25)
2. Explain the various molecular mechanisms of regulation of enzymes in the body. (25)
3. Write briefly on: (5 X 10)
 - a. Glycogen storage diseases – Hepatic types.
 - b. Functional importance of copper.
 - c. Chain breaking antioxidants.
 - d. Use of enzyme inhibitors as drugs.
 - e. Oxidation of Phytanic acid.

M.D. DEGREE EXAMINATION BRANCH-XIII: BIOCHEMISTRY

PAPER-IV

Clinical Biochemistry, laboratory Management and recent advances in Biochemistry

Time: 3 hours.

Max. Marks: 100

1. Describe the various biochemical tests performed in the differential diagnoses of jaundice. (25)
2. Describe the laboratory diagnosis of Diabetes Mellitus. Explain the basis of chronic complications of Diabetes Mellitus. (20 + 5)
3. Write briefly on:
 - a. Analysis of renal calculi.
 - b. Prion disease.
 - c. Biochemistry of Alzheimer's disease.
 - d. Tests to assess fetal maturity.
 - e. Levy-Jenning's curve.

MICROBIOLOGY

Preamble

The main aim of this course is to train students of Medicine in the field of medical Microbiology. Theoretical and practical training is imparted to the candidates in subspecialties viz., Bacteriology, Virology, Parasitology, Immunology and Mycology so that they can participate in good patient care and prevention of infectious diseases in the community. They are introduced to basic research methodology so that they can plan and conduct fundamental and applied research. They are also imparted training in teaching methods in the subject which may enable them to take up teaching assignments in medical colleges/institutes.

Objectives

At the end of the course the student will be able to

1. Establish good "laboratory medicine" in hospital and community in the field of Bacteriology, Virology, Parasitology, Immunology and Mycology.
2. Plan, execute and evaluate teaching assignments of Microbiology in medical college.
3. Undergo specialization in any of the above subspecialties.
4. Plan, execute and analyse applied and fundamental research in various branches of microbiology involving other related disciplines for health care.

Course content (Syllabus)

Paper I	:	General Microbiology and Immunology
Paper II	:	Systematic Bacteriology and Mycology
Paper III	:	Virology and Parasitology
Paper IV	:	Applied microbiology and recent advances

General Microbiology

1. History and pioneers in Microbiology
2. Microscopy
3. Bio-safety including universal precautions
4. Morphology of bacteria and other microorganisms
5. Nomenclature and classification of microbes
6. Growth and nutrition of bacteria
7. Bacterial metabolism
8. Sterilization and disinfection
9. Bacterial toxins
10. Bacterial antagonism: Bacteriocins
11. Bacterial genetics and bacteriophages
12. Molecular genetics relevant for medical microbiology including gene cloning
13. Antibacterial substances used in the treatment of infections and drug resistance in bacteria
14. Bacterial ecology - Normal flora of the human body
 - Hospital environment
 - Air, water and milk
15. Host parasite relationship
16. Quality assurance, quality control and accreditation in microbiology

Immunology

1. The immune system
2. Innate and acquired immunity
3. Cells involved in immune response
4. Antigens
5. Immunoglobulins
6. Complement
7. Antigen and antibody reactions
8. Hypersensitivity
9. Cell mediated immunity
10. Immunodeficiency
11. Autoimmunity
12. Immune tolerance
13. Transplantation immunity
14. Tumor immunity
15. Prophylaxis and immunotherapy
16. Measurement of immunity
17. Immunological techniques
18. Immunopotential and immunomodulation

Systematic Bacteriology

1. Isolation, description and identification of bacteria
2. Gram positive cocci of medical importance including *Staphylococcus*, *Micrococcus*, *Streptococcus*, anaerobic cocci, etc.
3. Gram negative cocci of medical importance including *Neisseria*, *Branhamella*, *Moraxella*, etc.
4. Gram positive bacilli of medical importance including *Lactobacillus*, Coryneform organisms, *Bacillus* & aerobic bacilli, Actinomyces, Nocardia, Actinobacillus and other Actinomycetales, *Erysipelothrix*, *Listeria*, *Clostridium* and other spore bearing anaerobic bacilli, etc.
5. Gram negative bacilli of medical importance including *Vibrio*, *Aeromonas*, *Pleisiomonas*, *Haemophilus*, *Bordetella*, *Brucella*, *Gardnerella*, *Pseudomonas* & other non-fermenters, *Pasturella*, *Francisella*, *Bacteroides*, *Fusobacterium*, *Leptotrichia*, and other anaerobic Gram negative bacilli, etc.
6. *Helicobacter*, *Campylobacter* and *Spirillum*
7. Mycobacteria
8. The Enterobacteriaceae
9. The Spirochaetes
10. *Chlamydiae*
11. *Rickettsia*, *Coxiella*, *Bartonella*
12. Mycoplasmatales: *Mycoplasma*, *Ureaplasma*, *Acholeplasma*
13. Miscellaneous bacteria

Virology

1. The nature of viruses
2. Classification of viruses
3. Morphology: virus structure
4. Virus replication
5. The genetics of viruses
6. The pathogenicity of viruses
7. Epidemiology of viral infections

8. Laboratory diagnosis of viral infections
9. Vaccines and anti-viral drugs
10. Bacteriophages
11. RNA viruses of medical importance including, Enteroviruses, Togaviridae, Flaviviruses, Orthomyxoviruses, Paramyxoviruses, Reoviridae, Rhabdoviridae, Arenaviridae, Bunyaviridae, Retroviridae, Filoviruses, Human immunodeficiency virus, Arboviruses, Coronaviridae, Calciviruses, etc.
12. DNA viruses of medical importance including Poxviridae, Herpesviridae, Adenoviridae, Hepadnavirus, Papova and Parvoviruses, etc.
13. Slow viruses and Prions
14. Human immunodeficiency viruses
15. Oncogenic viruses
16. Viruses of gastroenteritis
17. Miscellaneous and newer viruses
18. Viroids

Parasitology

1. General characteristics and classification of parasites
2. Pathogenesis and pathology of parasitic infections.
3. Protozoan parasites of medical importance including *Entamoeba*, *Giardia*, *Balantidium coli*, *Trichomonas*, intestinal coccidian parasites, *Toxoplasma*, *Sarcocystis*, blood parasites including *Plasmodium*, *Leishmania*, *Trypanosoma*.
4. Cestodes and Trematodes of medical importance including, *Diphyllobothrium latum*, *Spirometra*, *Taenia*, *Echinococcus*, *Hymenolepis*, *Dipylidium caninum*, *Schistosoma*, *Fasciola*, *Fasciolopsis buski*, *Paragonimus*, *Clonorchis*, other trematodes.
5. Nematodes of medical importance including, nematodes such as *Trichuris*, *Trichinella*, *Capillaria*, *Strongyloides*, *Ancylostoma*, *Necator*, *Enterobius*, *Ascaris*, *Toxocara*, agents causing larva migrans, tissue nematodes including, Filarial worms, *Dracunculus medinensis*.
6. Ectoparasites: Common arthropods and other vectors viz. Mosquito, Sandfly, Ticks, Mite, Cyclops
7. Common laboratory methods including common culture methods in Parasitology.
8. Antiparasitic agents.
9. Immunity mechanisms in parasitic infections.

MYCOLOGY

1. The morphology and reproduction of fungi and antimycotic agents
2. Classification of fungi
3. Contaminant and opportunistic fungi including *Candida*, *Cryptococcus*, *Pneumocystis*, *Aspergillus*, Zygomycetes, *Penicillium marneffeii*.
4. Superficial mycotic fungi including Dermatophytes.
5. Fungi causing subcutaneous mycoses including mycetoma and rhinosporidiosis.
6. Fungi causing systemic infections including *Histoplasma*, *Blastomyces*, *Coccidioides*, *Paracoccidioides*, *Sporothrix*.
7. Keratomycosis and otomycosis.
8. Fungal toxicosis.
9. Antifungal agents and *in-vitro* antifungal susceptibility testing.

MICROBIOLOGY APPLIED TO TROPICAL MEDICINE AND PATHOLOGY

1. Epidemiology of infectious diseases
2. Hospital acquired infections

3. Hospital waste management
4. Molecular genetics as applicable to Microbiology
5. Vaccinology: principle, methods of preparation, administration of vaccines
6. Investigation of an infectious outbreak including infections of various organs and systems of human body viz. sexually transmitted diseases, respiratory tract infections, urinary tract infections, central nervous system infections, congenital infections, reproductive tract infections, gastrointestinal infections, hepatitis, pyrexia of unknown origin, infections of eye, ear & nose, septicemia, endocarditis, haemorrhagic fever, etc.
7. Emerging and re-emerging infections.
8. Automation in microbiology.
9. Statistical analysis of microbiological data and research methodology.
10. Care & handling of animals and ethics

Skills for Postgraduate students in MD Microbiology

Bacteriology- Must Acquire

1. Preparation and pouring of media-nutrient agar, blood agar, MacConkey agar, sugars, serum sugars, Kligler Iron agar, Robertson's cooked meat, Lowenstein-Jensen's, Sabouraud's dextrose
2. Operation of autoclave, hot air oven, distillation plant, filters like Seitz and membrane and sterility tests
3. Washing and sterilization of glass wares (plugging and packing)
4. Preparation of reagents-oxidase, Kovac's, etc
5. Disposal of contaminated materials like cultures
6. Testing of disinfectants-phenol coefficient and "in use" tests
7. Quality control of media, reagents, etc
8. Aseptic practices in laboratory and safety precautions
9. Care and maintenance of common laboratory equipments like water bath, centrifuge, refrigerator, incubator, thermocycler, automated BACTEC system, microcentrifuge, ELISA system etc.
10. Preparation of antibiotic discs: performance antibiotic sensitivity tests by Kirby Bauer, Stokes method, etc. Estimation of minimal inhibitory/bactericidal concentration by tube/plate dilution methods
11. Tests for β -lactamases, ESBL, AmpC, Metallobetalactamases
12. Collection of specimens for microbiological investigations on blood, urine, throat swab, rectal swab, stool, pus (swabs), OT specimens
13. Identification of bacteria of medical importance up to species level (except anaerobes which could be up to generic level)
14. Techniques of anaerobiosis, anaerobic jars, evacuation and filling with CO₂ and H₂, automated anaerobic system.
15. Preparation of stains viz. Grams, Albert, capsule, spores, Ziehl-Neelsen etc. and performance of staining
16. Care and operation of microscopes viz. light, dark ground, phase contrast and fluorescence microscopes
17. Care and breeding of laboratory animals viz. mice, rats, guinea pigs and rabbits
18. Bleeding techniques from animals including sheep
19. Inoculation of infective material by different routes in the animals
20. Preparation, examination and interpretation of direct smears from clinical specimens viz. sputum for AFB-ZN, auramine O, slit smears for *M.leprae* for ZN staining, conjunctival smears for Chlamydia by Giemsa/Iodine
21. Quantitative analysis of urine by pour plate method and semiquantitative analysis by standard loop test for finding significant bacteriuria

22. Plating of clinical specimens on media for isolation, purification, identification and quantification purposes
23. Tests for motility: hanging drop, Craigie's tube, dark ground examination for spirochaetes- Treponema and Leptospira
24. In-vitro toxicity tests-Elek's test, Nagler's reaction
25. Skin tests like Mantoux, Lepromin etc.
26. Special tests-bile solubility, chick cell agglutination, sheep cell haemolysis, niacin and catalase tests for Mycobacterium, satellitism, CAMP test, catalase, slide agglutination tests
27. Bacteriological test for air, water and milk.
28. Maintenance and preservation of bacterial cultures.

Bacteriology-Desirable to acquire

1. Conjugation experiments for drug resistance
2. Serum antibiotic assays e.g. Gentamicin
3. Phage typing for *Staphylococcus*, *S. typhi* etc.
4. Bacteriocin typing viz. Proteocin, etc.
5. Enterotoxigenicity tests like rabbit ileal loop, intragastric inoculation of infant mouse, Sereny's test
6. Performance of autopsy on the animals
7. Animal pathogenicity / toxigenicity tests for *C. diphtheriae*, *C. tetani*, *S. pneumoniae*, *S. typhimurium*, *K. pneumoniae* etc.
8. Serological grouping of *Streptococcus*
9. Antibiotic susceptibility tests for Mycobacteria
10. Molecular typing methods.
11. Special staining techniques for Mycoplasma, Treponemes, Gardenerella.

Immunology-Must acquire

1. Collection of blood by venepuncture, separation of serum and preservation of serum for short and long periods
2. Preparation of antigens from bacteria or tissues like Widal, Weil-Felix, VDRL, etc and their standardization
3. Raising of antisera in laboratory animals
4. Performance of serological tests viz. Widal, Brucella tube agglutination, Weil-Felix, Cold agglutination, VDRL, Paul-Bunnell, ASO, IFA
5. Enzyme linked immunosorbent assay
6. Latex and Staphylococcal Co-agglutination tests

Immunology-desirable to acquire

1. Radial immunodiffusion for estimation of serum immunoglobulins
2. Immunoelectrophoresis
3. Crossed immunoelectrophoresis
4. Immunodiffusion in gels, (Ouchterlony) counter immunoelectrophoresis
5. Haemolysis and complement fixation.
6. Immunoblotting
7. Leukocyte migration test
8. T-cell resetting
9. Separation of lymphocytes by centrifugation, gravity sedimentation, etc

Mycology-Must acquire

1. Collection and transport of specimens
2. Direct examination of specimens by KOH, Gram's, Kinyoun's, Giemsa, Lactophenol cotton blue stains

3. Calcofluor staining and examination under fluorescent microscope.
4. Examination of histopathology slides for fungal infections
5. Isolation and identification of common laboratory contaminants, dermatophytes and others of medical importance (yeast, dematiaceous fungi)
6. Special techniques like Wood's lamp examination, hair baiting, hair perforation, paraffin baiting and slide culture
7. Maintenance of stock cultures

Mycology-Desirable to acquire

1. Animal pathogenicity tests viz. intracerebral and intraperitoneal inoculation of mice for *Cryptococcus*
2. Antigen and antibody based serological test in fungal diseases including *Candida*, *Cryptococcosis*, *Aspergillus*, etc.

Parasitology-Must Acquire

1. Examination of feces for parasitic ova and cysts etc. by direct and concentration methods (salt floatation and formal-ether methods)
2. Egg counting techniques for helminthes
3. Examination of blood for protozoa and helminthes by wet mount and thin and thick stained smears
4. Examination of other specimens e.g. urine, CSF, bone marrow etc. for parasites
5. Histopathology sections-examination and identification of parasites
6. Performance of stains- Leishman, Giemsa
7. In-vitro culture of parasites like *Entamoeba*, *Leishmania*, etc.
8. Preparation of media-NIH, NNN, etc.
9. Copro-culture of larva of hookworms
10. Antigen preparation-viz. *Entamoeba*, filarial, hydatid for serological tests like IHA and skin tests like Casoni's test
11. Identification of common arthropods and other vectors viz., mosquito, sandfly, tick, mite, Cyclops
12. Collection of specimens
13. Preservation of parasites- mounting, fixing, staining, etc.
14. QBC for malaria.

Parasitology-Desirable to Acquire

1. Permanent staining techniques like iron haematoxylin
2. *In-vitro* culture of *Plasmodium falciparum*
3. Maintenance of *Toxoplasma gondii* in mice
4. Antigen based and antibody based serological diagnostic tests such as IHA, ELISA, Western blot, etc for cysticercosis, amoebiasis, hydatid disease, filariasis, etc.

Virology-Must acquire

1. Preparation of glass wares for tissue cultures (washing, sterilization)
2. Preparation of media like Hanks, MEM
3. Preparation of clinical specimens for isolation of viruses
4. Maintenance of continuous cell lines by subcultures. Preservation in -70°C and liquid nitrogen
5. Recognition of CPE producing viruses
6. Serological tests-ELISA for HIV, ELISA for HBsAg, HCV, Hepatitis virus, serological tests for arboviruses.
7. Chick embryo techniques-inoculation and harvesting
8. Handling of mice, rat, guinea pigs for collection of blood, pathogenicity tests, etc.

Virology-Desirable to acquire

1. Performance of haemadsorption for Parainfluenza, Haemagglutination for Influenza, Immunofluorescence, neutralization for Enteroviruses and Respiratory viruses, identification tests on tissue cultures and supernatants, etc.

Molecular biology-Must acquire

1. Extraction of DNA, routine PCR protocols, gel documentation, RFLP, RAPD.
2. SDS PAGE
3. Western blot

Time frame for minimum skill acquisition by PG residents of Microbiology department

General Microbiology and Bacteriology
First year
<ul style="list-style-type: none"> • Media and reagent preparation • Operation of autoclave, hot air oven • Washing and sterilization of glass wares • Laboratory waste management • Aseptic practices in laboratory and safety precautions • Care and maintenance of common laboratory equipments • Preparation and performance of common bacterial stains • Collection of specimens for microbiological investigations • Care and operation of microscopes • Preparation, examination and interpretation of direct smears from clinical specimens • Motility testing of bacteria • Plating of clinical specimens on media
Second year
<ul style="list-style-type: none"> • Quality control of media and reagents • Quantitative and semi-quantitative analysis of urine • Skin tests • Preparation of antibiotic discs • Estimation of MIC, MBC, and tests for β-lactamases • Identification of bacteria of medical importance up to species level • Care and breeding of laboratory animals
Third year
<ul style="list-style-type: none"> • Techniques of anaerobiosis • Bleeding techniques from animals • Inoculation of infective material by different routes in the animals • Performance of autopsy on the animals • Animal pathogenicity / toxigenicity tests and in-vitro toxicity tests • Special tests
Immunology
First year
<ul style="list-style-type: none"> • Collection of blood by venepuncture • Separation of serum and preservation of serum for short and long periods • Preparation of antigens from bacteria or tissues like Widal, VDRL, etc and their standardization • Latex and Staphylococcal Co-agglutination tests

<ul style="list-style-type: none"> • Preparation of adjuvants like Freund's adjuvant
Second year
<ul style="list-style-type: none"> • Performance of serological tests viz. Widal, Brucella tube agglutination, Weil-Felix, Cold agglutination, VDRL, Paul-Bunnell, Rose-Waaler, IF • Raising of antisera in laboratory animals • Enzyme linked immunosorbent assay • Separation of lymphocytes by centrifugation, gravity sedimentation
Third year
<ul style="list-style-type: none"> • Counter immunoelectrophoresis • Haemolysin and complement titration • Leukocyte migration test • T-cell resetting • Radial immunodiffusion for estimation of serum immunoglobulins • Immunoelectrophoresis • Crossed immunoelectrophoresis • Neutrophil phagocytosis

Mycology
First year
<ul style="list-style-type: none"> • Collection of specimens • Direct examination of specimens by KOH, Gram's, Kinyoun's, Giemsa, Lactophenol cotton blue stains
Second year
<ul style="list-style-type: none"> • Isolation and identification of common laboratory contaminants, dermatophytes and others of medical importance (yeast, dematiaceous fungi) • Maintenance of stock cultures
Third year
<ul style="list-style-type: none"> • Examination of histopathology slides for fungal infections • Special techniques like Wood's lamp examination, hair baiting, hair perforation, paraffin baiting and slide culture • Animal pathogenicity tests viz. intracerebral and intraperitoneal inoculation of mice for <i>Cryptococcus</i>

Parasitology
First year
<ul style="list-style-type: none"> • Collection of specimens • Examination of feces for parasitic ova and cysts etc. by direct and concentration methods (salt floatation and formal-ether methods) • Examination of blood for protozoa and helminthes by wet mount and thin and thick stained smears • Performance of stains- Leishman, Giemsa • Preservation of parasites- mounting, fixing, staining, etc. • Preparation of media-NIH, NNN, etc.
Second year
<ul style="list-style-type: none"> • Egg counting techniques for helminthes • Examination of other specimens eg. urine, CSF, bone marrow etc. for parasites • In-vitro culture of parasites like <i>Entamoeba</i>, <i>Leishmania</i>, etc. • Copro-culture of larva of hookworms • Antigen preparation-viz. <i>Entamoeba</i>, filarial, hydatid for serological tests like IHA and skin tests like Casoni's test

<ul style="list-style-type: none"> • Serological tests like IHA, ELISA, Co-A
Third year
<ul style="list-style-type: none"> • Histopathology sections-examination and identification of parasites • Identification of common arthropods and other vectors viz., mosquito, sandfly, tick, mite, Cyclops • Permanent staining techniques like iron haematoxylin • Maintenance of <i>Toxoplasma gondii</i> in mice

Virology
First year
<ul style="list-style-type: none"> • Preparation of glass wares for tissue cultures (washing, sterilization) • Preparation of media like Hanks, Eagle's MEM • Preparation of clinical specimens for isolation of viruses • Serological tests-ELISA for HIV, RPHA for HBsAg
Second year
<ul style="list-style-type: none"> • Maintenance of continuous cell lines by subcultures. • Preservation in -70°C and liquid nitrogen • Handling of mice, rat, guinea pigs for collection of blood, pathogenicity tests, etc.
Third year
<ul style="list-style-type: none"> • Recognition of CPE producing viruses • Performance of viz. haemadsorption for Parainfluenza • Haemagglutination for Influenza • Immunofluorescence • Neutralization for Enteroviruses and Respiratory viruses • Identification tests on tissue cultures and supernatants, etc.

MD Microbiology Examination Format

Theory Examination

Each paper 3 hours

Paper I : General Microbiology and Immunology

Paper II : Systematic Bacteriology and Mycology

Paper III : Virology and Parasitology

Paper IV : Applied microbiology and recent advances

Practical Examination

Duration: three days

The examination will consist of the following exercises conjointly conducted and evaluated by four examiners, two internals and two externals.

1. Exercise in Clinical Bacteriology-

Isolation and identification of bacteria from clinical specimen

2. Exercise in Bacteriological Techniques-

Isolation and identification of bacteria given in pure culture

3. Animal experiment-

Any one of-

- bleeding of rabbit/guinea pig/mouse/rat
- Post mortem examination of laboratory infected animal
- Inoculation of infective material into laboratory animal and isolation of the pathogen

4. Exercise in Virology-

- Egg inoculation, or identification of unknown virus
 - a. serological tests

5. Identification of fungi

6. Exercise in Parasitology-

- Examination of stool for ova and cysts by direct and concentration techniques

7. Histopathology- identification of slides

8. Exercise in Immunology

- Any one of the serological techniques used in clinical medicine

9. Pedagogy

Oral examination: The oral examination consists of questioning on the dissertation and overall subject matter. It will be conducted by all the four examiners as in the case of the practical examination

MODEL QUESTION PAPERS

PAPER I – GENERAL MICROBIOLOGY & IMMUNOLOGY

Time: 3 hours

Max. Marks: 100

Note: Answer all questions

1. Discuss the principle and methods of preparation of monoclonal antibodies. Describe the clinical applications of monoclonal antibodies. 25
2. Define the principle and application of western blot in microbiology. 25
3. Write short notes on : 5x10
 - a) Advances in culture of anaerobic bacteria
 - b) Transposable genetic elements
 - c) C.Virulence factors of a Bacteria
 - d) D.Gaseous agents and disinfectants
 - e) Application of electron microscopy in diagnostic microbiology

PAPER II – SYSTEMATIC BACTERIOLOGY AND MICROBIOLOGY

Time: 3 hours

Max Marks: 100

Note: Answer all questions

1. Describe the newer concepts in taxonomy and nomenclature of *Leptospira* species. Discuss the epidemiology and laboratory diagnosis of leptospirosis. 25
2. Describe the newer *Vibrio* species. Discuss the newer vaccines against cholera. 25
3. Write short notes on : 5x10
 - a) Melidiosis
 - b) Leprosy eradication in India
 - c) *Penicillium marneffii*
 - d) Non-*Candida albicans* spp.
 - e) Histoplasmosis in India

PAPER III – VIROLOGY AND PARASITOLOGY

Time: 3 hours

Max. Marks: 100

Note: *Answer all questions*

1. Describe recent concepts in understanding *Entamoeba histolytica*, *Entamoeba dispar* and other look- alike species. 25
2. Discuss the epidemiology and pathogenesis of arbovirus infections in India. Discuss newer methods in diagnosis of viral infections. 25
3. Write short notes on : 5x10
 - a) Pathogenesis and laboratory diagnosis of neurocysticercosis
 - b) Vaccine trial against Malaria
 - c) Pathogenesis and laboratory diagnosis of lymphatic filariasis
 - d) Avian Influenza
 - e) Prion mediated diseases

PAPER IV - APPLIED MICROBIOLOGY AND RECENT ADVANCES

Time: 3 hours

Max Marks: 100

Note: *Answer all questions*

1. Discuss automation methods in clinical microbiology. 25
2. Discuss recent concepts in application of Nano technology in microbial diseases 25
3. Write short notes on : 5x10
 - a) Chimeric antibodies
 - b) Opportunistic infections in HIV
 - c) Antigen detection in non-blood specimens for diagnosis of infectious diseases
 - d) Newer concepts in the pathogenesis of urinary tract infection
 - e) Disposal of hospital wastes

Recommended Textbooks

Ananthanarayan & Paniker's Textbook of Microbiology, 7th edition. Orient Longman, India; 2007.

Anaissie Elias J. Clinical Mycology, Churchill livingstone 2003.

Bailey and Scott's Diagnostic Microbiology. 9th ed. CV Mosby, St. Louis, 2003.

Brooks, Geo F Jawetz Medical Microbiology 22nd ed McGraw Hill 2001.

Coller, Leslie Topley and Wilsons Microbiology and microbial infections Vol 1, 2, 3, 4, 5, 6 : 9th edition

Collee J G Mackie and Mc cartney Practical Medical Microbiology 14thed 1999.

Koneman EW, Allen SD, Schreckenber PC, Winn WC (Eds): Atlas and Textbook of Diagnostic Microbiology. 4th ed. JB Lippincott, Philadelphia, 1992.

Murray PR, Baron EJ, Pfaller MA, Tenover PC, and Tenover RH (Eds): Manual of Clinical Microbiology. 6th ed. American Society for Microbiology, Washington, DC, 2005.

Parija SC. Textbook of Medical Parasitology .3rd Edition 2008. All India Publishers and Distributors, New Delhi. India

Parija SC. Textbook of Practical Microbiology, 1st Edition, 2007 Ahuja Publishing House , New Delhi , India .

Roitt Ivan M, Immunology 10th edition Blackwell Science 1994.

Stites Immunolgy 10th edn, Mc Graw Hill 2001.

Woods GL, Washington JA: The Clinician and the Microbiology Laboratory. Mandell GL, Bennett JE, Dolin R (Eds): Principles and Practice of Infectious Diseases. 4th ed. Churchill Livingstone, New York, 2002.

PATHOLOGY

1. OVERALL OBJECTIVES

The goals of MD Pathology course is to produce over a period of three years a specialist who is competent to provide a laboratory based diagnosis of illnesses and is able to teach undergraduates and junior postgraduates the essentials of the subject and be comfortable with the basics of scientific research. On successful completion of the training, he or she should develop:

1.1 the capability of offering high quality diagnostic opinion in a given clinical situation with an appropriate and relevant sample of tissue, blood, body fluids etc for the purpose of diagnosis and management of the patient.

1.2 interpretive skills at both macroscopic and microscopic levels such that clinically useful opinions can be produced from surgical, biopsy and cytology specimens and from the findings of post-mortem examinations

It is expected that MD Pathology course should provide sufficient training, competence and confidence in diagnosis related to surgical pathology, cytopathology, hematology, Blood Banking and Laboratory Medicine.

1.3 the skill to teach and share his knowledge and competence with others.

Pathology forms the basis of understanding, diagnosis and hence the treatment of diseases. It is therefore an integral part of the training and curriculum of various undergraduate and postgraduate courses of medicine and allied branches. The MD Pathology course should encourage the candidates to teach students and colleagues of other disciplines. The course should attempt to bring out the talent of teaching in these candidates so that, when given the opportunity, such candidates can join academic institutions to fill the dearth of inspirational teachers in institutions.

1.4 the capability to pursue clinical and laboratory based research.

The training should include means by which a student can pursue research either independently or in a team. This facet is essential to the overall practice of Pathology. It is necessary therefore that a thesis or dissertation be included as a part of partial fulfillment to the award of the degree of MD Pathology

2. BROAD OBJECTIVES (At the end of course)

2.1. Cognitive Domain

2.1.1. Diagnose routine and complex clinical problems on the basis of surgical pathology and cytopathology specimens, blood and bone marrow examination and various other tests under the domain of clinical pathology, blood bank and transfusion medicine

2.1.2. Interpret clinical and laboratory data with reasonable accuracy.

- 2.1.3. Correlate clinical and pathological data in order to explain various clinical signs, symptoms and manifestations of diseases
- 2.1.4. Advice on the nature of the tests and appropriate specimens necessary to arrive at a diagnosis.
- 2.1.5. Able to correlate clinical and laboratory findings with pathology findings in autopsy, identify dyscorrelations and cause of death due to diseases
- 2.1.6. Able to teach Pathology to undergraduates, postgraduates, laboratory personnel, nurses and other paramedical staff
- 2.1.7. Carry out research
- 2.1.8. Maintain accurate records of tests and their results for a reasonable period of time for retrieval and archival purposes.
- 2.1.9. Able to systematically write a scientific paper and publish in journals
- 2.1.10. Able to present a paper at scientific conferences either through an oral or poster presentation
- 2.1.11. Able to identify technical problems in laboratory and offer useful solutions so as to maintain quality in laboratories.
- 2.1.12. Able to effectively dispose of laboratory waste to ensure minimal risk of infections and accidents in laboratories.
- 2.1.13. Able to supervise and work with subordinates and colleagues.
- 2.1.14. Subject himself/herself to the habit of lifelong learning by building on previous undergraduate and general medical training experience by updating continuing education so that relevant knowledge of disease processes is acquired and maintained at a level consistent with the requirements of independent practice.

2.2. Psychomotor domain

- 2.2.1. Able to perform most of the routine tests in a Pathology laboratory including grossing of specimens, processing and cutting of paraffin sections, making smears, frozen sections and staining.
- 2.2.2. Able to collect specimens by procedures such as venepuncture, finger prick, fine needle aspiration biopsies of superficial lumps and bone marrow aspirates. It is implied that the candidates be aware of the indications and possible complications following these procedures. Further whenever necessary the candidates must be able to provide appropriate help to colleagues performing invasive procedures such as a biopsy or imaging guided aspirations.
- 2.2.3. Perform an autopsy, dissect various organs and interpret gross findings.
- 2.2.4. Should be familiar with the function, handling and maintenance of laboratory equipment.

2.3. Affective domain

- 2.3.1. Should be able to function as a part of a team that is essential for the diagnosis and management of a patient. He/she should develop an attitude of co-operation so necessary for this purpose.
- 2.3.2. Should whenever necessary interact with patient and clinicians and colleagues to provide the best possible diagnosis.
- 2.3.3. Always adopt ethical principles and maintain proper etiquette in his/her dealings with patients, relatives and other health personnel.
- 2.3.4. Respect the rights of patients including the right to information and second opinion.
- 2.3.5. Should seek and give second opinion only when necessary.

- 2.3.6. Provide leadership and inspire members of the team involved in the field of diagnostic pathology, teaching and research.
- 2.3.7. Develop communication skills not only to word reports and professional opinions but also to interact with patients, relatives, peers and paramedical staff.

3. COURSE DESCRIPTION

3.1. Duration of course

It is recommended that the course of Doctor of Medicine (Pathology) or MD (Pathology) be of three years duration in the form of a Residency Programme that is full time.

3.2. Eligibility

- 3.2.1. The essential qualification shall be MBBS Degree recognized by any Indian University/ Deemed University/Autonomous Institution etc as recognized by the Medical Council of India
- 3.2.2. Postgraduate diploma in Clinical Pathology (DCP) may be taken as an added qualification for the eligibility of a candidate only if such a clause is recognized by the rules and regulations of JIPMER.

The guidelines are beyond the scope of this curriculum and can be provided by the competent authorities only

3.3. Selection

- 3.3.1 It is recommended that the selection be made on the basis of an entrance examination with Multiple Choice Questions of the level of MBBS, including all subjects of the MCI recognized MBBS course and preferably with at least 10% of the questions testing cognition in Pathology.
- 3.3.2 It is appreciated that individual universities or equivalent institutions will have their own methods of selection.

4. SCOPE OF TRAINING

It must be appreciated that within the time period of the training programme which covers a wide range of subjects and subspecialties it is difficult, if not impossible, to achieve full proficiency in all the technological methods and available theoretical knowledge. The following categorization is recommended:

4.1. High degree of Professional competence

In the following fields, related to diagnosis of appropriate diseases, a high degree of professional competence and theoretical knowledge is expected.

4.1.1. Pathologic Anatomy (Surgical Pathology and Cytopathology)

The study of pathologic anatomy includes all aspects of pathology as encompassed in the branches of General Pathology and systemic pathology. Therefore only a broad outline is provided and a compendium of chapters as available in standard textbooks

avoided. The scope of pathology is vast and following is a guideline that in essence covers all aspects.

4.1.1.1. General pathology:

Normal cell and tissue structure and function. The changes in cellular structure and function in diseases. Causes and pathogenesis of diseases/ Reaction of tissue and organs to various lethal and sublethal injury.

4.1.1.2. Systemic pathology:

The study of normal structure and function of various organ systems and etiopathogenesis, gross and microscopic alterations of structure and function of these organ systems in diseases.

All organ systems are to be studied. This forms the basis of Surgical Pathology, Cytopathology, Autopsy Pathology and Clinico-pathological correlation.

4.1.2. Hematology

The study of hematology includes all aspects of diseases of blood and bone marrow. This involves the study of the normal structure and function and the causes of diseases and morphological changes thereof.

4.2. Reasonable working knowledge

In the following fields the student is expected to achieve reasonable working knowledge and diagnostic skill, and be able to run independently a routine service in a teaching hospital, and if necessary, at some future date, with some additional effort acquire the level of competence as in 4.1. Some centers have separate degrees/diplomas/postgraduate courses for some of these subjects. However, current practice of pathology, both institutional or otherwise demands a reasonable working knowledge of these subjects and therefore until such time as the situation demands, these subjects should be an integral part of postgraduate training in pathology.

4.2.1. Laboratory Medicine (Clinical Chemistry/Clinical Biochemistry/Chemical Pathology / Clinical Pathology including Parasitology).

4.2.2. Transfusion Medicine (Blood-Banking)

4.3. General Acquaintance

Following are the fields in which the student is expected to acquire a general acquaintance of techniques and principles and competence to understand and interpret data without being called upon to achieve technologic proficiency.

4.3.1. Immunopathology

4.3.2. Electron microscopy

4.3.3. Histochemistry

4.3.4. Immunohistochemistry

4.3.5. Use of radioisotopes

4.3.6. Cytogenetics

4.3.7. Tissue culture

- 4.3.8. Medical statistics
- 4.3.9. Molecular Biology
- 4.3.10. Maintenance of records
- 4.3.11. Information retrieval, Computer, Internet in medicine.

It is expected that the level of proficiency that is to be expected may vary. Therefore the level of competence in Immunopathology assumes importance in the interpretation of Renal Diseases. Similarly the findings on Immunohistochemistry may be as important as the findings on light microscopy in a particular case.

5. COURSE CONTENT

Unlike the undergraduate syllabus, it is difficult to give a precise outline of the Course Content for postgraduate training. A postgraduate appearing for the MD degree is supposed to have acquired not only professional competence expected of a well-trained specialist but also academic maturity, a capacity to reason and critically analyse a set of scientific data. He/She is supposed to keep himself up to date with the latest developments in the field of the pathology and related sciences. A brief outline of what is expected to be learnt during each of the postings in the different sections/laboratories during the MD Course will be given under each head.

5.1. Surgical Pathology

5.1.1. Knowledge

- 5.1.1.1. The student should be able to demonstrate understanding of the histogenetic and patho-physiologic processes associated with various lesions during discussions with colleagues, clinicians, students and patients.
- 5.1.1.2. Should be able to identify problems in the laboratory and offer viable solutions.

5.1.2. Skills

- 5.1.2.1. Given the clinical and operative data, the student should be able to identify, and systematically and accurately describe the chief gross anatomic alterations in the surgically removed specimens.
- 5.1.2.2. Training in the performance of the examination, description and macroscopic sampling of surgical and biopsy specimens (the grossing) so as to be able to perform a systematic gross examination of the tissues including the taking of appropriate tissue sections and in special cases as in intestinal mucosal biopsies, muscle biopsies and nerve biopsies.
- 5.1.2.3. Given the relevant clinical, operative and radiological data, the student should be able to identify and systematically and accurately describe the chief histomorphological alterations in the tissue received in the surgical pathology service. He/she should also correctly interpret and as far as possible, correlate with the clinical data to diagnose at least 90% of the routine surgical material received on an average day. He/she should be able to diagnose at least 75% of the classical lesions being commonly encountered in the surgical pathology service without the aid of the clinical data.
- 5.1.2.4. Start the automatic tissue-processing machine and verbally demonstrate his understanding of the principles of its running.

5.1.2.5. Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome.

5.1.2.6. Select appropriate blocks to show lesions in relevant planes of section, including using protocols for minimum datasets where relevant

5.1.2.7. Handle different types of specimen appropriately according to the degree of clinical urgency

5.1.2.8. Stain paraffin sections with at least the following:

- i) Haematoxylin and eosin
- ii) Stains for collagen, elastic fibers and reticulin
- iii) Iron stain
- iv) PAS stain

5.1.2.9. Demonstrate understanding of the principles of:

- i) Fixation of tissues
- ii) Processing of tissues for section cutting
- iii) Section cutting and maintenance of related equipment
- iv) Differential (Special) stains and their utility

5.1.2.10. Cut a frozen section of tissues received from the operating room for quick diagnosis, stain and interpret the slide in correlation with the clinical data provided, and correctly diagnose at least 75 per cent of the lesions within 15 minutes.

5.1.2.11. Demonstrate the understanding of the utility of various immunohistochemical stains especially in the diagnosis of tumour subtypes.

5.1.2.12. Practice in writing histopathology reports including advice on their content and composition

5.2. Autopsy Pathology

5.2.1. Knowledge

5.2.1.1. Should be aware of the technique of autopsy

5.2.1.2. Should have sufficient understanding of various disease processes so that a meaningful clinico-pathological correlation can be made.

5.2.2. Skills

5.1.1.1. Demonstrate ability to perform a complete autopsy independently with some physical assistance, correctly following the prescribed instructions. Correctly identify all major lesions which have caused, or contributed to, the patient's death on macroscopic examination alone in at least 90% of the autopsies in an average teaching hospital. In exceptional circumstances, help of a frozen section may be obtained.

5.2.2.1.A. In places where non-medicolegal autopsies are not available each student/candidate should be made to dissect organs from atleast five medico-legal autopsies.

An improvised autopsy may also be arranged in places where full autopsy is not possible. Relevant organs from wet specimens in the museum with appropriate clinical history may be arranged for a detailed description and diagnosis. At least ten such improvised autopsies may be discussed by each candidate.

- 5.1.1.2. Identify and correctly diagnose at least 90% of the microscopic lesions found in most autopsies, and be able to correlate the pathologic changes with the patient's clinical history and events of a few days preceding death.
- 5.1.1.3. Write correctly and systematically Provisional and Final Anatomic Diagnosis reports (on gross and microscopy respectively), the major findings at autopsy, and the Autopsy Protocol as per prescribed instructions, of a standard fit for an international journal.

5.2. Cytopathology

5.2.1. Knowledge

- 5.2.1.1. Should possess the background necessary for the evaluation and reporting of cytopathology specimens.
- 5.2.1.2. Demonstrate verbal familiarity with, and guide the clinical residents in the following, keeping in view the special requirements of each case (Cyto-hormonal status, malignancy, infection, etc.)
 - i) Choice of site from which smears may be taken (as in the case of vaginal smears)
 - ii) Method of obtaining various specimens (urine sample, gastric smear, bronchial lavage etc.)

5.2.2. Skills

- 5.2.2.1. Independently prepare and stain good quality smears for cytopathologic examination and be conversant with the principles and preparation of solutions of stains.
- 5.2.2.2. Demonstrate conversance with the techniques for concentration of specimens: i.e. various filters and cytocentrifuge.
- 5.2.2.3. Independently be able to perform fine needle aspiration of palpable superficial lumps in patients; make good quality smears, and be able to decide on the type of staining in a given case.
- 5.2.2.4. Given the relevant clinical data, he/she should be able to independently and correctly:
 - i) Evaluate hormonal status in all cases as may be required.
 - ii) Diagnose the status of malignancy or otherwise in at least 75% of the cases received in a routine laboratory and categorize them into negative, inconclusive and positive.
 - iii) Demonstrate ability in the technique of screening and dotting the slides for suspicious cells
 - iv) Identify the difference between normal cells in common diagnostic cytology specimens (breast fine needle aspirations (FNAs), sputum, bronchial brushings, serous effusions, urine) and typical examples of malignancy.
 - v) Indicate correctly the type of tumour, if present, in at least 75% cases
 - vi) Identify with reasonable accuracy the presence of organisms, fungi and parasites in at least 75% of cases.

5.3. Haematology

5.3.1. Knowledge

- 5.3.1.1. Should demonstrate the capability of utilizing the principles of the practice of Haematology for the planning of tests, interpretation and diagnosis of diseases of the blood and bone marrow.
- 5.3.1.2. Should be conversant with various equipments used in the Haematology laboratory
- 5.3.1.3. Should have knowledge of automation and quality assurance in Haematology.

5.3.2. Skills

- 5.3.2.1. Correctly plan a strategy of investigations of the cases referred for special investigations in the Hematology Clinic and give ample justification for each step in consideration of the relevant clinical data provided.
- 5.3.2.2. Correctly and independently perform the following special tests, in addition to doing the routine blood counts :
 - i) Haemogram including Reticulocyte and Platelet counts
 - ii) Bone marrow staining including stain for iron
 - iii) Blood smear staining
 - iv) Cytochemical characterization of leukemia with special stains like Peroxidase, Leukocyte Alkaline Phosphatase (LAP), PAS, Sudan Black, Oil Red O, Acid Phosphatase (including Tartarate resistant) and Non-specific esterase
 - v) Osmotic fragility
 - vi) Fetal Haemoglobin
 - vii) Sickling phenomenon
 - viii) Bleeding time
 - ix) Clotting time
 - x) Prothrombin time (PT)
 - xi) Activated partial thromboplastin time (APTT)
 - xii) Haemoglobin electrophoresis
 - xiii) Coombs Test
 - xiv) Clot Solubility Test
- 5.3.2.3. Demonstrate familiarity with the principle and utility in diagnosis of the following :
 - i) Red cell indices
 - ii) Plasma haemoglobin
 - iii) Haemosiderin in urine
 - iv) Presumptive tests for complete antibodies
 - v) Ham's Acid test
 - vi) Serum electrophoresis
 - vii) Platelet function tests including platelet aggregation and adhesion and PF3 release
 - viii) Russell's viper venom time (RVVT)
 - ix) Coagulation Factor assays
 - x) Screening for coagulation factor inhibitors
 - xi) Fibrin Degradation Products (FDP), D-Dimers
 - xii) Monitoring of anticoagulant therapy

- xiii) Tests for thrombosis : Lupus anticoagulant (LAC), Anticardiolipin Antibody (ACA), Activated Protein C Resistance (APCR), Protein C (Pr C),
 - xiv) Serum ferritin
 - xv) Serum iron and total iron binding capacity
 - xvi) Immunophenotyping
 - xvii) Cytogenetics
- 5.3.2.4. Demonstrate verbally and in writing, his/her understanding of the principles of the above tests, their utility in diagnosis and interpretation of results.
- 5.3.2.5. Perform a successful bone marrow aspiration/iliac crest biopsy and stain the peripheral and bone marrow smears with Romanowsky stains.
- 5.3.2.6. Describe accurately the morphologic findings in the peripheral blood and bone marrow smears, identifying and quantitating the morphologic abnormalities in disease states and arriving at a correct diagnosis in at least 90% of the case referred to the Haematology laboratory, given the relevant clinical data.
- 5.3.2.7. Posses working knowledge of the following :
 - i) Bone marrow transplantation
 - ii) Prenatal diagnosis of genetic haematological diseases
 - iii) Molecular biology of haematological diseases
 - iv) Automated blood cell counter

5.4. Laboratory Medicine

5.4.1. Knowledge

- 5.4.1.1. Demonstrate familiarity with the normal range of values of the chemical content of body fluids, significance of the altered values and interpretation thereof.
- 5.4.1.2. Possess knowledge of the principles of following specialized organ function tests and the relative utility and limitations of each and significance of the altered values.
 - i) Renal function test
 - ii) Liver function test
 - iii) Gastric and Pancreatic function
 - iv) Endocrine function test
 - v) Tests for malabsorption
- 5.4.1.3. Explain the biochemical principles involved in the above estimations.
- 5.4.1.4. Know the principles, advantages and disadvantages, scope and limitation of Automation in laboratory.
- 5.4.1.5. Learn the principles and methodology of quality control in laboratory.

5.4.2. Skills

- 5.4.2.1. Plan a strategy of laboratory investigation of a given case, given the relevant clinical history and physical findings in a logical sequence, with a rational explanation of each step. He should be able to correctly interpret the laboratory data of such studies, and discuss their significance with a view to arrive at a diagnosis.

- 5.4.2.2. Demonstrate familiarity with and successfully perform a routine Urinalysis including Physical, Chemical and Microscopic, examination of the sediment.
- 5.4.2.3. Demonstrate familiarity with and successfully perform the macroscopic and microscopic examination of faeces and identify the ova and cysts of common parasites.
- 5.4.2.4. Independently and successfully perform a complete examination; physical, chemical and cell content of Cerebrospinal Fluid (C.S.F.), Pleural and Peritoneal fluid.
- 5.4.2.5. Successfully perform an examination of Peripheral Blood for the commonly occurring parasites.
- 5.4.2.6. Demonstrate familiarity with and successfully perform a Semen analysis.
- 5.4.2.7. Demonstrate familiarity with the following Quantitative Estimations by Automated/ Manual Techniques and interpretation of normal versus abnormal values.
 - i) Blood urea
 - ii) Blood sugar
 - iii) Serum Proteins total & fractional
 - iv) Serum Bilirubin total & fractional
 - v) Serum cholesterol
 - vi) Uric acid
 - vii) Serum Transaminases (ALT and AST/SGOT and SGPT)
 - viii) Serum Alkaline Phosphatase
 - ix) Creatinine
 - x) Serum Electrolyte (Na⁺ and K⁺)
- 5.4.2.8. Demonstrate familiarity with :
 - i) Determination of bicarbonates
 - ii) Blood gas analysis
- 5.4.2.9. Prepare standard normal solution, molar solution and Buffers.
- 5.4.2.10. Explain the principle of Instrumentation, use and application of the following instruments.
 - i) Photoelectric colorimeter
 - ii) Spectrophotometer
 - iii) pH meter
 - iv) Flame photometer
 - v) Centrifuge
 - vi) Analytical balance
 - vii) Electrophoresis apparatus
 - viii) Light Microscope
 - ix) Blood gas analyzer

5.5. Transfusion Medicine (Blood Banking)

5.5.1. Knowledge

It is expected that students should possess knowledge of the following aspects of Transfusion Medicine.

- 5.5.1.1. Basic immunology
- 5.5.1.2. ABO and Rh groups
- 5.5.1.3. Clinical significance of other blood groups
- 5.5.1.4. Transfusion therapy including the use of whole blood and RBC concentrates
- 5.5.1.5. Blood component therapy
- 5.5.1.6. Rationale of pre-transfusion testing.
- 5.5.1.7. Infections transmitted in blood.
- 5.5.1.8. Adverse reactions to transfusion of blood and components
- 5.5.1.9. Quality control in blood bank

5.5.2. Skills

It is expected that the student shall correctly and independently perform the following.

- 5.5.2.1. Selection and bleeding of donors
- 5.5.2.2. Preparation of blood components i.e. Cryoprecipitates, Platelet concentrate, Fresh Frozen Plasma, Single Donor Plasma, Red Blood Cell concentrates.
- 5.5.2.3. ABO and Rh grouping
- 5.5.2.4. Resolving ABO grouping problems by secretor status in saliva and expanded panel
- 5.5.2.5. Demonstrate familiarity with Antibody screening by
 - i) LISS (Low-ionic salt solution)
 - ii) Enzymes
 - iii) AHG (Anti-Human Globulin)
- 5.5.2.6. Steps to be taken if the above are positive
- 5.5.2.7. Demonstrate familiarity with Crossmatching by
 - i) LISS (Low-ionic salt solution)
 - ii) Enzymes
 - iii) AHG (Anti-Human Globulin)
- 5.5.2.8. Steps to be taken if there is incompatibility
- 5.5.2.9. Demonstrate familiarity with Antenatal and Neonatal work
 - i) Direct antiglobulin test
 - ii) Antibody screening and titre
 - iii) Selection of blood for exchange transfusion
- 5.5.2.10. Demonstrate familiarity with principle and procedures involved in
 - i) Resolving ABO grouping problems
 - ii) Identification of RBC antibody
 - iii) Investigation of transfusion reaction
 - iv) Testing of blood for presence of
 - a) HBV (Hepatitis B Virus Markers)
 - b) HCV (Hepatitis C Virus Markers)
 - c) HIV (Human Immunodeficiency Virus Testing)
 - d) VDRL

5.6. Basic Sciences (in relation to Pathology)

5.6.1. Immunopathology

5.6.1.1. Knowledge

- i) Demonstrate familiarity with the current concepts of structure and function of the immune system, its aberrations and mechanisms thereof.
- ii) Demonstrate familiarity with the scope, principles, limitations and interpretations of the results of the following procedures employed in clinical and experimental studies relating to immunology.
- iii) ELISA techniques
- iv) Radioimmuno assay
- v) HLA typing

5.6.1.2. Skills

- i) Perform and interpret simple immunological tests used in diagnosis of diseases and in research procedures, subject to the availability of facilities
 - a) Immunoelectrophoresis
 - b) Immunofluorescence techniques especially on kidney and skin biopsies
 - c) Countercurrent electrophoresis for demonstration of antigen
 - d) Latex agglutination
 - e) Anti-nuclear Factor (ANF)
 - f) Anti-neutrophil cytoplasmic antibody (ANCA)

5.6.2. Electron Microscopy

5.6.2.1. Knowledge

- i) Demonstrate familiarity with Principles and techniques of electron microscopy and the working of an electron microscope (including Transmission and Scanning Electron microscopy: TEM and SEM)

5.6.2.2. Skills

- i) Should be conversant with the technique of proper fixation, processing and staining of tissues for electron microscopy, subject to the availability.
- ii) Recognize the appearance of the normal subcellular organelles and their common abnormalities (when provided with appropriate photographs).

5.6.3. Enzyme Histochemistry

5.6.3.1. Knowledge

Should be familiar with the principles, use and interpretation of common enzyme histochemical procedures (Alkaline Phosphatase, Acid Phosphatase, Glucose-6-Phosphate Dehydrogenase, Succinyl Dehydrogenase, Chloroacetate Esterase, Gammaglutamyl Transpeptidase and Acetyl Cholinesterase etc).

5.6.3.2. Skills

- i) Operate the cryostat and demonstrate familiarity with the principles of its working and be able to stain tissue sections for some cell constituents.
- ii) Demonstrate familiarity with the commonly used enzyme histochemical procedures.

5.6.4. Immunohistochemistry

5.6.4.1. Knowledge

Demonstrate familiarity with the principles and exact procedures of various immunohistochemical stains using appropriate systems; employing monoclonal and polyclonal antibodies.

5.6.4.2. Skills

Be able to perform immunohistochemical staining using paraffin section with at least one of the commonly used antibodies using appropriate system as available.

5.6.5. Molecular Biology

5.6.5.1. Knowledge

Should understand the principles of Molecular biology especially related to the understanding of disease processes and its use in various diagnostic tests.

5.6.5.2. Skills

Should be conversant with the steps of a Polymerase Chain Reaction (PCR) and should demonstrate understanding of the steps and principles of interpretation of Western Blot, Southern Blot, Northern Blot and Hybridisation procedures.

5.6.6. Principles of Medical Statistics

5.6.6.1. Knowledge

Demonstrate familiarity with importance of statistical methods in assessing data from patient material and experimental studies e.g., correlation coefficients, expected versus observed, etc. and their interpretation.

5.6.6.2. Skills

Calculate mean, standard deviation and standard error, sensitivity and specificity from the given experimental data.

5.6.7. Radio Isotope and Autoradiography, Tissue Culture, Cytogenetics

5.6.7.1. Knowledge

5.6.7.1.1 Demonstrate familiarity with the principles of the commonly used radioisotopes in medicine and autoradiography, and the instruments used to measure radioactivity, techniques of tissue culture

5.6.7.1.2. Demonstrate familiarity with methods of Karyotyping and Fluorescent in-situ Hybridisation (FISH).

Important Note

- i) It is appreciated that the facilities in Institutions vary and this is more likely in the case of Basic Sciences Training. All efforts must be made so that the student gets an opportunity to be familiar with all the aspects of expected training that have been mentioned. If necessary extra-mural postings may be considered to take care of any likely shortcomings in the training. It must be emphasized that the training for the degree of MD (Pathology) is not merely to produce a diagnostic pathologist well versed with routine diagnosis but also to ensure all-round development of the student who will be an asset to the society as a responsible teacher and scientist.
- ii) Development of knowledge and skills in fields not mentioned explicitly should be encouraged. Thus knowledge in imaging techniques and their interpretation would be an asset while interpreting diseases of bones and joints. Knowledge regarding the nature of therapy for various diseases would be helpful not only in identifying iatrogenic diseases but also in actively participating in the diagnosis and management of patients. The relevance of every report of a patient thus becomes more easily understood. No branch of medicine is today restricted or isolated to it. The overall well being of the sick is a team-effort. The student must learn that working, as a team is essential today.
- iii) It should be the endeavor of every training programme to emphasise on quality control and also on the limitations of each and every test.

6. RESEARCH

All effort must be made so that awareness of research methodology is apparent at the end of the course. It is recommended that students submit a Thesis or Dissertation six months prior to examinations as a partial fulfillment to the award of the degree of MD (Pathology). Students should be encouraged to present papers in conferences and publish papers in peer reviewed journals. Due emphasis must be laid on the importance of obtaining ethical clearance from appropriate committees for both animal and human studies.

A separate course for training in research methodology may not be necessary. Skills will be acquired largely depending on the topic of research. The following points are guidelines to what may be expected of the student at the end of the course.

- 6.1. Recognise a research problem – basic or applied
- 6.2. Clearly state the objectives in terms of what is expected to be achieved in the end
- 6.3. Plan rational approaches with appropriate controls with full awareness of the statistical validity of the size of experimental material
- 6.4. Carry out most of the technical procedures required for the study
- 6.5. Accurately and objectively record on systematic lines the results and observations made
- 6.6. Analyse the data with the aid of an appropriate statistical analysis, if necessary
- 6.7. Interpret the observations in the light of existing knowledge and highlight in what ways the study has advanced existing knowledge on the subject and what further remains to be done.
- 6.8. Take photomicrographs, of a quality fit for publication in an international journal
- 6.9. Write the thesis or a scientific paper in accordance with the prescribed instructions, as expected of international standards.

- | |
|---|
| <ol style="list-style-type: none">i) It should be appreciated that a clear definition of the goals and precise objectives before starting a research project is as essential as stating one's destination before starting for the journey. These must be stated in clear, unambiguous terms as ultimate results of the study and not as the methods of approach to the problem.ii) For the purpose of thesis/dissertation, as far as possible each individual must be given the freedom of choice of his/her own subjects he would like to study. He/she should be given an opportunity to apprise himself/herself with topics of current research interests of each member of the faculty. In case the student does not have a preference of his/her own, topics are to be suggested by the faculty who ensure that there is generally an equitable distribution of the postgraduates among the faculty. It is obvious that the thesis or dissertation will be on a topic on which there is general interest, expertise and facilities with the faculty. Interdepartmental collaboration should be encouraged to widen the scope and outlook of the research proposal and training. |
|---|

7. TRAINING METHODS

Diagnostic pathology is concerned with the application of the knowledge of the human body and its diseases, and that of the investigative procedures in the recognition and quantitation of disease. In the training of a pathologist, acquisition of both these disciplines is essential. Eventually, the primary role of the pathologist is to apply the basic understanding of the disease processes to patient care, with the intellectual rigor and careful delineation of problems, characteristic of a research investigator. The training programme should be designed to enable the student to acquire a capacity to learn and investigate for

himself, to synthesize and integrate a set of facts and develop a faculty to reason. The curricular programmes and scheduling of postings must provide the student with opportunities to embrace the above broad objectives. Much of the learning is to be accomplished by the student himself. Interactive discussions are to be preferred over didactic sessions. The student must blend as an integral part of the activities of an academic department that usually revolves around three equally important basic functions of teaching, research and diagnostic service. As mentioned earlier the emphasis is recommended under a residency programme or learning while serving/working. The following is a rough guideline to various teaching/learning activities that may be employed.

- 7.1. Collection of specimens including blood and bone marrow, fine needle aspiration of superficial lumps etc.
- 7.2. Grossing of specimens.
- 7.3. Performing autopsies.
- 7.4. Discussions during routine activities such as during signing out of cases.
- 7.5. Presentation and work-up of cases including the identification of special stains and ancillary procedures needed.
- 7.6. Clinico-pathological conferences.
- 7.7. Intradepartmental and interdepartmental conferences related to case discussions.
- 7.8. Conferences, Seminars, Continuing Medical Education (CME) Programmes.
- 7.9. Journal Club.
- 7.10. Research Presentation and review of research work.
- 7.11. Guest and in-house lectures.
- 7.12. Participation in workshops, conferences and presentation of papers etc.
- 7.13. Laboratory-work.
- 7.14. Use and maintenance of equipment.
- 7.15. Maintenance of records.
- 7.16. Teaching undergraduates and paramedical staff.

8. STRUCTURED TRAINING PROGRAMME

A structured scheme of training is recommended so that every student is exposed to different aspects of the subject and acquires sufficient knowledge and skill as expected from the course. The method by which this is done may vary from institution to institution. However, it is suggested that one senior member of the faculty be given the chief responsibility for organizing and coordinating this programme and any enquires may be made or assistance taken, if necessary, from him/her. The three-year training programme for the M.D. degree may be arranged in the form of postings to different assignments/laboratories for specified periods as outlined below. The period of such assignments/postings is recommended for 35 months, leaving the final month for the purpose of examination. Posting schedules may be modified depending on needs, feasibility and exigencies. It is appreciated that individual institutions may find it convenient to follow a different pattern of posting.

Section / Subject	Duration in months
i) Surgical Pathology and Autopsy including techniques	12
ii) Haematology	9
iii) Cytopathology	6
iv) Thesis/Dissertation Work	2
v) Laboratory Medicine	2
vi) Transfusion Medicine/Blood Bank	2
vii) Basic Sciences including Immunopathology, Electronmicroscopy, Molecular Biology, Research Techniques, biochemistry etc. plus Elective/reorientation	2
TOTAL	35

What has been provided above is a rough guideline. Duration of each posting may vary depending on the resources available and the needs of each institute. Extramural postings to reputed institutions or to other institutions to learn techniques not available in the parent institution and also to acquire knowledge and skill in some aspects of the course may be encouraged.

EVALUATION

8.1.1. There shall be four theory papers :

- | | | |
|-----------|---|--|
| Paper I | : | General Pathology and Pathophysiology,
Immunopathology |
| Paper II | : | Systemic Pathology & Cytopathology |
| Paper III | : | Haematology, Transfusion Medicine (Blood
Banking) and Laboratory Medicine |
| Paper IV | : | Recent advances & Applied aspects. |

8.1.2. Practical Examination should be conducted over a minimum period of two days and a maximum of three days.

The following is a guideline of the aspects to be covered:

- i) A. Clinical Pathology: Discussion of a clinical case history plan relevant investigations of the above case. One relevant investigations should be performed/result interpreted.
B. Complete urinalysis
- ii) Haematology : Discuss haematology cases given the relevant history
Plan relevant investigations
Perform atleast two tests: one routine and one special exercise.
Identify electrophoresis strips, osmotic fragility chart etc.
Examine, report and discuss ten cases given the history and relevant blood smears and/or bone marrow aspirate smears.
- iii) Transfusion (Medicine): Perform blood grouping. Perform the necessary exercise given a relevant history
- iv) Histopathology (Cytopathology): Examine, report and discuss ten to twelve histopathology and three to five cytopathology cases given the relevant history and slides.
Perform a Haematoxylin and Eosin stain and any special stain on a paraffin section
Report on a frozen section
- v) Autopsy: Given a case history and relevant organs (with or without slides) give a list of anatomical diagnosis in a autopsy case.
- vi) Gross Pathology : Describe findings of at least 10 gross specimens, give diagnosis and identify the sections to be processed
- vii) Basic Sciences : Identify electronmicrographs, Identify gels, results of PCR, immunological tests including staining for direct/indirect immunofluorescence, Identify histochemical and immunohistochemistry stains

8.1.3. Viva-voce is expected to be conducted at every stage of the practical examination. Additionally a formal “grand” viva-voce may be held at the end of the practical examination. Questions on the thesis/dissertation may be asked at this time.

The above are guidelines only. It is appreciated that individual institutions may have well-laid out and time-tested methods of examinations. It is recommended that attempts be made to ensure that examinations be as objective as possible. The introduction of structured short answers, multiple choice questions and objective-structured practical examinations (OSPE) may be considered. Nevertheless the value of long answer questions in evaluating a candidate's ability to comprehend and systematically explain scientific literature cannot be undermined. Similarly viva-voce, though subjective allows an in-depth examination of the candidate's strengths and weaknesses in the subject.

CRITERIA FOR DEPARTMENTS TRAINING STUDENTS

It is recommended that any department that wishes to train a candidate leading to the award of the postgraduate degree in MD (Pathology) should fulfill the following criteria.

- 8.2. The department should be part of a teaching hospital attached or affiliated to a Medical College or autonomous institution recognized by appropriate authorities including the Medical Council of India.
- 8.3. The institution should have various departments encompassing different medical specialties and super-specialties so that there is no dearth of clinical material, there is adequate scope of interaction with different departments and overall training of the candidate as given earlier.
- 8.4. The department should be of minimum three years standing performing all routine activities as is necessary to fulfil the training requirements of MD (Pathology).
- 8.5. For the first candidate, there should be a minimum of three faculty members of which one has a minimum of five years and the other two a minimum of three years teaching experience after MD (Pathology) or any such degree recognized by the Medical Council of India.
- 8.6. It is recommended that a maximum of two candidates be admitted for every Professor, three for every two Additional Professors/Readers/Associate Professors and one for every Assistant Professor/Lecturer (with three years experience after the requisite qualification). In case there is only one Additional Professor / Reader / Associate Professor then two candidates may be selected. It must be emphasised that this is a guideline for the calculation of total MD (Pathology) students at any given time in a department.
- 8.7. It is expected that all the Faculty members are full-time employees of the institution concerned.
- 8.8. Every thesis / dissertation shall have one Guide / Supervisor and at least one Co-guide/Co-supervisor from the department. Co-guides / Co-supervisors from other departments may be opted as necessary. In the event of the Guide / Supervisor leaving or retiring, the senior-most Co-guide / Co-Supervisor from the department shall take over as the Guide / Supervisor. Institutional guidelines are to be followed regarding the appointment of Guides / Supervisors. It is recommended that at any given time one Faculty member should not be the Guide / Supervisor for more than five candidates. No such limit can be applied to Co-guides / Co-supervisors.

It must be emphasized that the above are only guidelines and it is necessary to apply the rules and regulations as approved by the Medical Council of India, concerned Universities and the institution.

9. READING MATERIAL

A complete list of reading material is extremely difficult to provide for the postgraduate student in Pathology. In any postgraduate course reading should not be limited only to the subject of specialization. One is expected to acquire as much theoretical and practical knowledge as possible. There can be no set guidelines in this regard. Students must be encouraged to utilize the Internet and similar information technologies to further their knowledge and to supplement conventional reading.

The following is an incomplete list of reading material that may be helpful to a postgraduate student of Pathology. The habit of referring to current literature and the method of searching for literature must be made a mandatory component of the training.

9.1. Journals and Periodicals

- Acta Cytologica
- The American Journal of Pathology
- The American Journal of Surgical Pathology
- The American Journal of Hematology
- The American Journal of Clinical Pathology
- Archives of Pathology and Laboratory Medicine
- British Journal of Haematology
- Blood
- Diagnostic Cytopathology
- Histopathology
- Human Pathology
- Indian Journal of Cytology
- Indian Journal of Pathology and Microbiology
- Journal of Pathology
- Journal of Clinical Pathology
- Laboratory Investigation
- Modern Pathology
- Pathology
- Seminars in Hematology
- Seminars in Diagnostic Pathology
- Virchows Archives
- Year Book Series
- Recent Advances Series

The list of journals is incomplete. It is also expected that the students make it a habit to read other journals because pathology is not confined to pathology journals alone. Specialty journals such as those related to oncology (Cancer, British Journal of Cancer, International Journal of Cancer, Cancer Research, Journal of National Cancer Institute, Journal of Surgical Oncology etc.) are excellent sources of information regarding the pathology of tumours. Similarly journals related to Cardiology, Chest Diseases, Dermatology, Endocrinology, Gynecology, Gastroenterology, Hepatology, Nephrology, Neurology, Neurosurgery, etc. are invaluable sources of material on the appropriate pathology. Further Journals such as Lancet, New England Journal of Medicine, Nature and Science are a must for every postgraduate student who wishes to keep abreast with what is new in medical science and therefore in pathology.

9.2. Books

- Histology for Pathologists. *Stephen S. Sternberg (Ed)*, Raven Press, New York.
- General Pathology *JB Walter, MS Israel*. Churchill Livingstone, Edinburgh.
- Robbin's Pathologic Basis of Disease *Ramzi S. Cotran, Vinay Kumar, Stanley L Robbins WB Saunders Co.*, Philadelphia.
- Pathology Emanuel Rubin, *John L Farber*. JB Lippincott Co., Philadelphia.
- Anderson's Pathology. *John M Kissane (Ed)*. The CV Mosby Co., St. Louis
- Ackerman's Surgical Pathology. *Juan Rosai* Mosby. St. Louis
- Diagnostic Surgical Pathology. *Stephen S Sternberg*. Lippincott, William Wilkins. Philadelphia
- Systemic Pathology. *W St. C Symmers (Series Ed)* Churchill Livingstone, Edinburgh
- Diagnostic Histopathology of Tumours. *Christopher DM Fletcher (Ed)*. Churchill Livingstone. Edinburgh.
- Soft Tissue Tumors. *Franz M Enzinger, Sharon W Weiss*. Mosby, St. Louis
- Cardiovascular Pathology *Malcolm D Silver* Churchill Livingstone New York.
- Pathology of Pulmonary Diseases *Mario J Saldhana*. JB Lippincott Co., Philadelphia
- Spencer's Pathology of the Lung. *PS Hasleton*. Mc Graw-Hill, New York.
- Dahlin's Bone Tumors. *K Krishnan Unni*. Lippincott-Raven Publishers, Philadelphia, New York
- Bone Tumours *Andrew G Huves* WB Saunders Co. Philadelphia
- Greenfield's Neuropathology. *J Hume Adams (Ed)* Edward Arnold, London.
- Russel & Rubeinstein's Pathology of the Tumours of the Nervous System. *Darrell D Bigna Roger E Mc Lendon, Janet M Bruner (Eds.)*, Arnold, London.
- Rosen's Breast Pathology. Paul Peter Rosen. Lippincott-Raven Publishers, Philadelphia. New York.
- Pathology of the Gastrointestinal Tract. *S-I Chun Ming. Harvey Goldman (Eds.)* Williams & Wilkins, Baltimore.
- Haynes and Taylor Obstetrical & Gynaecological Pathology. *H Fox, M Wells*. Churchill Livingstone New York.
- Heptinstall's Pathology of the Kidney. *J Charles Jenetie, Jean L. Olson, Melvin M Schwart Fred G Silva (Eds)*. Lippincott-Raven Publishers, Philadelphia, New York.
- Potter's Pathology of the Fetus & Infant. *Enid Gilbert-Barnes (Ed)*. Mosby, St. Louis
- Lever's Histopathology of the Skin, *David Elder (Ed)*, Lippincott-Raven Publishers, Philadelphia, New York.
- Theory and Practice of Histological Techniques, *Bancroft JD, Stevens A, Turner DR*, Churchill Livingstone, Edinburgh
- Histotechnology – A Self Instructional Text, *Carson FL*, American Society of Clinical Pathologists, Chicago.

- Histochemistry Theoretical and Applied. *AG Everson Pearse*. Churchill Livingstone. Edinburgh.
- Manual & Atlas of Fine Needle Aspiration Cytology. *Svante R Orell, Gregory F Sterrett, Max N. J. Walters*, Darrel Whitaker: Churchill Livingstone, London.
- Cytopathology. *Zuher M Zaib*. Little Brown and Company, Boston.
- Diagnostic Cytology and its Histopathologic Basis, *Koss LG*, J.B. Lippincott, Philadelphia
- Comprehensive Cytopathology, *Bibbo M*, W.B. Saunders Co, Philadelphia.
- William's Hematology *Beutler E, Lichtmann MA, Collier BS, Kipps TJ*, McGraw Hill, New York.
- Postgraduate Hematology *Hoffbrand AV, Lewis SM, Tuddenham EGD*, Butterworth Heinemann, Oxford.
- Wintrobe's Clinical Hematology, *Lee GR, Foerster J, Lupeus J, Paraskevas F, Gveer JP, Rodgers GN*, Williams & Wilkins, Baltimore.
- Practical Haematology, *Dacie JV, Lewis SM*, Churchill Livingstone, Edinburgh
- Bone Marrow Pathology, *Bain BJ, Clark DM*, Lampert IA, Blackwell Science, Oxford
- Leukemia Diagnosis-A guide to the FAB Classification, *Bain BJ, J.B. Lippincott*, Philadelphia.
- Clinical Diagnosis and Management by Laboratory Methods, *Henry JB, WB Saunders*. (Indian Edition, Eastern Press, Bangalore).

MODEL QUESTION PAPERS

MD Degree Examination – Branch III – Pathology

Paper I

General Pathology, Pathophysiology and Immunopathology

Time 3 hours

Max Marks 100

1. Give an account of immune reactions to transplant organs and tissues. (25)
2. Discuss the role of mast cells in health and disease. (25)
3. Write briefly on: (5x10=50)
 - a) Aetiopathogenesis of edema
 - b) Molecular basis of metastasis
 - c) Leucotrienes in inflammation
 - d) Langerhans cells
 - e) Radiation induced carcinogenesis

MD Degree Examination – Branch III – Pathology

Paper II

Systemic Pathology including Cytopathology

Time 3 hours

Max Marks 100

1. Discuss the pathology and diagnosis of gestational trophoblastic disease. (25)
2. Discuss the role of cytology in the diagnosis of salivary gland tumors. (25)
3. Write briefly on: (5x10=50)
 - a) Childhood renal tumors
 - b) Prostatic intraepithelial neoplasm
 - c) Myasthenia gravis
 - d) Primary Biliary Cirrhosis
 - e) Body cavity lymphoma

MD Degree Examination – Branch III – Pathology

Paper III

**Haematology, Transfusion Medicine (Blood Banking)
and Laboratory Medicine**

Time 3 hours

Max Marks 100

1. Discuss your approach to a patient with hemorrhagic diathesis. (25)
2. Discuss the haematological sequelae of infection with Human Immunodeficiency Virus-type 1 (HIV-1) (25)
3. Write briefly on: (5 x10=50)
 - a) Chromosomal anomalies in leukemia
 - b) Alpha thalassemia
 - c) Laboratory evaluation of iron deficiency anemia
 - d) Rational use of blood components
 - e) Liquid based cytology for cervical screening

MD Degree Examination – Branch III – Pathology

Paper IV

Recent Advances and Applied aspects

Time 3 hours

Max Marks 100

1. Discuss the role of immunopathology in the diagnosis of kidney diseases. (25)
2. Discuss the current concepts in the pathology of Hodgkin lymphoma. (25)
3. Write briefly on: (5x10 =50)
 - a) Tissue microarray
 - b) Lectins in diagnostic pathology
 - c) Premalignant endometrial lesions
 - d) Pathology of Barrett esophagus
 - e) Matrix metalloproteinases in neoplastic proliferation

The question paper may be formed in such a way so as to elicit precise information. The questions should be less open ended and strive to evaluate the approach to a disease entity, recent concepts and not mere theoretical rote knowledge.

PHARMACOLOGY

Objectives:

At the end of three year course in Pharmacology the candidate should be able to

1. Apply the knowledge of general pharmacology, molecular pharmacology, systemic pharmacology and clinical pharmacology in drug development and the rational use of drugs.
2. Use recent educational tools for conducting lectures, practical demonstration and tutorial classes for students to teach pharmacology.
3. Carry out screening of drugs for pharmacological and toxicological profiles.
4. Write protocols and to conduct experimental studies in animals and clinical trials in human beings
5. Plan and conduct research works, applying the principles of research methodology including biomedical statistics.
6. Write and publish research papers in peer reviewed journals; critically review and comment on published research papers.
7. Monitor adverse drug reactions and provide drug information service to the needy.

Course content

First year

In the first year the candidate

- a. will be introduced to the field of pharmacology and its branches
- b. has to select a dissertation topic
- c. will be trained for laboratory work, clinical work and teaching undergraduates.

0-4 months

Must know	Topics to be covered
GLP	Principles, management's responsibilities, study director's responsibilities, quality assurance programme, facilities, apparatus, material, reagents, receipt, handling, sampling and storage, characterization, standard operating procedures, reporting of study results, storage and retention of records and material.
GCP	Principles of ICH GCP, responsibilities, composition, functions and operations, procedures, records, investigator, sponsor, clinical trial protocol and protocol amendment, investigator's brochure, essential documents for the conduct of a clinical trial.
Laboratory animals	Animal ethics Basic physiology (rat, mouse, guinea pig, , hamster, rabbit, cat, dog, monkey, frog and toad) Life span, Gestational period, Breeding types, Breeding methods, Factors affecting the nature and degree of pharmacological responses, Daily food intake, HR, BP, RR, hemoglobin, blood volume. Experimental models for screening various disease states and drugs Handling of animals, Blood collection , Intragastric administration and intravenous injection for mouse, rat, guinea pig rabbit

	<p>Anesthesia (Pre-medication, Local and general anesthesia, Sedation and analgesia, Anesthetic compounds, Termination of anesthesia)</p> <p>Euthanasia (Chemical agents recommended for euthanasia of laboratory animals, Physical methods, Recommended methods for specific animal species)</p>
Introduction to some standard drug and salt solutions used for various experiments	<p>Composition of salt solutions (Frog ringer, Tyrode etc)</p> <p>Drug solutions (Stock solutions of noradrenaline, adrenaline, isoprenaline, dopamine, acetylcholine, histamine, physostigmine)</p> <p>Concentrations, molarity and conversion factors</p> <p>Solvents or vehicles</p> <p>Commonly used anticoagulants</p> <p>Different strengths of alcohol</p> <p>Storage unitage</p>
Basic laboratory equipments -6 days	Levers, Aerators, Organ bath, kymographs, physiographs, Marriott's bottle, frog heart setup, hind limb perfusion setup, balances (Mechanical & electronic), pH meter, colorimeter, spectrophotometer, spectrofluorimeter, HPLC, RIA, PCR, centrifuge, pipettes, sample storage, refrigerators, water purifiers, Cleaning of glass wares.
Research methodology	
Statistics	Data presentation, alpha and beta errors, statistical calculations, SD and SEM, parametric and non parametric tests, sample size calculations, probit plotting
Teaching aids	Conventional methods, modern teaching aids, effective usage
Computer and internet	Medline search, Bibliography software, statistics software, Biomedical communication, OHP
Pedagogy	

5 to 12 months

Must do	
Smoking of drum and fixing of tracings on the smoked surface.	
In vitro animal experiments	<p>Graded dose response for acetylcholine in frog rectus</p> <p>Cumulative dose response for acetylcholine in frog rectus</p> <p>Potential of acetyl choline by serine</p> <p>Antagonism of acetyl choline by d-TC</p> <p>Matching assay, 2+1 assay, 2+2 assay, PA_2 value, Isolated frog heart, Frog lumbar plexus</p>

	Rat aorta for histaminergic systems Rat vas deferens for adrenoceptor systems Guinea pig tracheal chain histaminergic systems Hind limb perfusion of frog
In vivo animal experiments	Preclinical toxicity testing, LD 50, RAT BP rabbit eye experiments, frog saline purgative, frog ciliary movement, anti psychotic-haloperidol Screening methods Analgesic, Anticonvulsant, anti inflammatory, anti diabetic, anti motility, anti anxiety, anorectic, anti ulcer, anti hypertensive, diuretic-metabolic cage, hepatoprotective drugs, dermatological screening methods.
Clinical posting	The candidate will be posted in medicine and allied subjects 6 months after joining the course. The clinical posting is only in forenoon for 3 months which includes a 15 day posting in emergency department.

Second year

In second year the candidate will be given

- a) Teaching assignments
- b) Training for laboratory and clinical work
- c) Dissertation work
- d) Administrative and service work

Must know	Must do
Pharmacovigilance,pharmaco economics, Essential Drug List , P list, Therapeutic Drug Monitoring, Pre-clinical toxicity testing	Clinical pharmacology ECG taking, HPLC- estimation of phenytoin, Spectrophotometry and colorimetry for salicylates, Spectrofluorimetry for quinine, RIA- estradiol assay , Preparation of buffer of a particular PH , pulmonary Function Tests, Psychomotor tests, Training in biochemistry, physiology
Bioavailability studies, Writing protocol, Preparing consent forms, Check list for bioavailability studies, Collection, separation and storage of samples, Calculation of pharmacokinetic (parameters – model dependant & model independent), Zero order kinetics, Multi dose kinetics, Regulatory requirement for pharmacokinetic data	Molecular biology Extraction of DNA, Horizontal gel electrophoresis, Vertical gel electrophoresis, Gel documentation system, Interpretation of PCR-RFLP based genotype, Bioinformatics
	Clinical trials Writing protocol for Antihypertensives, Antianginal, Antiarrhythmic, Cardiotonic, Analgesic, Anticonvulsant, Antipyretic, Antipsychotic, Antidepressant, Hypnotic, Antiparkinsonism, Anti-inflammatory, Skeletal

	muscle relaxants, Local anaesthetics, Antihistamines, Antitussive, Antiulcerogenic drugs, Antitumour, Diuretic, Antiemetics, Anti diabetics, Hypolipidemics drugs, Anti malarial drugs, Anti tubercular drugs, Anti fertility, Osteoporosis, Anti asthmatics
--	--

Third year

During third year the student has to complete and submit his/her dissertation to JIPMER and will be given teaching assignments.

Must know	Must do
Recent advances including pharmacogenomics, cell culture and nanotechnology.	Visit to pharmaceutical company, lab , CRO Presentation of thesis work in department
	Submission of thesis 6 months before exam

Teaching and learning opportunities

Throughout the course emphasis shall be on acquiring knowledge, skill and attitudes through first hand experiences as far as possible. The focus will be on self learning and based on the concept best way to learn is to do.

During three year course the following sessions will be held for PG students

- 1. Learning experience:** lectures, group discussions, symposia, practical demonstrations, dissertation, posting at various labs.
- 2. Journal club:** to familiarize with research methodologies and analysis of results.
- 3. Seminars:** to update newer developments in pharmacology, emerging trends in therapeutics, novel mechanisms of drug action, novel use of an old drug etc.
- 4. Clinical Experience:** the student will be posted in clinical departments in forenoon for 3 months including 15 days posting in emergency department.
- 5. Practical exercises:** at least once a week, under the supervision of a faculty to develop practical skills to conduct similar experiments in the future. The student must maintain a record of conducted practicals.
- 6. Thesis:** Each PG student will carry out a research work under the supervision of an eligible faculty member of the Pharmacology department. The dissertation will be reviewed by all faculty members of the department once in 6 months. The thesis will be submitted to JIPMER and will be evaluated by a panel of examiners appointed by JIPMER. The candidate should score at least 50% of marks for acceptance of his thesis work. Acceptance of thesis will be a prerequisite for the candidate to appear in the final examination.
- 7. Examination:** at the end of three years there will be an examination consisting of theory, practical and oral examination.
- 8. Theory examination:** will consist of four papers, each of three hours duration. Each paper will have MCQs (multiple correct response type, 20% weightage) and essays and short essays type (80% weightage).
- 9. Practical examination:** will be held in two days which will include
 - i) One experimental pharmacology exercise on intact animal
 - (or)
 - One experimental pharmacology exercise with isolated tissue/organ.

- ii) One drug assay with calculation of pharmacokinetic parameters and its interpretation exercise.
- iii) Two clinical pharmacology exercise (Protocol writing and critically evaluating a published research paper).
- iv) One statistical exercise.
- v) Demonstration of techniques in laboratory animals.
- vi) Microteaching.
- vii) Viva.

Syllabus for doctorate course (MD Pharmacology) – Branch VI

General Pharmacology and allied sciences

1. Principles of drug action, agonist, antagonist, partial agonist, inverse agonist, spare receptors and types of antagonism.
2. Molecular mechanisms of drug action including drug receptor interactions, transducer mechanisms, second messenger systems in transmembrane signaling, G – protein coupled receptors, tyrosine kinase linked receptors, ion channel linked receptors, nuclear receptors, P-glycoprotein.
3. Pharmacokinetic principles: factors governing transport of drugs across biological membranes; basis of selective distribution of drugs in the body; biotransformation and elimination of drugs; drug elimination kinetics and its clinical importance; bioavailability and bioequivalence.
4. Drug interactions, fixed dose combinations and combined use of drugs.
5. Adverse effects of drugs including drug toxicity, hypersensitivity, idiosyncrasy, tolerance, dependence, teratogenicity, mutagenicity and carcinogenicity.
6. Dose –response relationships, variation in drug response and factors governing it.
7. Physiological processes and biochemical mechanisms relevant to the understanding of drug action.
8. Etiopathogenesis of diseases relevant to the understanding of therapeutic effect of drugs.
9. Basic concepts of immunology needed to understand the immunomodulatory action of drugs.
10. Basic knowledge of microbes, viruses and parasites needed to understand the action of anti-microbial and anti-parasitic drugs.
11. Ethnopharmacology.
12. Essential drugs, P list, rational prescribing.
13. Structure – activity relationships in drug action.
14. Molecular biology in Pharmacology: pharmacogenomics, proteomics, epigenetics, gene expression, PCR, Northern blot, Southern blot, Western blot, antisense oligonucleotides, molecular targets of drug actions etc.

Practical skills:

- a) To demonstrate the action of agonist and antagonist in an intact animal or an isolated tissue.
- b) To isolate an active principle from a plant product using chromatographic methods.
- c) To be able to extract DNA from blood and do genotype analysis using PCR and electrophoresis techniques

Systemic Pharmacology

1. Pharmacology of drugs acting on

- a) Autonomic nervous system

- b) Cardiovascular system
- c) Central nervous system
- d) Endocrine system
- e) Respiratory system
- f) Kidney
- g) Haemopoietic system
- h) Gastrointestinal tract

2. Pharmacology of

- a) Antimicrobial drugs
- b) Antiviral drugs
- c) Antiparasitic drugs
- d) Antineoplastic drugs
- e) Immunomodulating drugs
- f) Skeletal muscle relaxants
- g) Local anaesthetics
- h) Autacoids and related drugs
- i) Chelating agents

3. Miscellaneous

Vitamins, ocular and dermatopharmacology, gene therapy, therapeutic gases, antioxidants, pharmacotherapy of migraine, neurodegenerative disease, male sexual dysfunction etc.

Practical skills:

- a) To demonstrate the vasomotor reversal of Dale phenomenon in rat.
- b) To find out the effect of a drug on various systems in a healthy volunteer or patient using ECG, PFT, psychometric tests etc.

Experimental Pharmacology, Drug Evaluation, Research Methodology and Biostatistics

1. Principles governing animal experimentation and their limitations in drug evaluations.
2. Screening methods for drug activities and animal models used in the evaluation of drugs for actions like – antihypertensive, antianginal, antiarrhythmic, cardiotonic, analgesic, anticonvulsant, antipyretic, antipsychotic, antidepressant, hypnotic, antiparkinsonian, antiinflammatory, skeletal muscle relaxant, local anaesthetic, antihistaminic, hypoglycemic, antifertility, antitussive, antiulcerogenic, antitumour, diuretic and antiemetics.
3. General principles of bioassay of drugs, methods of bioassay of – acetylcholine, histamine, 5-HT, adrenaline/noradrenaline, insulin, digoxin, glucocorticoids, androgens, estrogens, progestins, anabolic steroids, antimicrobials and antimalarials.
4. Toxicity studies including acute, sub acute and chronic toxicity evaluation in animals.
5. Basics of cell cultures techniques and in vitro cell culture based on drug toxicity testing.
6. Methods involved in testing teratogenicity, carcinogenicity and mutagenicity in animals.
7. Evaluation of addicting liability of drugs, methods of studying intestinal absorption of drugs, methods of studying biotransformation and excretion of drugs.

8. Basic principles of physicochemical, chromatographic, radio-immuno and enzyme linked immuno assay of drugs.
9. Research methodology including GLP, IEC, SOP etc.
10. Biostatistics as applied to measurement of drug action.
11. Calculation of basic statistical parameters (mean, median, mode, standard deviation, standard error, p value etc), parametric and non parametric tests (Student 't' test, Wilcoxon, Anova etc), metaanalysis.

Practical skills:

- a. Evaluation of various drugs using appropriate animal models.
- b. Estimation of drug concentration using HPLC, RIA, colorimeter, spectrophotometer, spectrofluorimeter.
- c. Calculation of statistical significance in the given data for student's paired and unpaired t test, applying ANOVA to the given set of concentration vs time data of two drug formulations to comment about their bioequivalence.
- d. In vitro drug toxicity testing using cell cultures techniques.
- e. Writing a research proposal on animals for ethics committee approval.

Clinical Pharmacology and Recent advances in Pharmacology

1. The scope of clinical pharmacology and its relevance to optimum use of drugs.
2. Preclinical data needed by regulatory authorities before undertaking clinical trial of a new drug.
3. Clinical trials: GCP, protocol designing, placebos, phases of clinical trial – their purpose and methodology.
4. Ethical aspects of clinical trials and studies of drugs in human beings.
5. Drug regulations: drug regulatory requirements for clinical trials in India, drugs and cosmetic act, drug price control order
6. Pharmacovigilance.
7. Therapeutic drug monitoring: dosage strategies, influence of hepatic, renal, cardiovascular, hormonal, gastrointestinal diseases and ageing on pharmacokinetics of drugs.
8. Drug utilization studies, pharmacoeconomics, rational prescribing and concept of essential drugs.
9. Recent advances in the understanding of drug action and their future therapeutic relevance.

Practical skills:

- a) Calculation of pharmacokinetic parameters like K_a , K_e , C_{max} , t_{max} , $t_{1/2}$, MRT, AUC, AUMC, Vd and clearance from given concentration vs time data.
- b) Writing for the approval of Investigational New Drug (IND) and New Drug Application (NDA) by regulatory authorities.
- c) Writing a protocol to conduct phase I II and III clinical trials for a new drug.
- d) Writing a research proposal involving humans for ethics committee approval.

List of Postgraduate practical exercises

1. Bioassays of histamine and acetylcholine on guinea pig ileum, frog rectus abdominis muscle using matching assay, (2+1) assay, (2+2) four point assay.
2. Study of competitive antagonism using frog rectus abdominis muscle preparation.
3. Determination of pA_2 values of mepyramine or any other H1 blocker against histamine on guinea pig ileum.

4. Determination of pA_2 values of d-tubocurarine against acetylcholine on frog rectus abdominis muscle.
5. Study of potentiation of acetylcholine by eserine on frog rectus abdominis muscle.
6. Study of analgesic activity of drugs using
 - a) Thermal assay
 - b) Chemical assay
 - c) Physical assay
7. Study of anticonvulsant drugs using
 - a) Electroshock seizures
 - b) Chemoconvulsions
8. Study of drugs on spontaneous motor activity of rats/mice.
9. Study of anorectic activity of drugs on rats/mice.
10. Study of mydriatic and miotic drugs.
11. Evaluation of local anaesthetic activity by
 - a) Guinea pig intradermal wheal
 - b) Frog lumbar plexus
12. Study of drugs on Blood Pressure in anaesthetized rats.
13. Demonstration of vasomotor reversal of Dale.
14. Study of potentiation of barbiturate hypnosis on chlorpromazine.
15. Study of drug actions on perfused hind limbs of frog.
16. Estimation of salicylic acid by colorimetric method.
17. Spectrophotometric estimation of drugs.
18. Estimation of drugs using HPLC.
19. Genotyping using molecular biology techniques.

Evaluation of Postgraduates during the course (Internal Assessment)

1. Postgraduates will be assessed continuously during their training period.
2. Internal assessment is to be carried out by continuous evaluation during the three years. Each PG will have a diary on which scores/marks will be maintained.
3. Evaluation will be done during journal clubs, subject reviews and by individual faculty members in charge of laboratories. They will be assessed on attendance, sincerity and learning skills. Objective evaluation based on scores for mastering particular skills will be done whenever possible.
4. All practical exercises should be done and documented in a record by the PG. Each practical must be signed by a faculty member.
5. Notified written tests will be conducted on different topics followed by a viva voce. Two tests will be conducted per year with an additional send-up exam in the final year. The internal assessment marks will be calculated from the best 5 performances out of six notified tests (excluding send up examination).
6. The maximum marks for the internal assessment is 200 (Theory 90 and viva 10, total 100) and Practicals 80 and records 20, total 100). They should score at least 50% to appear for the Final Examination.

Final examination

Theory (4 papers) – 400 Marks (To be conducted in four days)

Paper - I General Pharmacology and allied sciences

Paper - II Systemic Pharmacology

Paper - III Experimental Pharmacology, Drug Evaluation, Research Methodology and Biostatistics

Paper - IV Clinical Pharmacology and Recent advances in Pharmacology

Model question papers

M.D. Degree Examination – Branch VI – Pharmacology

Paper – 1: General Pharmacology & Allied Sciences

Time - 3 hrs

Total - 100 marks

1. Discuss the role of ligand gated ion channels in drug action. (25 marks)
2. Discuss useful and harmful drug interactions in the body (25 marks)
3. Write short notes on (5 x 10 = 50 marks)
 - a) Influence of pH on transport of drugs across biological membranes.
 - b) Pharmacogenetics of drug transporters.
 - c) Presynaptic receptors.
 - d) Drug use in elderly patients.
 - e) Structure activity relationships among glucocorticoids.

Paper - II (Systemic Pharmacology)

Time - 3 hrs

Total - 100 marks

1. Discuss the pharmacotherapy of congestive heart failure. (25 marks)
2. Discuss the role of haematopoietic growth factors in cancer chemotherapy (25 marks)
3. Write short notes on (5 x 10 = 50 marks)
 - a) Low molecular weight heparins
 - b) Third generation cephalosporins
 - c) Antifungal antibiotics.
 - d) Immunomodulators.
 - e) Protease inhibitors in HIV infection.

**Paper - III (Experimental Pharmacology, Drug Evaluation,
Research Methodology and Biostatistics)**

Time - 3 hrs

Total - 100 marks

1. Discuss the experimental methods employed in evaluating a new anti-diabetic agent. (25 marks)
2. Discuss the screening techniques for anti –inflammatory drugs. (25 marks)
3. Write short notes on (5 x 10 = 50 marks)
 - a) Guinea pig as an experimental animal.
 - b) Subacute toxicity tests.
 - c) Screening technique for anti-fertility drugs for males.
 - d) Sample size calculation.
 - e) Type 2 error and its significance in clinical trials.

Paper - IV :Clinical Pharmacology and Recent advances in Pharmacology

Time - 3 hrs

Total - 100 marks

1. Discuss the drug regulatory requirements for clinical trial of a new drug. (25 marks)
2. Discuss the role of Monoclonal antibodies in cancer management. (25 marks)
3. Write short notes on (5 x 10 = 50 marks)
 - a) Concept of essential drugs.
 - b) Pharmacovigilance.
 - c) Newer approaches to treat malaria.
 - d) Selective estrogen receptor modulators.
 - e) Drugs acting on potassium channels.

Books recommended

1. Goodman & Gilman's The Pharmacological basis of therapeutics. Ed. Hardman JG, Limbird LE (11th edn/ latest edition) McGraw Hill press New York (2005 / latest).
2. Applied biopharmaceuticals and pharmacokinetics. Ed. Shargel L. (4th edition/latest) Prentice – Hall international, London (1999 / latest).
3. Fundamentals of experimental pharmacology. Ed. Ghosh MN. (3rd edition/latest) Scientific book agency, Calcutta (2005 / latest).
4. Drug discovery and evaluation – Pharmacological assays. Ed. Vogel HG & Vogel WH. Springer – New York (2002 / latest).
5. Harrison's Principles of Internal Medicine. (16th edition/latest) McGraw Hill press New York volume I & II (2005 / latest).
6. Principles of Clinical Pharmacology. Ed. Arthur J. Atkinson, JR. Academic Press (2001)
7. Textbook of Therapeutics Drugs and Disease Management. (7th edition/latest) Ed. Herfindal ET & Gourley DR. Lippincott Williams & Wilkins (2000 / latest).
8. Clarke's Analysis of Drugs and Poisons. (3rd edition/latest) volume 1 & 2. Eds. Maffat AC, Osselton MD & Widdop B. (2004 / latest)
9. Clinical Toxicology. Ford MD. Saunders. (2001 / latest)
10. Oxford Textbook of Clinical Pharmacology and Drug Therapy. (3rd edition/latest). Smith G & Aronson JK. (2002 / latest)
11. Pharmacotherapy – A pathophysiological approach. (6th edition / latest) DiPiro JT. McGraw Hill press New York (2005 / latest).
12. Text book of receptor pharmacology. Eds. Forman JC & Johansen TJ. CRC press, New York 1996.
13. Applied therapeutics - The Clinical Use of Drugs. (8th edition / latest) Kimble MA. Lippincott Williams & Wilkins.
14. Clinical Pharmacokinetics Concepts & Applications. (3rd edition / latest) Rowland M & Tozer TN (1996 / latest).
15. A textbook of Pharmacognosy. Trease GE and Evans WC. (11th edition/latest)
16. Pharmacognosy and Pharmacobiotechnology. Ashutosh Kar. New Age International Publishers – 2003.
17. Avery's Drug Treatment. (4th edition / latest) Eds. Speight TM & Holford NHG. Adis International Ltd (1997 / latest)
18. Design and analysis of clinical trials – concepts & methodologies. Chow SC & Liu JP. (2nd edition / latest) Wiley.

Journals to be referred

1. Indian Journal of Pharmacology
2. Indian Journal of Physiology & Pharmacology
3. Trends in Pharmacological Sciences
4. Annual Review of Pharmacology and Toxicology
5. Pharmacological Reviews
6. Drugs
7. Clinical Pharmacology and Therapeutics
8. British Journal of Pharmacology
9. British Journal of Clinical Pharmacology
10. Fundamental and Clinical pharmacology
11. Journal of Pharmacology and Experimental Therapeutics
12. European Journal of Clinical Pharmacology
13. Pharmacogenomics Journal
14. Pharmacogenetics and Genomics
15. Journal of Ethnopharmacology
16. Nature
17. Science

PHYSIOLOGY

AIMS AND OBJECTIVES

Aim (goal):

The aim of teaching PG students is to provide comprehensive knowledge of functions of various systems of body to facilitate understanding of the physiological basis of health and disease and to carry out the basic responsibilities of a teacher in physiology.

Objectives:

A. At the end of the course, the student shall be able to:

- 1) Learn history of medicine, pertaining to the contributors in the development of the physiology (system-wise), including recent contributors.
- 2) Know details of functions of organ systems of human body including their molecular basis of mechanisms.
- 3) Understand details of regulatory mechanisms that govern various functions of our body.
- 4) Comprehend physiological principles underlying pathogenesis and treatment of various diseases.
- 5) Know recent advances in physiology.
- 6) Teach undergraduate and postgraduates in physiology.
- 7) Plan and conduct basic medical research.
- 8) Plan and execute educational programme / teaching schedules.
- 9) Organize and equip physiology laboratories.
- 10) Apply his knowledge in physiology for understanding clinical medicine.

PAPERS AND COURSE CONTENT

Theory Papers (4 papers)

Paper I: General physiology, Body fluids, Blood, Physiological basis of immunity, Renal physiology, Basics of biostatistics, and History of Medicine.

Paper II: Endocrine physiology, Physiology of reproduction, ANS and Gastro-intestinal system.

Paper III: Cardiovascular system, Respiratory system, Integrative physiology (environmental physiology, exercise physiology, nutrition and yoga).

Paper IV: Central nervous system, Special senses, Nerve and muscle, and Recent advances.

Details of Course Content

A. Theory

I. General physiology, Body fluids, Blood, Physiological basis of immunity, Renal physiology, and Basics of biostatistics.

General Physiology:

1. Principles of homeostasis and feedback control mechanisms
2. Functional organization of cell, intercellular connections, cell death (apoptosis)
3. Physiology of genetics
4. Transport across cell membrane
5. Membrane potential

Body Fluids:

1. Body fluid compartments
2. Measurement of body fluids
3. Regulation of volume and composition of body fluids

Blood:

1. Composition and functions of blood
2. Bone marrow and hemopoiesis
3. Erythropoiesis and physiology of red cells
4. Blood groups and blood transfusion
5. Pathophysiology of anemia and polycythemia
6. Leucopoiesis and leucocytes
7. Hemostasis, platelets and blood coagulation

Physiological basis of Immunity:

1. Development of immunity
2. Cellular immunity
3. Humoral immunity
4. Physiological basis of immunotherapy, and prevention of transplant rejection

Renal Physiology

1. Functional Anatomy of Kidney
2. Renal Blood Flow and Glomerular Filtration
3. Tubular Functions
4. Mechanisms of Urine Concentration and Dilution
5. Water Excretion; Diuresis and Diuretics
6. Acidification of Urine
7. Kidney Function Tests
8. Physiology of Micturition and Bladder Dysfunctions

Basics of Biostatistics:

1. Student's t test
2. ANOVA
3. Post-hoc tests
4. Tests for statistical comparison

II. Endocrine physiology, Physiology of reproduction, ANS and Gastro-intestinal system

Endocrine Physiology:

1. Mechanisms of hormone actions, G proteins
2. Endocrine functions of hypothalamus and hypothalamopituitary axis
3. Anterior and posterior pituitary glands
4. Thyroid gland
5. Adrenal cortex and medulla
6. Endocrine pancreas
7. Parathyroid gland and calcium homeostasis, bone physiology
8. Pineal gland
9. Local hormones

Physiology of Reproduction:

1. Sex differentiation and development
2. Physiology of puberty and menopause

3. Male reproductive system
4. Female reproductive system
5. Physiology of pregnancy and parturition
6. Physiology of breast development and lactation
7. Physiology of contraception

ANS:

1. Functional Organization of ANS
2. The Sympathetic System
3. The Parasympathetic System
4. Control of Autonomic Functions; Autonomic Dysfunction; Autonomic Function Tests

Gastro-intestinal System:

1. Functional Organization of GI tract
2. Gastrointestinal Hormones
3. GI Secretions
 - Salivary secretion
 - Gastric Secretion; Gastric Function Tests and Pathophysiology of Peptic Ulcer
 - Pancreatic Secretion and Pancreatic Function Tests
 - Functions of Liver and Pathophysiology of Jaundice
 - Biliary Secretion
 - Intestinal Secretion
4. GI Motility
 - Chewing, Deglutition and Esophageal Motility
 - Gastric Motility
 - Small Intestinal Motility
 - Motility of Large Intestine; Colonic Functions and Defecation
5. Principles of Digestion and Absorption

III: Cardiovascular system, Respiratory system, and Integrative physiology (environmental physiology, exercise physiology, nutrition and yoga)

Cardiovascular System:

1. Functional organization of CVS, Functional anatomy and innervation of heart
2. Properties of Cardiac Muscle
3. Electrophysiology of Heart and Electrocardiogram
4. Cardiac Cycle
5. Cardiac Output
6. Heart Rate and Arterial Pulse
7. Principles of Hemodynamics
8. The Arterial System
9. The Venous System
10. Capillary and Lymphatic Circulations Blood Pressure and its Regulation
11. Integrated Regulation of Cardiovascular System
12. The Regional Circulations
13. Fetal Circulation
14. Pathophysiology of Hypertension and Hypotension
15. Pathophysiology of Shock
16. Pathophysiology of Heart Failure

Respiratory System:

1. Functional Organization of Respiratory System
2. Mechanics of Breathing
3. Alveolar Ventilation and Gas Exchange in Lungs
4. Pulmonary Circulation and Ventilation-Perfusion Ratio
5. Transport of Gases in Blood
6. Regulation of Respiration
7. Physiological Changes at High Altitude
8. Hypoxia and Oxygen Therapy
9. Hazards of Deep-Sea Diving and Effects of Increased Barometric Pressure
10. Respiration in Abnormal Conditions and Abnormal Respirations
11. Artificial Respiration and Cardiopulmonary Resuscitation
12. Pulmonary Function Tests

Integrative Physiology:

1. Environmental physiology
2. Exercise physiology
3. Nutrition
4. Physiology of yoga

IV: Central nervous system, Special senses, Nerve and muscle, and Recent advances

Central nervous system:

1. Functional Organization of Nervous System; Functions of glial cells
2. Synaptic Transmission in CNS
3. The Sensory System
 - Physiology of Receptors
 - Ascending Pathways
 - Physiology of Pain
 - Trigeminal System
 - Thalamus and Sensory Cortex
4. The Motor System
 - Segmental Organization of Motor System
 - Muscle Spindle and Golgi Tendon Organ
 - Spinal Reflexes
 - Descending Pathways
 - Control of Posture and Movement
 - Basal Ganglia
 - Cerebellum
 - Vestibular Apparatus
5. Functions of Hypothalamus, EEG and Sleep
6. Limbic System and Higher Functions
7. Cerebrospinal Fluid

Special senses:

1. Physiology of vision
2. Physiology of hearing
3. Physiology of taste and smell

Nerve and muscle:

1. Physiology of nerve (nerve action potential, propagation and conduction of action potential, classification of nerve fibers, responses of nerve to injury)
2. Physiology of muscle (structure of skeletal, cardiac and smooth muscles; molecular basis of muscle contraction)
3. Neuromuscular transmission

Recent advances:

1. Advances in all branches of physiology like neurophysiology, cell physiology etc.
2. Advances in techniques like recombinant DNA technology, voltage clamping, patch clamping, echocardiography, MRI, computerized investigations etc.
3. Advances in applied physiology
4. Advances in research methodologies

B. Practical

Hematology Practicals

1. All undergraduate hematology practicals like RBC count, WBC count, differential leucocyte count, BT, CT, blood grouping, ESR, osmotic fragility test, etc.
2. Absolute eosinophil count
3. Arneth count
4. Reticulocyte count
5. Platelet count
6. Study of a stained bone marrow smear.

Amphibian Nerve-Muscle Experiments

1. Effect of temperature on simple muscle curve
2. Effect of increasing strength of stimuli on muscle contraction
3. Effect of two successive stimuli on muscle contraction
4. Genesis of clonus and tetanus
5. Demonstration of site of fatigue
6. Effect of load on muscle contraction
7. Isometric contraction
8. Nerve conduction velocity

Experiments on Frog's Heart

1. Effect of temperature on normal cardiogram
2. Effect of Stannius ligature
3. Properties of cardiac muscle
4. Effect of stimulation of vagosympathetic trunk
5. Perfusion of frog's heart and effect of drugs and ions on it
6. Capillary circulation

Mammalian Practicals

1. Perfusion of isolated rabbit heart by Langendorff's method and effect of drugs and ions on it.
2. Effect of drugs and ions on isolated mammalian (rabbit / rat) intestine
3. Effect of drugs/chemicals on mammalian uterine contraction
4. Study of estrous cycle in rat

Human Practicals

1. Perimetry
2. ECG
3. Effect of posture on blood pressure and heart rate
4. Effect of exercise on blood pressure and heart rate
5. Systolic time intervals
6. Mosso's ergography
7. Nerve conduction studies
8. EMG
9. Autonomic function tests
10. Evoked potentials (BAEP, SSEP and VEP)
11. Pulmonary function tests

Clinical Practicals

1. Clinical examination of CVS
2. Clinical examination respiratory system
3. Clinical examination of GI system
4. Clinical examination of sensory system
5. Clinical examination of motor system
6. Clinical examination cranial nerves

DUTIES AND RESPONSIBILITIES OF PG STUDENTS

1. Attends all undergraduate classes taken by faculty members during 1st and 2nd year of his PG course.
2. Actively participates and conducts undergraduate practical classes.
3. Actively participates in all PG programmes of the department (PG seminars, symposia, PG talk, journal club and presentation of review articles)
4. Carries out dissertation work (research work of the thesis) and completes it satisfactorily and submits thesis on time (as notified by JIPMER)
5. Learns all research and clinical investigations carried out by the department
6. Participates in all notified examinations of the department
7. Should have minimum 80% attendance

EXAMINATIONS

Final Examination

Final examination will be conducted at the end of three year and will have following distribution of marks.

A. Theory Examination

Four theory papers: Total 400 marks (100 for each paper)

Duration of each paper: 3 hours on four different days

B. Practical and Viva-Microteaching Examinations

Duration: Two days

Maximum Marks: 400 (Practical: 300 marks; Viva and Microteaching: 100 marks)

First day:

1. Hematology practical: 60 marks
2. Amphibian nerve-muscle experiments: 50 marks
3. Experiments on frog heart: 50 marks
4. Mammalian practical: 40 marks
5. Human practical: 40 marks

Second day:

6. Clinical practical: 60 marks
7. Microteaching: 20 marks
8. Viva: 80 marks

MODEL QUESTION PAPERS

Four theory papers

Maximum marks: 100 for each paper

Duration of each paper: 3 hours

All questions are compulsory

Each paper has two long questions (25 marks each) and five short questions (10 marks each)

Model Question Papers

MD Branch V – Physiology

March, 2008.

Paper I: General physiology, Body fluids, Blood, Physiological basis of immunity, Renal physiology, Basics of biostatistics, and History of medicine.

Duration: Three hours

Maximum Marks: 100

Answer all questions

Draw diagrams wherever necessary

1. Discuss the mechanisms of cellular immunity. Give a note on monoclonal antibodies. (15 + 10 = 25)
2. Discuss recent theories of blood coagulation. Give a note on platelet function tests. (15 + 10 = 25)
3. Write briefly on (5 × 10 = 50)
 - a) Resting membrane potential
 - b) Mechanisms of urine concentration
 - c) Co-efficient of variance
 - d) Apoptosis
 - e) Nobel prize winners in physiology in last two decades

MD Branch V – Physiology

March, 2008.

Paper II: Endocrine physiology, Physiology of reproduction, ANS and Gastro-intestinal system.

Duration: Three hours

Maximum Marks: 100

Answer all questions.

Draw diagrams wherever necessary.

1. Discuss various mechanisms by which hormones exert their effects through membrane receptors. Give a note on G protein dysfunctions. (15 + 10 = 25)
2. Discuss physiological basis of clinical and laboratory features of insulin deficiency/resistance. Give a note on mechanism of insulin action. (15 + 10 = 25)
3. Write briefly on (5 × 10 = 50)
 - a) In-vitro fertilization
 - b) Hormonal changes in pregnancy
 - c) Enterohepatic circulation
 - d) Parasympathetic function tests
 - e) Gastric emptying

MD Branch V – Physiology

March, 2008.

Paper III: Cardiovascular system, Respiratory system, Integrative physiology (environmental physiology, exercise physiology, nutrition and yoga).

Duration: Three hours

Maximum Marks: 100

Answer all questions.

Draw diagrams wherever necessary.

1. Discuss various mechanisms short-term regulation of blood pressure. Give a note on anaphylactic shock. (15 + 10 = 25)
2. Discuss physiological basis of changes that occur within two weeks of ascension to high altitude. Give a note on oxygen therapy. (15 + 10 = 25)
3. Write briefly on (5 × 10 = 50)
 - a) Heart-lung preparation
 - b) Respiratory flow-volume curve
 - c) Cardiovascular effects of increased environmental temperature
 - d) Acute effects of shavasana
 - e) Effects of isotonic exercise on cardiovascular and respiratory functions

MD Branch V – Physiology

March, 2008.

Paper IV: Central nervous system, Special senses, Nerve and muscle, and Recent advances.

Duration: Three hours

Maximum Marks: 100

Answer all questions.

Draw diagrams wherever necessary.

1. Discuss various mechanisms of regulation of posture and movement. Add a note on vestibular function tests. (15 + 10 = 25)
2. Discuss the various theories of color vision. Give a note on effects of lesion at various parts of visual pathway. (15 + 10 = 25)
3. Write briefly on (5 × 10 = 50)
 - a) Endogenous pain-inhibiting systems
 - b) Mechanisms of short-term memory
 - c) Responses of nerve to injury
 - d) Voltage clamp technique
 - e) Slow-wave sleep

RECOMMENDED BOOKS

Theory Books:

1. Review of Medical Physiology: by W. F. Ganong
2. Textbook of Medical Physiology: by Dr. G. K. Pal
3. Understanding Medical Physiology: by Dr. R. L. Bijlani
4. Medical Physiology: by A. Rhodes and G. A. Tanner
5. Medical Physiology: by W. F. Boron and E. L. Boulpaep
6. Textbook of Medical Physiology: Author C. Guyton
7. Textbook of Medical Physiology: by Dr. A. K. Jain
8. Physiological basis of Medical Practice: by Best and Taylor
9. Physiology: by R. M. Berne and M. N. Levy
10. Textbook of Physiology: by H. D. Patton, A. F. Fuchs, B. Hille, A. M. Scher and R. Steiner

Practical Books:

1. Textbook of Practical Physiology: by Dr. G. K. Pal and Dr. Pravati Pal
2. Textbook of Practical Physiology: by Dr. A. K. Jain
3. Textbook of Practical Physiology: by Dr. C. L. Ghai
4. Textbook of Practical Physiology: by Dr. Ranade

CLINICAL DISCIPLINES (M.D. Doctor of Medicine)

ANAESTHESIOLOGY

Preamble

Any curriculum should define three components, namely;

- a) Knowledge to be learned (Syllabus, Cognitive domain),
- b) Skills to be learned (practical training, psychomotor domain) and
- c) Attitude to be developed (Behavioral changes to be brought about, Affective domain)

The curriculum should ensure that the candidate acquires knowledge, basic skills and attitudes in the subject to become a competent anaesthesiologist. It should discipline the thinking habit for problem solving and discovery of new knowledge in the field. It is needless to emphasize that the course content should ensure that the candidate learn the art of teaching students, nurses and paramedical staff and carry out a simple research project.

The curriculum should also define the Teaching-Learning methods to be adopted to achieve the goals and the methods of assessment through out the training period and at the completion of training.

A) Syllabus

The syllabus should define the course content and the time frame in which the course content should be covered. The course content should include a fund of acquired information and the strategy evolved for acquiring the information. Most useful information should be included taking into account the limits of the time available.

To this extent the Course Content in Anaesthesiology should include

- a) A thorough knowledge of the pharmacokinetics and pharmacodynamics of anaesthetic drugs and adjuncts.
- b) Knowledge of cardiovascular, respiratory, neurological, hepatobiliary, renal and endocrine homeostasis and related drugs as relevant to patients undergoing anaesthesia.
- c) Relevant anatomy, physiology and biochemistry.
- d) A basic idea of the relevant physical principles involved in the construction and functioning of equipment used in anaesthesia and monitoring.
- e) Knowledge to attain expertise of the commonly used techniques in general, regional and local anaesthesia
- f) A clear cut concept of unconsciousness and its implications.
- g) Relevant knowledge about chronic intractable pain and its management.
- h) Relevant knowledge to manage patients in intensive therapy unit.
- i) Relevant knowledge of medical Statistics
- j) Knowledge & Expertise in Cardiopulmonary resuscitation.

The Course content should also include ways and means of stimulating the thought processes of the candidate and ensure that the candidate can critically acquire new information from books, journals, lectures, seminars and discussions. It should include ways and means of developing reflective thinking and problem solving by critically analysing events during anaesthesia. Interpretation of these data and logical reasoning should lead to application of facts and principles in practice.

1st Year Theory

Should cover the following:

1. Anatomy —
 - a) Relevant anatomy of respiratory system involved in gas exchange process, Diaphragm, larynx and upper and lower airway.
 - b) Relevant anatomy of cardiovascular and central nervous systems.
 - c) Anatomy of musculoskeletal system and neuromuscular transmission.
 - d) Learn relevant anatomy of peripheral nerves and surface anatomy for regional anaesthesia and venous cannulations.
 - e) Some Anatomical areas of interest to the anaesthetist are Orbit of the Eye, Base of skull, Vertebral Column, spinal cord, and meninges, axilla, 1st rib, intercostal space.
2. Principles of physics and use of equipment in anaesthesia
 - a) Anaesthesia machine - checking the machine and assembly of necessary items.
 - b) Airway equipment including Tracheostomy. Equipments for airway management - mask, LMA, fiberoptic laryngoscopes; other devices like Combi tube etc.
 - c) Breathing systems - continuous flow systems, draw over system - Assembly and checking.
 - d) Monitoring in Anaesthesia with concepts of minimal monitoring.
 - e) Safety in Anaesthesia Equipments.
 - f) Medical gases - storage and central pipeline system.
3. Physiology
 - a) Theories of mechanism of production of Anaesthesia.
 - b) Respiratory, cardiovascular hepatobiliary, renal and endocrine system.
 - c) Pregnancy, Blood coagulation,
 - d) Muscle & N M junction,
 - e) Regulation of temperature & Metabolism, Stress response,
 - f) Cerebral blood flow and ICP
4. Pharmacology -
 - a) General pharmacological principles.
 - b) Concepts of pharmacokinetics and pharmacodynamics.
 - c) Uptake and distribution of inhaled anaesthesia agents.
 - d) Drugs used in Anaesthesia,
 - e) Drugs used for treatment of diseases and interaction of these drugs with Anaesthetic drugs.
5. Theoretical background of the commonly used anaesthetic techniques of general and region anaesthesia viz.
 - a) GA - Intravenous, inhalational, Endotracheal etc. using spontaneous and controlled mode ventilation.
 - b) RA – Spinal, epidural and local.
 - c) Effect of positioning.
6. Biochemistry relevant to
 - a) Fluid balance & Blood Transfusions, Artificial Blood. & Perioperative fluid therapy.
 - b) Acid base homeostasis in health and diseases.

7. Documentation and medico-legal aspects of anaesthesia. Stress the importance of accurate documentation.
8. Theoretical background on disorders of
 - a) Cardiovascular system.
 - b) Respiratory system
 - c) Hepatobiliary system.
 - d) Urinary system.
 - e) Endocrine system, Pregnancy.
9. Cardiopulmonary Resuscitation;
 - a) Theories of cardiac pump, thoracic pump and defibrillation.
 - b) Resuscitation of a patient with overdose of drug / poisons.
 - c) Management of unconscious patients.
 - d) Resuscitation of a severely injured patient.
10. Neonatal resuscitation.
11. Introduction to Research methodology, Random clinical trials etc. and basics of biostatistics.
12. Preoperative assessments and medication - general principals.
13. Introduction to anatomical physiological, pharmacological and biochemical aspects of pain and pain management.
14. Introduction to artificial ventilation.
15. Oxygen therapy
16. Introduction to the operation theatre, concepts of PACU and ICU.
17. Recovery from anaesthesia.
18. Shock – pathophysiology, clinical diagnosis and management.
19. Pulmonary function tests - principles and applications.

2nd Year Theory

1. Relevant anatomy of each system
2. Physics of equipment used in anaesthesia
 - a) Medical gases - gas plant, central pipeline Scavenging system.
 - b) Reducing valves
 - c) Anaesthesia machine, Humidifiers
 - d) Flow meters
 - e) Vaporizers - Characteristics and functional specifications.
 - f) Breathing systems –Assembly, functional analysis. APL and flow directional valves.
 - g) Minimum monitoring standards requirements.
3. Sterilization of equipment
4. Computers, Utility, computer assisted leaning and data storage. Computerized anaesthesia records.
5. Pharmacology of drugs used in cardiovascular, respiratory, endocrine, renal diseases and CNS disorders.
6. Acid-base and electrolyte balance and Interpretation of blood gases and other relevant biochemical values, various function tests and basics of measurement techniques, ECG
7. Paediatrics — Prematurity, Physiology, anatomy of neonate vs. adult.

8. Principles of monitoring equipment used for assessment of
 - a) Cardiac function viz. Rhythm, pulse, venous and arterial pressures, cardiac output.
 - b) Temperature
 - c) Respiratory function viz. Rate volumes, compliance, resistance, blood gases.
 - d) Intracranial pressure, depth of anaesthesia and
 - e) Neuromuscular block.
9. Working principles of ventilators.
10. Special anaesthetic techniques as relevant to outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments and calamitous situations.
11. Anaesthetic management in special situations - Emergency, ENT, Ophthalmology, Obstetrics, Obstetric analgesia. Plastic, Dental. Radio-diagnosis and Radiotherapeutic procedures and patients with systemic diseases.
12. Medical statistics relevant to data collection, analysis, comparison and estimation of significance.
13. Journal clubs.

SECOND YEAR- SPECIALITY ANAESTHESIA

1. Principles of paediatric anaesthesia, management of neonatal surgical emergencies, RA in infants.
2. Basics of orthopaedic anaesthesia.
3. Day care anaesthesia.
4. Rural anaesthesia - anaesthesia for camp surgery.
5. Anaesthesia for otorhinolaryngology with special emphasis on difficult airway management.
6. Blood and blood component therapy. Anaesthetic implications in coagulation disorders.
7. Monitored anaesthesia care.
8. Anaesthetic implication in Diabetic mellitus, thyroid and parathyroid disorders, phaeochromocytoma, cushings disease etc.
9. Principles of geriatric anaesthesia
10. Anaesthesia outside the OR and in special situation
11. Principle of management in Trauma, disorders and mass casualties

3rd Year Theory

Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorders posted for unrelated surgery

- a) Management of patients in shock, renal failure, critically ill and / or on ventilator.
- b) Chronic pain therapy and therapeutic nerve blocks.
- c) Selection, purchase, maintenance and sterilization of anaesthesia and related equipment.

THIRD YEAR- SPECIALITY ANAESTHESIA

1. Principles of anaesthetic management of neuro / cardiac / thoracic / vascular/ Transplantation / burn and plastic surgery.
2. Principles of neonatal ventilation and critical care.
3. Principles of human resources and material management.
4. General principles of medical audit
5. Principles of one lung anaesthesia

B) Skill development

Requirement of Practical Training by Junior Resident

It is felt that at the end of a 3-year training course a candidate should have the knowledge and ability to:

1. Plan and conduct anaesthesia, recovery, and postoperative pain relief for elective and emergency surgery related to all surgical specialties.
2. Carry out basic life support (BLS) and advanced life support (ALS) and train medical and paramedical staff in BLS and ALS.
3. Manage unconscious patients
 - a) Airway management and long term management of unconscious patient.
4. Manage patients admitted to an intensive care unit.
5. Manage patients suffering from chronic intractable pain.
6. Organize the Hospital environment to manage mass casualty situation.
7. Critically review and acquire relevant knowledge from the journals about the new development in the speciality.
8. Should be able to participate in anesthesia audit.

Major stress will be on practical Training. The Goals of postings both the general goals and of specific subspecialty postings will be fulfilled by rotating the junior resident in various operating theatres.

C) Attitude Development

The student should develop attitudes that lead to:

1. Life long learning and updating
2. Sympathetic Communication with relatives
3. Sympathetic Communication with patients
4. Appropriate communication with colleagues to function in a group in OR/ICU
5. Become a teacher for Technicians, Nurses, and paramedical staff and teach undergraduates.
6. Ability to discuss. Participate in case discussion and scientific presentations
7. Ability to function as a leader in the Operating room

TEACHING LEARNING METHODS

The teaching learning methods should not totally depend on didactic lectures. Only the introductory lectures by faculty can be in this format.

Introductory lectures

The faculty should do the teaching and it should be aimed to familiarize the student with the

- a) Basic anaesthesia delivery equipment and Monitors and important principles of physics that govern the functions of these equipments.
- b) Intravenous Anaesthetic drugs and Inhalation agents.
- c) Patient evaluation, interpretation of laboratory investigation as applied to the care of the patients, planning and conduct of general anaesthesia, and postoperative care.

Students should be taught basic and advanced cardiac life support. The student should be familiarized about the principle of the sterilization and universal precautions. They should be able to ask for consultation when necessary.

The students are encouraged and taught to search literature to be able to write a thesis protocol.

Participation of the student in the T/L experience should be in the form of

- Seminars, group discussions and symposia. These should be regularly organized in the department.
- Problem case discussion, before and after the conduct of the case should form part of training.
- Journal club presentation and discussion
- Computers and Internet use with LCD Projector
- Presenting papers in Conferences and attending CME's & Workshops
- Interdepartmental programmes with clinical departments like Cardiology, CTVS, Neuro surgery and others
- Practical training in the Operation Theatres, Intensive Care Unit, Pre-anaesthetic Unit, Burns Unit, Emergency Theatres, Pain Clinics, Peripheral areas like CT Room, MRI Room, Endoscopy room, interventional cardiology lab – along with case discussions and management plans

Structured and Graded Training

The trainee will undergo a graded training in the following manner:

Orientation: At the beginning of 3 Years each student should be given an orientation to the hospital operation theatre and subject of anaesthesia. The candidate shall be assigned thesis guides so as to help them prepare protocols.

1st Year Objectives

The first year resident should be taught expertise in the management of ASA I and II cases. To start with they will observe and slowly become independent in giving general anaesthesia and spinal anaesthesia to ASA I & II cases for minor and major surgery, under graded supervision. They should be posted to the following specialties during the first year gynecology, General Surgery, Orthopedics and Recover Room. They should work in allied specialties and emergency departments for a period of 3-6 months.

2nd Year Objectives

The student should be taught to give general anaesthesia and regional anaesthesia to ASA III & IV under supervision. They should be able to give extradural block, Spinal Block, and Peripheral Nerve Blocks under supervision. Should learn pediatric and trauma life supports and maintain skills for basic and advanced cardiac life support.

It is advised that they be posted in the following specialties: Obstetrics, Dental Surgery, ENT, Eye, ICU, Urology, Pain Clinic and peripheral Theatres.

The student should be able to analyze data and write a thesis. Should be able to present scientific data.

3rd Year Objectives

The student should be able to plan and administer anaesthesia to all patients under graded supervision, including patients for cardiac, Neurosurgery, Pediatric surgery and for all major surgery. The aim at the end is to be competent and independent soon after the third year of junior residency in providing anaesthesia to elective and emergency cases. The

junior resident should be able to manage critically ill patient, treat intractable pain. They should also know how to organize mass casualty.

Practical training for skill development

The recommended period of posting to achieve the goal:

Specialily	Months
General Surgery	4
Urology	2
Eye	1
ENT	2
Dental	1
Orthopedics/trauma	3
Gynecology	3
Obstetrics	2
Pediatrics	2
Burns/Plastic	2
CTVS	2
Neurosurgery	2
ICU	3
Pain	1
Recovery	1
Day care anaesthesia	1
Radiology, Radiotherapy, ECT	1
Cardiac Cath	

The student will discuss the preoperative preparation of the patients and the intraoperative problems of cases being conducted on the day. During these postings the students will initially observe and then perform various procedures and conduct the anesthetic procedure as discussed. Each procedure observed and performed will be listed in the logbook which will be signed by attending faculty.

Details of training objectives in each segment of posting

BASIC KNOWLEDGE AND SKILLS

These are the basic knowledge and skills to be developed in the first year of training. This basic knowledge and skills should be developed while working in General surgery, Gynaecology and Orthopaedics.

Knowledge

Anaesthetic and monitoring equipment:

1. standards
2. care, cleaning, disinfecting and sterilisation (particularly airway equipment)
3. potential defects and problems
4. safety precautions and checking
5. Anaesthesia in abnormal environments:
 - a) High altitude
 - b) pressure chambers / at depth
 - c) low temperature

6. Problems for patients and staff because of:
 - a) age (anaesthesia and the elderly)
 - b) obesity
 - c) smoking
 - d) alcoholism
 - e) drug dependency and addiction
 - f) hepatitis B & C carriers
 - g) HIV and AIDS
 - h) variant CJD
 - i) pacemakers
7. Hazards for patients and staff because of:
 - a) anaesthetic drugs and pregnancy
 - b) electricity and electrocution
 - c) diathermy
 - d) sharps injury
 - e) pollution by anaesthetic gases
 - f) fires and explosions
 - g) Intravenous fluid replacement
 - h) blood transfusion
 - i) Jehovah's Witnesses
 - j) blood substitutes
 - k) disseminated intravascular coagulation
 - l) colloid / crystalloid
8. Posture and positioning
 - a) lateral position
 - b) prone position
 - c) Trendelenberg position
 - d) lithotomy
 - e) peripheral nerve damage
 - f) prevention of deep vein thrombosis

Airway Management

9. Anatomy of the airway
10. Physiology of airway and airway reflexes
11. Pharmacology relevant to the airway:
 - a) control of secretions
 - b) control of airway reflexes in conscious sedation
 - c) effect of anaesthetic drugs on airway reflexes
 - d) reducing the prevalence and sequelae of gastro-oesophageal reflux
12. Evaluation of the airway:
 - a) history
 - b) general examination
 - c) specific predictive tests
 - d) special investigations
13. Airway strategy:
 - a) aspiration risk
 - b) predicted difficult direct laryngoscopy
 - c) predicted difficult mask inflation
 - d) known abnormal / narrowed tracheo-bronchial tree
 - e) unexpected difficult ventilation
 - f) unexpected difficult intubation
 - g) can't intubate / can't oxygenate

14. Preoxygenation – techniques / purpose
15. Confirmation of position of tracheal tube within trachea
16. Monitoring of ventilation by pressure changes, gas flows and capnography
17. Application of cricoid force in a rapid sequence induction
18. Cricoid force induced difficulties with airway management
19. Airway equipment - difficult airway trolley
20. Tracheostomy tubes, types, fixation and care
21. Conscious sedated (awake) intubation:
 - a) preparation of patient
 - b) topical anaesthesia
 - c) nerve blocks
 - d) laryngoscopy, bronchoscopy
 - e) specialised tubes
22. The obstructed airway:
 - a) recognition
 - b) immediate treatment of acute obstruction
 - c) anaesthetic management of acute and chronic obstruction
 - d) flexible nasendoscopy and imaging
23. Emergency cricothyrotomy
 - a) needle
 - b) purpose built cannula >4 mm ID
 - c) surgical
24. Extubation strategies - routine, predicted and unexpected difficulty
25. Complications of difficult airway management
26. Follow-up care of patient, documentation and patient information
27. Surgical approach to the airway - indications, techniques, conduct
28. Percutaneous cricothyrotomy and tracheostomy

Skills

1. Recognition of the difficult airway
2. when to ask for help
3. Failed rapid sequence intubation
4. performance of recognised 'drills' for failed intubation / ventilation
5. Alternative methods of intubation
6. other laryngoscopy blades and bougies
7. low skill fiberoptic intubation e.g. via laryngeal mask or specialised airway
8. Placement and checking of double lumen tubes
9. Anaesthetic techniques for laryngoscopy, bronchoscopy and tracheostomy
10. Extubation in abnormal airway
11. Clinical review of patient to detect and treat airway instrumentation damage
12. Interpretation of CT, MRI imaging and flow-volume loops

Additional desirable clinical skills to be learnt primarily in the non-clinical environment (skills laboratory / manikin / simulator) but supplemented by some clinical experience during subsequent 2 years:

The availability of equipment to display the fiberoptic image on a screen will also extend the opportunities for clinical teaching.

13. Awake intubation:
 - a) indications
 - b) use with the compromised airway

14. Fibreoptic intubation through the nose and mouth with and without concurrent ventilation
15. Fibre-endoscopy skills to:
 - a) visualise tracheo-bronchial tree
 - b) confirm placement of single and double lumen tubes
 - c) intubate through the laryngeal mask
16. Blind and fibreoptic assisted intubation via the intubating laryngeal mask
17. Elective trans-tracheal ventilation to aid difficult intubation
18. Retrograde intubation - blind and fibreoptic assisted
19. Placement bronchial blockers
20. Specialised bougies and airway exchange catheters
21. Use of the combitube or other supraglottic balloon device
22. Emergency cricothyrotomy:
 - a) landmarks
 - b) insertion of needle / cannula
 - c) confirmation of position within trachea
 - d) fixation
 - e) pressures required for adequate gas flows
 - f) ventilation through cannula / catheter
 - g) complications
23. Application of 30 N cricoid force

GENERAL SURGERY / GYNAECOLOGY / UROLOGY

Anaesthesia for general surgical procedures forms the backbone of anaesthesia. Focused area of training during the subsequent postings in these specialities is mentioned below.

Knowledge

General surgery

1. Relevant anatomy and physiology for common surgical procedures
2. Anaesthesia for complex GI surgery including intrathoracic procedures
3. Emergency anaesthesia for general surgery
4. Carcinoid syndrome / tumours
5. Endocrinology; diseases relevant to hepatobiliary, pancreatic, splenic surgery
6. Management of thyroid (and parathyroid) surgery
7. Starvation / obesity
8. Metabolism; nutrients, carbohydrates, fats, proteins, vitamins, minerals

Gynaecology

1. Relevant anatomy and physiology
2. Endocrinology relating to gynaecology
3. Preoperative assessment
4. Laparoscopic surgery
5. Gynaecological procedures during pregnancy

Urology

1. Anatomy of the renal tract
2. Blood flow, GFR, plasma clearance
3. Tubular function, urine formation and micturition

4. Assessment of renal function
5. Disturbances of fluid balance, oedema and dehydration
6. Management of acid-base abnormalities
7. Renal failure and its management
8. Plasma electrolyte disturbances
9. Anaesthesia on spinal injuries patients for urological procedures
10. TUR syndrome

Transplantation

1. Principles and complications of Immunosuppression
2. Specific anaesthetic problems associated with renal transplantation
3. Anaesthetic management of patients with transplanted organs

Skills

General surgery

1. Preoperative assessment and resuscitation of emergency surgical patient e.g. trauma, obstruction and perforation
2. Postoperative analgesia e.g. regional and field blocks
3. Assessment of need for ICU and HDU admission
4. Assessment of the elderly and children
5. Laparoscopic surgery
6. TIVA

Gynaecology

1. Regional techniques
2. Laparoscopic surgery

Urology

1. Regional techniques
2. Major procedures – e.g. nephrectomy, cystectomy

Attitudes and behaviour

General surgery

1. Can assess preoperative patients effectively and resuscitate appropriately
2. Links with other staff showing ability to co-ordinate a team

Gynaecology

1. Shows appropriate attitude and behaviour to the female patient

Transplantation

1. Understands the ethical implications of transplantation

Workplace training objectives

1. The trainee should demonstrate the required professional judgement in assessing and managing the risk of aspiration, in deciding the urgency of a case against any delay necessary for resuscitation and in assessing the requirement for postoperative critical care.

ORTHOPAEDIC ANAESTHESIA

This is a 'General Unit of Training' in which it is expected that all Resident trainees will gain appropriate training.

Knowledge

1. Preoperative assessment with particular reference to the problems of children, the elderly and patients with co-existing disease or injury such as congenital syndromes, rheumatoid arthritis or vertebral fractures
2. Special airway problems especially in the rheumatoid patient and those with cervical spine injury or pathology
3. Emergency anaesthesia for fractures
4. Resuscitation and management of patients with multiple injuries
5. Routine anaesthesia for joint replacement surgery, arthroscopy, fractured bones, dislocations and tendon repair
6. The problems that may result from the use of tourniquets and of cement
7. Problems of operations in the prone position
8. Anaesthesia for spinal surgery (including scoliosis)
9. Perioperative analgesia, including use of regional analgesia
10. Prevention, recognition and management of potential postoperative complications, including prophylaxis, recognition and management of deep venous thrombosis & pulmonary embolus, and fat embolus
11. Other specific complications of orthopaedic surgery including continuing blood loss, compartment syndromes, neurovascular deficit, complications due to difficulty of access to patients who may be on traction, in hip spicas, plaster jackets, and the problems of pressure areas.

Skills

1. Airway assessment and management in the patient with rheumatoid arthritis
2. Safe positioning of patient, particularly in lateral and prone positions
3. Assessment and management of major blood loss
4. Correct application and use of tourniquets

19.3: Attitudes and behaviour

1. Provides explanations of anaesthesia for orthopaedic surgery in a way that patients can understand
2. Gentle handling of patient during positioning and performance of general or regional anaesthesia
3. Enlists help / advice from other professionals when appropriate

19.4: Workplace training objectives

1. Anaesthesia for orthopaedic lists enables trainees to attain competency in ensuring the smooth and efficient running of an operating list; liaising with other staff, avoiding delays and reassuring patients. They should demonstrate their ability to employ safe but effective methods for postoperative pain relief. In addition they should develop awareness of the potential hazards and complications of orthopaedic surgery.

Recommended local requirements to support training

1. As well as the requirements for adequately staffed and equipped operating theatres, there must be provision of adequate recovery facilities, and access to an HDU if there is massive blood loss, severe hypothermia, or postoperative compromised lung function. An ICU will be needed if ventilation is required.

OBSTETRIC ANAESTHESIA

This is a 'Key Unit of Training' in which Resident trainees should spend the equivalent of at least 2 month of training and, normally, not more than 4 months.

Obstetric anaesthesia and analgesia is the only area of anaesthetic practice where two patients are cared for simultaneously. Pregnancy is a physiological rather than a pathological state. The majority of the workload is anaesthesia for operative delivery and the provision of analgesia in labour. Multidisciplinary care for the sick mother is increasingly important and highlighted.

Knowledge

1. Anatomy and physiology of pregnancy
2. Physiology of labour
3. Placental structure and mechanisms affecting drug transfer across the placenta
4. Basic knowledge of obstetrics
5. Gastrointestinal physiology and acid aspiration prophylaxis
6. Pharmacology of drugs relevant to obstetric anaesthesia
7. Pain and pain relief in labour
8. Emergencies in obstetric anaesthesia:
 - a) pre-eclampsia, eclampsia, failed intubation, major haemorrhage, maternal resuscitation, amniotic fluid embolus, total spinal
 - b) Use of magnesium sulphate
9. Incidental surgery during pregnancy
10. Assessment of fetal well being in utero
11. Thromboprophylaxis
12. Feeding / starvation policies
13. Influence of common concurrent medical diseases
14. Management of twin pregnancy
15. Management of premature delivery
16. Maternal morbidity and mortality
17. Management of difficult or failed intubation
18. Maternal and neonatal resuscitation
19. Legal aspects related to fetus

Skills

1. Assessment of pregnant woman presenting for anaesthesia / analgesia
2. Epidural / subarachnoid analgesia for labour

3. Management of complications of regional block and of failure to achieve adequate block
4. Epidural and subarachnoid anaesthesia for Caesarean Section, and other operative deliveries
5. Conversion of analgesia for labour to that for operative delivery
6. General anaesthesia for Caesarean Section
7. Airway management
8. Management of the awake patient during surgery
9. Ability to ventilate the newborn with bag and mask
10. Anaesthesia for interventions other than delivery
11. Post-delivery pain relief
12. Management of accidental dural puncture and post-dural puncture headache
13. Recognition of sick mother
14. High dependency care of obstetric patients
15. Optimisation for the 'at risk' baby

Attitudes and behaviour

1. To be aware of local guidelines in the obstetric unit
2. To communicate a balanced view of the advantages, disadvantages, risks and benefits of various forms of analgesia and anaesthesia appropriate to individual patients
3. To communicate effectively with partner and relatives
4. To help deal with disappointment
5. To be involved in the initial management of complaints
6. To communicate effectively with midwives
7. To obtain consent appropriately
8. To keep good records
9. To identify priorities
10. To attempt by conscientious care to recognise problems early
11. To allocate resources and call for assistance appropriately
12. To be aware of local audits and self audit

Workplace training objectives

1. Within the obstetric team, the trainee should play a full part; communicating effectively about anaesthetic and analgesic techniques used in obstetrics and developing organisational skills. They should consolidate clinical management of common obstetric practice but recognise and treat common complications exercising proper judgement in calling for help.

Recommended local requirements to support training

1. Training should normally be provided in units carrying out at least 2,000 deliveries annually.
2. Local protocols should be available to guide trainees in the management of common obstetric emergencies based on the individual units staffing and local support.
3. Appropriately trained assistance for the anaesthetist (OT Technician) must be locally available whenever a trainee anaesthetist is required to manage a patient during an operative delivery. The person providing this assistance to the anaesthetist should have no other duties at that time.
4. Access for patients to critical care facilities must be immediately available at all times.
5. Appropriate anaesthetic 'bench books' should be available within the delivery suite.

REGIONAL ANAESTHESIA

Regional techniques are integral components of anaesthesia. It is inappropriate to expect that every trainee will become competent in every possible block technique, although they must be competent in all the generic aspects of block performance. All trainees should become competent in spinal and epidural block, with training in certain other blocks where opportunities allow and should increase the range of block techniques in which they become competent.

Knowledge

1. Basic sciences applied to regional anaesthesia: anatomy, physiology and pharmacology
2. Advantages / disadvantages, risks / benefits and indications / contra-indications
3. Assessment, preparation and management of the patient for regional anaesthesia
4. The principles of minor and major peripheral nerve blocks (including cranial nerve blocks) and central neural blocks
5. Desirable effects, possible side effects and complications of regional anaesthesia
6. Management of effects and complications

Skills

1. Assessment and preparation of the patient for regional anaesthesia, to include discussion of anaesthetic options (i.e. regional versus general)
2. Management of the patient receiving a regional block during surgery (whether awake or as part of a 'balanced' anaesthetic technique) and during labour
3. Management of the patient receiving regional techniques in the postoperative period, including liaison with surgeons, acute pain teams, and ward staff
4. Central nerve blocks:
5. Spinal anaesthesia
6. Epidural block (lumbar & sacral)
7. Combined spinal /epidural
8. Major nerve block – able to perform at least one method for upper and lower limb surgery respectively:
 - a) Brachial plexus – one technique at least
 - b) Sciatic
 - c) Femoral
9. Minor nerve block:
 - a) Superficial cervical plexus block
 - b) Trunk (penile, intercostal & inguinal blocks)
 - c) Upper limb (elbow and distal)
 - d) Lower limb (ankle & distal)
10. Miscellaneous: Ophthalmic blocks, topical, IVRA, infiltration & intra-articular
11. Recognition and management of the adverse effects of regional anaesthesia. There should be formal assessment, of each block before the trainee can be judged as competent.

Attitudes and behaviour

1. Provides explanations of regional techniques in a way that patients can understand
2. Understands patients' anxieties about regional techniques, especially the stress of undergoing surgery while conscious
3. Recognises need for communication with staff about use of regional block

4. Handles patients gently during performance of regional block
5. Meticulous attention to safety and sterility during performance of regional blocks
6. Enlists help / advice from other professionals when appropriate

Workplace training objectives

1. Trainees should take appropriate opportunities to use regional anaesthesia in patients undergoing a range of operations in specialties such as orthopaedics, gynaecology, urology and plastic surgery in order to demonstrate their attainment of the listed requirements. All such cases should be fully detailed in the logbook.

EAR, NOSE AND THROAT (OTORHINOLARYNGOLOGY)

This is a 'General Unit of Training' in which it is expected that all Resident trainees will gain appropriate training.

Knowledge

1. Preoperative assessment, particularly prediction of a difficult intubation
2. Management of patients of all ages to include patients with: stridor; intubation difficulties; sleep apnoea; concomitant diseases
3. Local techniques and surface analgesia
4. Acute ENT emergencies (e.g. bleeding tonsils, croup, epiglottitis, foreign bodies) Laryngoscopy and bronchoscopy
5. Knowledge of special tubes, gags and equipment for microlaryngoscopy, bronchoscopy, laser surgery (e.g. Venturi devices, ventilating bronchoscope and fiberoptic bronchoscopy)
6. Middle ear surgery including hypotensive techniques
7. Major head and neck surgery (including laryngectomy)
8. Emergency airway management including tracheostomy
9. Use of helium
10. Postoperative management

Skills

Preoperative

1. Recognise the importance of preoperative assessment with particular attention to:
 - a) age (paediatric / adult / elderly)
 - b) concomitant disease GI tract
 - c) patients with sleep apnoea, stridor and intubation difficulties
2. Discuss the anaesthetic procedures with the patient and/or relatives (if a child is involved)
3. Discuss special requirements with the surgical team
4. Acute ENT emergencies such as bleeding tonsil bed, croup / epiglottitis
5. Prepare all appropriate drugs, appropriate masks, airways, tracheal tubes, bougies, laryngoscopes, throat packs

Peroperative

1. Provide smooth anaesthesia / analgesic / surgical operating conditions
2. Cope with parental presence in the anaesthetic room
3. Use the appropriate tracheal tube or laryngeal mask
4. Use of special tubes, gags and goggles (laser surgery)

5. Techniques available for microlaryngoscopy and bronchoscopy (Venturi devices and ventilating bronchoscope)
6. Hypotensive anaesthetic techniques, when appropriate
7. To use invasive monitoring (arterial, CVP, urinary) for major surgical procedures on the head and neck

Postoperative

1. Extubation procedures to avoid laryngospasm
2. Oxygen therapy
3. Appropriate postoperative analgesia
4. Postoperative fluid balance
5. Maintain venous access after operation, if required
6. Postoperative anti-emetics

Attitudes and behaviour

1. Develop an understanding of the needs of the surgeon when operating on a shared airway but the absolute importance of not compromising patient safety.
2. To support and guide recovery and other staff taking responsibility for the unconscious patient who has undergone surgery to the airway.

Workplace training objectives

1. To develop confidence in the anaesthetic management of adults and children undergoing surgery to the airway.

Recommended local requirements to support training

1. Surgery is undertaken on patients of all ages from neonates to the elderly. Ear Nose and Throat units must have a paediatric facility with trained paediatric nurses
2. Upper airway problems are commonplace, equipment and expertise for fiberoptic intubation must be available
3. Rapid access to an experienced and efficient emergency service is required.
4. Access to beds for intensive or high dependency care must be available when required

MAXILLO-FACIAL / DENTAL ANAESTHESIA

Maxillo-facial surgery covers a range of procedures from simple dental extractions to complex resections and reconstructive procedures. The age range of patients is similarly wide, from childhood to the elderly.

Knowledge

1. Preoperative assessment
2. Day case / inpatient requirements
3. Resuscitation facilities
4. Anaesthesia for dental extractions (to include sedation and analgesic techniques)
5. Paediatric anaesthesia
6. Assessment and management of the difficult airway including fiberoptic intubation
Anaesthesia for maxillo-facial surgery including the perioperative management of the fractured jaw and other major facial injuries.

7. Postoperative management for all patients undergoing dental or maxillo-facial procedures

Skills

Many of the skills required for this unit of training are shared with ENT surgery

1. Patient assessment for day-stay surgery, including children and the mentally and physically handicapped
2. Pre and postoperative instructions for patients
3. Talking to patients and explaining the anaesthesia proposed
4. Choice of anaesthetic technique
5. Potential problems and hazards of the shared airway
6. Airway management including nasal masks, naso-pharyngeal airways, laryngeal mask airways, oral and nasal endotracheal intubation
7. Working with dental and oral surgeons and their use of mouth props and packs
8. Appropriate monitoring techniques and record keeping
9. Recovery and patient assessment for discharge including regular audit of outcomes
10. Management of emergencies
11. Conscious sedation:
 - a) Patient selection, assessment and suitability for treatment under sedation
 - b) The techniques and drugs available including non-pharmacological methods
 - c) Administration methods - oral, inhalational, intravenous, transmucosal, patient-controlled
12. Monitoring and management of the sedated patient

Attitudes and behaviour

1. Develop an understanding of the needs of the surgeon when operating on a shared airway but the absolute importance of not compromising patient safety
2. To support and guide recovery and other staff taking responsibility for the unconscious patient who has undergone surgery to the airway

Workplace training objectives

1. Trainees should develop confidence in the anaesthetic management of adults and children undergoing surgery to the airway.

Recommended local requirements to support training

1. Surgery is undertaken on patients of all ages from neonates to the elderly. There must be a paediatric facility with trained paediatric nurses
2. Upper airway problems are commonplace, equipment and expertise for fiberoptic intubation must be available
3. Rapid access to an experienced and efficient emergency service is required.
4. Access to beds for intensive or high dependency care must be available when required

OPHTHALMIC ANAESTHESIA

This specialty affords potentially very valuable training for resident trainees. The age range of the patients and the wide adoption of local anaesthetic techniques are particular aspects that can be beneficial to the development of the trainee. However, it is recognised that only a proportion of trainees will be able to gain this experience

Knowledge

1. Preoperative assessment with particular reference to patients with comorbidities
2. Choice of local or general anaesthetic techniques in relation to the patient and surgery with particular reference to:
3. strabismus surgery
4. cataract surgery
5. surgery for the detached retina
6. Penetrating eye injury
7. Control of intraocular pressure
8. Action of anaesthetic drugs on the eye
9. Anatomy relevant to local anaesthetic blocks
10. Local analgesia
11. topical anaesthesia
12. risks of sharp needles in peribulbar and retrobulbar techniques
13. sub-Tenon's block
14. Problems of glaucoma surgery
15. Postoperative care

Skills

1. Assessment and preparation, including the use of day care facilities
2. Anaesthetic management of patients for lachrymal surgery including syringing and probing and dacryocystorhinostomy
3. Requirements for strabismus surgery, including knowledge of the oculocardiac reflex
4. Control of intraocular pressure
5. The use of topical preparations, possible effects and interactions
6. Appropriate local anaesthetic methods
7. Techniques of general anaesthesia for ophthalmic surgery
8. Choice and use of appropriate method for airway maintenance under general anaesthesia
9. Postoperative care

Attitudes and behaviour

1. Understanding of the importance of the patient's general health and wishes to decisions relating to the choice of anaesthetic techniques
2. Being an effective communicator with elderly patients in explaining the risks and benefits of general and local anaesthesia for eye surgery

Workplace training objectives

1. Trainees should develop expertise in the administration of local anaesthesia for eye surgery trying to obtain competency in at least one block. They should also show the necessary medical knowledge and skill in the preoperative assessment of elderly patients.

CARDIAC / THORACIC ANAESTHESIA

This is a 'Key Unit of Training' in which Resident trainees should spend the equivalent of at least 1 month of training and, normally, not more than 3 months. It is recognised that for training Resident there will, due to the distribution of specialist units, be considerable

variability in the degree of experience available to individual trainees. Through attachments and links between different colleges it is expected that the majority of trainees will receive at least one month of experience in this anaesthetic subspecialty. However, where experience in this sub-specialty is more freely available, a unit of training should be limited to 3 months within the 3 year training programme.

Knowledge

Cardiac Anaesthesia

1. Preoperative assessment and perioperative care of patients with cardiac disease
2. Induction and maintenance of anaesthesia for high risk cardiac procedures, including valve replacement
3. Antibiotic prophylaxis against subacute bacterial endocarditis
4. Problems of cardiopulmonary bypass
5. Postoperative cardiac critical care, including analgesia, sedation and ventilatory management
6. Significance of cardiac tamponade
7. Interpretation of ECG and CXR
8. Interpretation of invasive and non-invasive cardiovascular monitoring
9. Temperature control and patient rewarming methods
10. Coagulopathy
11. Cardiac pacing modes
12. Intra-aortic balloon counter pulsation
13. Understanding of the adult patient with congenital heart disease
14. A working knowledge of the following investigations:
 - a) stress testing
 - b) cardiac catheterisation
 - c) echocardiography – transthoracic / transoesophageal
 - d) radionuclide scan

Thoracic Anaesthesia

1. Preoperative pulmonary function tests
2. Local and general anaesthesia for bronchoscopy including techniques of ventilation
3. Understanding of fiberoptic bronchoscopic techniques for airway management
4. Principles of one-lung anaesthesia
5. Management of a pneumothorax
6. Principles of underwater seals on chest drains
7. Postoperative care and analgesia after thoracic surgery

Skills

Generic

1. Internal jugular and subclavian venous cannulation
2. Arterial cannulation
3. Invasive pressure monitoring, including pulmonary artery catheters and interpretation of derived indices
4. Postoperative analgesia by appropriate methods including local techniques
5. Cardiopulmonary resuscitation and appropriate use of defibrillators

Cardiac Anaesthesia

1. Preoperative assessment of patients with valvular and with ischaemic heart disease
2. Induction and maintenance of anaesthesia for elective coronary bypass
3. Management of the patient during cardiopulmonary bypass
4. Use of inotropes and vasodilators
5. Anaesthesia for procedures in intensive care including emergency resternotomy, re-intubation, tracheostomy or cardioversion

Thoracic Anaesthesia

1. Preoperative assessment, preparation of patients with pulmonary disease
2. Preoperative assessment, preparation of patients for thoracic surgery
3. Induction and maintenance of anaesthesia for minor thoracic procedures, in particular, bronchoscopy and the use of the Sanders injector
4. Use of single and double lumen endobronchial intubation
5. Fibreoptic endoscopic confirmation of tube placement
6. Induction and maintenance of anaesthesia for major thoracic procedures
7. One lung ventilation

Attitudes and behaviour

1. To communicate effectively with surgical colleagues / other members of the theatre team
2. To be able to summarise a case to critical care staff
3. Understand how to communicate with the intubated patient in intensive care
4. To be able to recognise the need for senior help when appropriate
5. Maintain accurate clinical records
6. Presentation of material to departmental meetings and participation in clinical audit

Workplace training objectives

By gaining experience in cardiothoracic anaesthesia, the trainee should also develop competency in the management of cardiovascular and pulmonary problems arising in non-cardiac surgical patients.

Cardiac Surgery

1. The trainee should develop the ability to assess the circulation and have experience in the use of inotropes and vasoactive agents to support of the circulation in patients with cardiac disease. They should also develop an understanding of the problems of extracorporeal circulation.

Thoracic Surgery

1. The trainee should understand the problems of one lung anaesthesia and develop experience in the placement of double-lumen tubes

Recommended local requirements to support training

Cardiac Surgery

1. Cardiac surgery must take place in theatres equipped to a high standard for anaesthesia and monitoring with facilities for cardiopulmonary bypass and mechanical support of the circulation.
2. Rapid access to biochemistry and haematology services.
3. Each cardiac unit must have a consultant anaesthetist with dedicated responsibility for cardiac anaesthetic services.
4. There must be appropriate support facilities provided.
5. Extensive patient monitoring is required.
6. Adequate critical care facilities must be provided.
7. There must be resident medical staff cover of the intensive care unit.
8. There must be an ongoing, adequately resourced, audit programme.

Thoracic Surgery

1. On-site pulmonary function laboratory facilities must be available.
2. Patients must be managed in an area, equipped and staffed to a high standard.
3. Patients may routinely return to a high dependency care facility, however supporting intensive care facilities should also be easily accessible.
4. Pain relief and other clinical protocols must be clearly defined.

NEUROANAESTHESIA

This is a 'Key Unit of Training' in which Resident trainees should spend the equivalent of at least 1 month of training and, normally, not more than 3 months. Anaesthetic training for Neurosurgery and Neuroradiology will take place within designated specialist centres with the appropriate critical care facilities.

Knowledge

1. Preoperative assessment and management of patients with neurological disease
2. Anaesthesia for imaging relevant to the CNS
3. Anaesthesia for MRI including problems of magnetic fields
4. Anatomy of the skull and skull base
5. Anatomy, physiological control and effect of drugs on cerebral blood volume and flow, ICP, CMRO₂
6. Principles of anaesthesia for craniotomy, to include vascular disease, cerebral tumours and posterior fossa lesions
7. Anaesthetic implications of pituitary disease including endocrine effects (acromegaly) and trans-sphenoidal surgery
8. Perioperative management of interventional neuroradiological procedures
9. Anaesthesia for spinal column surgery and anaesthetic implications of spinal cord trauma
10. Principles of immediate postoperative management including pain relief and special considerations with narcotics
11. Principles of neurological monitoring
12. Implications of prion diseases for the anaesthetist and other staff
13. Anaesthetic and critical care implications of neuromedical diseases:
14. Guillain-Barré syndrome
15. myasthenia gravis - pharmacological management / thymectomy
16. myasthenic syndrome
17. dystrophia myotonica
18. muscular dystrophy
19. paraplegia and long-term spinal cord damage
20. control of convulsions including status epilepticus
21. tetanus
22. trigeminal neuralgia including thermocoagulation

Skills

1. The trainee will be supervised during the provision of anaesthesia for:
2. Planned
 - a) intracranial surgery
 - b) spinal surgery
 - c) Emergency neurosurgery for head trauma
3. Safe patient positioning – prone, park-bench (lateral)

4. The trainee will be instructed in the non-surgical management of the head trauma patient
5. Resuscitation and patient transfer
6. Monitoring:
 - a) insertion of arterial lines
 - b) insertion of CVP lines
 - c) techniques for detection and management of air embolism
 - d) EEG and evoked potentials
 - e) intracranial pressure measurement
 - f) spinal drainage

Critical Care:

1. Indications for ventilation
2. The role of drugs
3. Management of raised intracranial pressure and manipulation of cerebral perfusion pressure
4. Fluid and electrolyte balance in neurocritical care
5. Complications
6. Treatment of raised intracranial pressure
7. Cerebral protection and prevention of cerebral ischaemia
8. Management of patients for organ donation

Neuroradiology

1. Practical aspects of patient management for CT and MRI
2. Anaesthetic considerations in interventional radiology

Attitudes and behaviour

1. To understand the problems of obtaining consent in patients with impaired consciousness.
2. To appreciate the limits of medical intervention
3. To gain the ability to establish a rapport with the operating neurosurgeon and exchange information during surgery on aspects of changes in the patient's vital signs which are relevant to the operative procedure
4. To communicate well with the nursing staff in the ICU, patients, relatives and other hospital staff
5. To offer comfort to the patient and relatives when there is no prospect of survival
6. To understand the requirements for organ donation

Workplace training objectives

1. Trainees should gain an understanding of the principles of neuroanaesthesia and the associated neuro-critical care in order to manage, with safety, patients for routine operations on the brain and spinal cord. For patients with head injury, trainees should be able to manage their resuscitation, stabilisation and transfer.

Recommended local requirements to support training

1. Neuroanaesthesia should only take place in Neuroscience Centres.
2. Staffing levels in the operating theatre should be sufficient to allow anaesthetists to work in teams during long operations.

3. Interventional neuroradiology requires full neuroanaesthesia cover by consultants
4. Neuro-critical care is a joint responsibility between neuroanaesthesia and neurosurgery; there should be specific sessions for neuroanaesthetists in Critical care.
5. The provision of beds for neuro-critical care must be adequate, the ventilation of patients in other areas should only occur in exceptional circumstances.
6. Operating theatres, Intensive Care Units (ICU) and neuroradiology facilities including scanners should all be in close proximity.
7. For patients with Head Injuries
 - a) The care of head injured patients is an integral part of neuroanaesthesia. Specialist units accepting these patients need to make specific arrangements including protocols, staff training and rapid availability of facilities. Optimal management will improve outcome and save resources in the long term.
 - b) Local guidelines on the transfer of patients with head injuries should be drawn up between the referring hospital trusts and the neurosurgical unit which should be consistent with established national guidelines. Details of the transfer of the responsibility for patient care should also be agreed.
 - c) Only in exceptional circumstances should a patient with a significantly altered conscious level requiring transfer for neurosurgical care not be intubated.

PAEDIATRIC ANAESTHESIA

This is a 'Key Unit of Training' in which Resident trainees should spend the equivalent of at least 1 month of training and, normally, not more than 3 months.

Paediatric anaesthesia and pain management includes everything from healthy children to the sickest premature babies in tertiary referral centres and in paediatric intensive care units (PICU).

Knowledge

General

1. Anatomical and physiological characteristics which affect anaesthesia and the changes which take place during growth from neonate to a young child
2. Paediatric medical and surgical problems including major congenital abnormalities, congenital heart disease and syndromes e.g. Down's and their implications for anaesthesia
3. Starvation and hypoglycaemia
4. Preoperative assessment and psychological preparation for surgery
5. Anaesthetic equipment and the differences from adult practice

Children and Infants

1. Anaesthetic management of children for minor operations and major elective and emergency surgery
2. Management of recovery
3. Management of postoperative pain, and nausea and vomiting in children
4. Management of acute airway obstruction including croup and epiglottitis

Neonates

1. Anatomical, physiological and pharmacological differences to the older child / adult
2. Preoperative assessment
3. Anaesthetic techniques and thermoregulation
4. Analgesia
5. Neonatal equipment and monitoring

6. Anaesthetic problems and management of important congenital anomalies including those requiring surgical correction in the neonatal period (tracheo-oesophageal fistula, diaphragmatic hernia, exomphalos, gastroschisis, intestinal obstruction, pyloric stenosis)
7. Special problems of the premature and ex-premature neonate
8. Resuscitation of the newborn

PICU

1. Principles of paediatric intensive care: management of the commoner problems, ventilatory and circulatory support, multi-organ failure
2. Principles of safe transport of critically ill children and babies

Skills

Children and Infants

1. Resuscitation – Basic life support (BLS) and advanced life support (ALS) at all ages
2. Preoperative assessment and preparation
3. Techniques of induction, maintenance and monitoring for elective and emergency anaesthesia
4. Selection, management and monitoring of children for diagnostic and therapeutic procedures carried out under sedation
5. Maintenance of physiology: glucose, fluids, temperature
6. Strategies and practice for the management of anaesthetic emergencies in children: loss of airway, laryngospasm, failed venous access, suxamethonium apnoea and anaphylaxis including latex allergy.
7. Postoperative pain management including the use of local and regional anaesthetic techniques, simple analgesics, NSAIDs and use of opioids (including infusions and PCA)
8. Communication with paediatric patients and their family

Attitudes and behaviour

1. To understand consent in children: the law, research, restraint
2. To communicate with parents (carers) and children throughout the surgical episode

Workplace training objectives

1. The trainee should develop a wide knowledge of the anaesthetic needs of children and neonates. They should, as Resident trainees at the end of their training, be able to organise and manage safely a list of straightforward paediatric cases over the age of 3 years with available consultant cover. They should understand the potential hazards of paediatric anaesthesia and have had as much practical training as is possible in planning for the management of such events.

Recommended local requirements to support training

1. Trainers for the initial period of training should be spending not less than the equivalent of one full operating session a week in paediatric anaesthesia
2. Anaesthesia for children requires specially trained staff and special facilities
3. Provision should be made for parents to be involved in the care of their children

4. Adequate assistance for the anaesthetist by staff with paediatric training and skill should be available
5. Paediatric anaesthetic equipment must be available where children are treated

DIAGNOSTIC IMAGING, ANAESTHESIA & SEDATION

The role of the anaesthetist in providing general anaesthesia and sedation together with physiological and pharmacological support for patients in the X-ray department is evolving rapidly. Trainees need to understand the benefits and risks particularly with regard to interventional procedures.

Knowledge

1. Preanaesthetic preparation
2. Techniques appropriate for adults and children for CT scanning, MR imaging and angiography
3. Post-investigation care

Skills

1. Pre-anaesthetic preparation
2. Sedation and general anaesthetic techniques for:
 - a) angiography and interventional procedures
 - b) CT scanning, adults and children
 - c) Magnetic resonance imaging with respect to:
 - d) the isolated patient
 - e) the problems due to magnetic field
3. Post-investigation care

Attitudes and behaviour

1. Establishing good communication and an understanding of their working needs with nursing staff, radiographers and radiologists

Workplace training objectives

1. Trainees should understand the implications of different interventional radiological procedures in their anaesthetic care of the patient and be able to establish safe anaesthesia or sedation within the confines and limitations of the X-ray department.

Recommended local requirements to support training

1. The provision of anaesthetic and monitoring equipment together with assistance for the anaesthetist should be to a similar standard as is provided in the operating theatres for an equivalent case.

INTENSIVE CARE MEDICINE

This is a 'Key Unit of Training'. All trainees in anaesthesia must receive a minimum of three months training in ICM during the 3 years of residency. This requirement is based on the recognition that knowledge and skills gained in critical care underpin the trainees' ability to gain competency in aspects of anaesthesia later in their training.

Knowledge

General

1. Trainees should have a good understanding of the diagnosis and management of the critically ill patient. All trainees should be familiar with the monitoring and life support equipment used in the treatment of critically ill patients. Trainees must be able to demonstrate their knowledge of practical invasive procedures, with an understanding of the principles and hazards involved and the interpretation of data from such procedures.
2. Transport of the critically ill:
 - a) assessment and organisation of transfer
 - b) physiological consequences of acceleration
 - c) problems of working in isolated environments
3. Outreach care:
 - a) early warning signs and symptoms
 - b) infection and Multiple Organ Failure
4. Sepsis and endotoxaemia:
 - a) nosocomial infections
 - b) assessment and management of oxygen delivery
 - c) antibiotics and immunotherapy
 - d) reperfusion injury and antioxidants
5. Cardiovascular system to include
 - a) pathophysiology and management of cardiogenic and hypovolaemic shock
 - b) pulmonary embolism
 - c) investigation and management of cardiac failure
 - d) investigation and management of arrhythmias
6. Respiratory system to include:
 - a) airway care, including tracheal intubation and clearance of secretions
 - b) humidification
 - c) management of tracheostomy and decannulation
 - d) ventilators and modes of pulmonary ventilation (including non-invasive ventilation)
 - e) management of acute and chronic respiratory failure
 - f) management of severe asthma
7. Nervous system to include:
 - a) central nervous system infection
 - b) acute polyneuropathy
 - c) traumatic and non-traumatic coma
 - d) encephalopathies
 - e) cerebral ischaemia
 - f) status epilepticus
 - g) brain stem death
8. Renal, Electrolyte and Metabolic Disorders to include:
 - a) diagnosis, prevention and management of acute renal failure
 - b) fluid, electrolyte and acid-base disorders
 - c) body temperature
 - d) adrenal and thyroid dysfunction
9. Haematological Disorders to include:
 - a) coagulopathies
 - b) immunocompromised patients

10. Gastrointestinal Disorders:
 - a) acute liver failure - diagnosis and management
 - b) acute pancreatitis
 - c) gut ischaemia
 - d) gastrointestinal ulceration and bleeding
 - e) translocation and absorption disorders
11. Nutrition:
 - a) enteral and parenteral nutrition: methods, nutrients, and complications
12. Analgesia, Anxiolysis and Sedation
13. Trauma:
 - a) management of multiple injuries
 - b) near-drowning
 - c) burns and smoke inhalation
14. Cardiopulmonary Resuscitation
15. Management of Acute Poisoning:
 - a) paracetamol
 - b) Barbiturates
 - c) Benzodiazepines
 - d) Organophosphorus
 - e) Tricyclics
 - f) Yellow oleander
 - g) Corrosive poisoning
16. Organ Donation
17. Scoring Systems and Audit
18. Ethics

Skills

General

1. Arterial and central venous access
2. Insertion of thoracic drain
3. Insertion of oro- or naso- gastric tube

Specific

1. Recognition of the critically ill patient
2. Insertion of flow directed pulmonary artery catheter
3. Insertion of transvenous pacemaker
4. Fiberoptic bronchoscopic clearance of sputum
5. Peritoneal lavage
6. Set up ventilator for adult suffering from severe ARDS
7. Assist in prone positioning patient
8. Assist in weaning patient from IPPV via assist/CPAP

Attitudes and behaviour

1. An awareness of the importance of communication skills and interpersonal relationships will be expected
2. Obtaining consent / assent for procedures in the critical care unit
3. Breaking bad news
4. Requesting post mortem investigation
5. Explaining need for unexpected / early discharge
6. Introducing the concept of organ donation

Workplace training objectives

1. There will be variation in the experience and degree of competence that individual trainees will achieve in this initial period of ICM training. However, for example, they should be able to admit and manage a patient who has undergone major emergency for instance in vascular surgery or to admit and organise the early management of a patient suffering from severe respiratory failure complicated by acute renal failure.

Recommended local requirements to support training

1. There should be a separate designated facility (the Intensive Care Unit) for the care of the critically ill patient.
2. There must be a sufficient number of intensive care and high dependency beds available to serve the designated population.
3. The Critical Care Unit must be properly staffed and equipped for the care of such patients.
4. All staff providing Critical Care, medical, nursing and paramedical must be appropriately trained.
5. Critical Care services should be subject to clinical audit

DAY SURGERY

This is a 'General Unit of Training' in which it is expected that all SpR 1/2 trainees will gain appropriate training.

Training should take place within a dedicated Day Surgery Unit where the management of cases as an outpatient is not compromised by elective or other operations taking place for inpatients.

Knowledge

1. Anaesthetic pre-assessment clinics
2. Instructions to patients, anaesthetic and social
3. Regional analgesia appropriate to day cases
4. General anaesthesia appropriate to day cases
5. Appropriate drugs for day cases
6. Recovery assessment
7. Postoperative analgesia

Skills

1. Instructions to patient:
 - a) transport
 - b) accompanying person who can drive if in own car
 - c) home not more than 1 hour away from day stay unit
 - d) level of care overnight
 - e) telephone availability
2. Anaesthesia:
 - a) regional or local anaesthesia
 - b) local topical anaesthesia or sedation
 - c) general anaesthesia
 - d) recognise those unsuitable for day case management

3. General Anaesthesia:
 - a) to limit the loss of physiological stability and to achieve rapid recovery
 - b) to select where appropriate analgesics and muscle relaxants used during outpatient GA to recognise when a patient is sufficiently recovered to return home supervised
4. Use of protocols or guidelines

Attitudes and behaviour

1. Good communication with nursing staff, patients, relatives and other hospital staff
2. The development of a professional and reassuring manner in order to allay patient anxieties

Workplace training objectives

1. The trainee must understand and apply agreed protocols with regard to patient selection and other aspects of care, and also appreciate the importance of minimising postoperative complications such as nausea and pain, in patients who are returning home the same day.

Recommended local requirements to support training

1. Clear guidelines must exist for appropriate patient selection for day case surgery, these will include consideration of social factors
2. Day surgery units will have a consultant in charge who chairs a multi-disciplinary management team
3. Specific arrangements must be made for the treatment of children
4. All patients must be assessed during the recovery phase for the adequacy of analgesia and fitness for discharge
5. Clear written discharge criteria must be established
6. Full written records must be maintained
7. Specific instructions and information must be available for patients, their relatives and community services

ACADEMIC / RESEARCH

An understanding of the scientific basis of anaesthetic practice is essential. This unit of training effectively underwrites the understanding and education of trainees in all the other aspects of the training that they will receive. Even if separate time is not allocated, the concepts identified here should be fundamental to the education of Trainees.

Knowledge

1. In The scientific basis of clinical practice
2. In The methodology and processes of clinical and laboratory research including the ethical considerations raised by research, the importance of study design in clinical research and the importance of statistical analyses
3. In The audit cycle
4. In Critical Incident Reporting:
 - a) In purpose and value
 - b) In methods – local / national
 - c) In anonymity – pros and cons

Skills

1. Able to locate published research in a systematic manner
2. Critically interpret and evaluate the value of published clinical research
3. Plan and prepare a presentation and present to a live audience.

Attitudes and behaviour

1. Maintain an inquisitive, questioning approach to clinical practice
2. Cultivate an evidence-based practice
3. Awareness of and detachment from vested interests or entrenched views
4. Develop a readiness to both listen and explain
5. Demonstrate a willingness to teach and learn
6. Develop an informed critical approach to the scientific literature

Workplace training objectives

1. Trainees should gain competency in the critical interpretation and evaluation of published clinical research and be able to assess the benefit of applying the results of research to clinical practice.

Recommended local requirements to support training

1. A suitably experienced consultant or clinical academic
2. Library and computing facilities
3. Regular academic meetings

Evaluation (Assessment):

Evaluation will have 2 components.

A – Formative Assessment

B – Summative Assessment

A) FORMATIVE ASSESSMENT:

1. Ongoing assessment through the duration of the course, during each posting and at the end of the posting.
2. The resident will be assessed at the end of each posting by the consultant in-charge under whom the resident has worked during the posting.
3. The procedure to be adopted for assessment is
 - a) Regularity of pre-operative assessment and post-operative care
 - b) Regularity in OT/ICU's
 - c) Inquisitiveness, Expression and Application
 - d) Skills acquired
 - e) Attitude towards patients and colleagues
 - f) Conduct of anaesthesia
 - g) Involvement in teaching program

The use of MCQs is recommended for formative / end semester evaluation.

Technical Skills / Competency Evaluations:

Methods to be used

1. Observing the candidate during anaesthetic management on real patients by the consultant in-charge (check lists of each skill and competency according to speciality may be used)
2. Assessment on Simulators (if available)
3. Objective Structured Clinical Examination (OSCE)

This evaluation will be done either in the OT or ICU or PAC or Postoperative wards.

Problem Solving Cases:

Method to be used

1. Case presentations (evaluation by peers)
2. Simulated case cards
3. OT discussions
4. OSCE

Oral Skills / Attitudinal Development:

Method to be used

1. Ability to present seminars, discussion in class room (evaluation by Peers)
2. Talking to patients in pre-anaesthesia rounds
3. Behavior in the Operation Theatre.

Cardiopulmonary Resuscitation:

Method to be used

1. Mannequins demonstration
2. Check lists for evaluation
3. OSCE

CPR evaluation will be repeated at the end of each semester

M.D. ANAESTHESIOLOGY**PAPER I - Applied Basic Sciences in Relation to Anaesthesiology**

Answer all questions.

Draw diagrams where necessary.

Time: 3 Hours

Maximum Marks: 10 X 10 = 100

1. Describe the various bronchopulmonary segments.
2. Describe the 'Circle of Willis' and discuss how autoregulation of blood flow occurs to the brain.
3. What is 'Hypoxic pulmonary vasoconstriction'? Discuss its significance in anaesthesia.
4. Describe the pharmacodynamics, pharmacokinetics, side effects and contraindications of Thiopentone.
5. Classify local anaesthetics. Discuss and compare the toxic effects of amide local anaesthetics.
6. Student's t-Test.
7. What is the principle of pulse oximetry? Briefly discuss the clinical utility of this monitoring tool in the perioperative period.
8. Link-25 System.
9. Classify breathing systems. Give the functional analysis of Mapleson D system in controlled ventilation.
10. Discuss the various methods of disinfection and sterilization related to anaesthesia practice.

M.D. ANAESTHESIOLOGY

PAPER-II - Clinical Anaesthesiology

Answer all questions.

Time: 3 Hours

Maximum Marks: 100

1. A 50 year male with end-stage renal disease in CRF is scheduled for renal transplant. Describe the features of end-stage renal disease. Describe the pre-op evaluation, preparation and anaesthetic management. (Marks: 25)
2. Discuss the anaesthetic considerations in a 25 year female with primary infertility, posted for outpatient gynaecological laparoscopy. Describe your anaesthetic technique for this patient. (Marks: 25)
3. Short Notes:- (Marks: 5 x 10 = 50)
 - a) WTG. Morton.
 - b) Celiac plexus block.
 - c) ASA classification of physical status.
 - d) Informed consent.
 - e) Surgery in patients with suspected steroid induced adrenal suppression.

M.D. ANAESTHESIOLOGY

PAPER-III - Anaesthesiology in Relation to Other Clinical Sciences.

Answer all questions.

Time: 3 Hours

Maximum Marks: 100

1. A 65 year old male with hypertension, IHD and unstable angina on treatment sustains a fracture neck of femur (L), and is posted for orthopaedic surgery. Discuss the anaesthetic implications and outline the anaesthetic management. (Marks: 25)
2. A 9 month old baby with history of foreign body aspiration is posted for emergency bronchoscopy. What would be the anaesthetic problems? Describe the preop evaluation, preparation and anaesthetic management. (Marks: 25)
3. Short Notes: (Marks: 5 x 10 = 50)
 - a) Occulocardiac reflex.
 - b) Sedation for CT and MRI
 - c) CVP monitoring in cardiac surgery.
 - d) Postoperative fluid management after tonsillectomy.
 - e) Air embolism during neurosurgery.

M.D. ANAESTHESIOLOGY

PAPER IV - Anaesthesiology Including Resuscitation, Critical Care and Recent Advances.

Answer all questions.

Time: 3 Hours

Maximum Marks: 100

1. Describe the 'Difficult Airway Algorithm' and practice guidelines for both anticipated and unanticipated difficult airway situations. (Marks: 25)
2. Outline how to re-organise hospital facilities, to manage if there is a "Mass Casualty" near your hospital area. (Marks: 25)
3. Short Notes: (Marks: 5 x 10 = 50)
 - a) Accidental Total Spinal.
 - b) Refractory hypoxiemia.
 - c) Supraglottic airway devices.
 - d) Discuss any 3 recent modifications in CPR guidelines.
 - e) Dual controlled mode of ventilation.

LIST OF BOOKS RECOMMENDED

Sl. No.	Name of the book	Name of the Author	Ed.	Publishers
1	A synopsis of Anaesthesia	J. Alfred Lee	4th	
2	Lumbar puncture and spinal Anesthesia	R. Macintosh	2nd	
3	Management of pain	J.J. Bonica		
4	Spinal Epidural Analgesia	R.R.Bromage		
5	General Anaesthesia - I Vol.	Evans F.T. & Gray		
6	General Anaesthesia - I Voll.	Evans F.T. & Gray		
7	Anaesthesia for infants and children	R.M. Smith		
8	The year book of Anaesthesia - 1963-64 series	Stuart C. Cullen		
9	Anaesthesia for infants and children	R.M. Smith & Robert E. Gross	2nd	
10	Recent advances in Anaesthesia and Analgesia	C.Langton Hewer	9th	
11	A Practice of Anaesthesia	Wylic and Churchill Davidson	2nd	
12	Anaesthetics, Resuscitation and Intensive care	Morris and Campbell		
13	Anaesthetic techniques for Obstetrical Anaesthesia and Analgesia	Daniel C. Moore		
14	Anaesthesia for infants and children	Robert Smith. M.		
15	Appraisal of current concepts in Anaesthesiology	John Adriani		

16	General Anaesthesia - Vol.I.	Cecil Gray John F.Num - J.E.Utting	IV	Butterworths
17	General Anaesthesia - Vol.II	Cecil Gray John F.Num - J.E.Utting	IV	Butterworths
18	Anaesthesia - Vol.I	Miller	3rd	
19	Anaesthesia Vol.II	Miller	3rd	
20	Management of pain Vol.I	Bonica	2nd	
21	Management of pain Vol.II	Bonica	2nd	
22	Atlas of Anaesthesia & Critical Care Vol.I	Miller	1997	
23	Atlas of Anaesthesia & Critical Care Vol.II	Miller	1998	
24	Atlas of Anaesthesia & Critical Care Vol.III	Miller	1997	
25	Atlas of Anaesthesia & Critical Care Vol.IV	Miller	1998	
26	Atlas of Anaesthesia & Critical Care Vol.V	Miller	1998	
27	Clinical Anaesthesia	Barash	4th 1997	
28	Critical Care	Civetta	3rd 1997	
29	Anaesthesia : Reviews	Leon Kaufman		
30	Neuro Surgical Anaesthesia	A.P. Hunter	1964	
31	Acta Anaesthesiologica and Scandinavica	CHR.Thorshaug e	1970	
32	Recent advances in Anaesthesia and analgesia	C. Langton Hewer	1979	
33	General Anaesthesia and the central nervous system	Leonard C. Jenkins	1969	
34	Anaesthesia for Cardiac Surgery and Allied procedures	M.A.Branthwait e.A.P.	1977	
35	Neurosurgical Anaesthesia	C. Langton Hewer	1964	
36	Recent advances in Anaesthesia and analgesia EDB	Emil Blair	1958	
37	Acta Anaesthesiologica and Scandinavica	Eric Nilsson Lund	1967	
38	Automatic ventilation of the lungs	William W. Mushin	3rd 1980	
39	The chemistry and physics of Anaesthesia	John Adriani	2nd 1962	
40	Cardiac Anaesthesia	Dr. Deepak Tempe		
41	Handbook of Neuroanaesthesia	Cottrell		
42	Anaesthesia Equipments	Dorsch & Dorsch		
43	Cardiac Anaesthesia	Kaplan		
44	Anaesthesia Equipments - Ward			
45	Anaesthesia and Neurosurgery	Cottrell & Smith		
46	Paediatric Anaesthesia	Gregory		

47	ICU Book	Paul Marino		
48	Critical Care	Joseph Civetta		
49	Pharmacology & Physiology in Anaesthetic practice	Robert K.Stocling		

LIST OF JOURNALS

Sl.No.	Names of journals
1	Anaesthesiology
2	Anesthesia Analgesia
3	Anaesthesia
4	Anesthesia Intensive Care
5	Canadian Journal of Anaesthesia
6	British Journal of Anaesthesia
7	Indian Journal of Anaesthesia
8	Journal of Anaesthesiology Clinical Pharmacology

COMMUNITY MEDICINE

PREAMBLE

- a) Health care has attained wider connotations than merely care during illness. The attainment of health by the individual, family and community is a cherished goal. Optimal use of restricted resources requires planning and management, making the goal an even more challenging one. After acquiring the required training in MD (Community Medicine), the specialist will have more versatility, focus and commitment in helping reaching the goal. It is with this in mind the following curriculum has been planned for the award of MD (Community Medicine) by JIPMER.
- b) This document describes:
 - The objectives of training in M. D. (community medicine)
 - The course contents
 - Skills to be acquired by the postgraduate
 - The training program
 - Scheme of evaluation
 - Distribution of marks
 - List of books recommended for m.d. (community medicine)
- c) A set of Instructions for Question Paper Setter and 4 model question papers are also included at the end.

1. THE OBJECTIVES OF TRAINING IN M. D. (COMMUNITY MEDICINE)

Teaching and training of postgraduates in Community Medicine is directed towards achievement of the goal of “Health for All”. The aim of postgraduate training is to prepare the students to function effectively as:

- Teachers
- Epidemiologists
- Researchers
- Health Managers
- Public Health Care Providers

Towards this end it is hoped that upon of training, the postgraduate student should be:

1. Aware of the physical, social, psychological, economic and environmental aspects of health and disease in individuals, families and the community.
2. Able to apply clinical skills to recognize and manage common health problems including their physical, emotional, social and economical aspects at the individual, family and community levels.
3. Able to manage health emergencies at the community level.
4. Able to identify, plan and manage the health problems of the community.

To achieve these, the postgraduate should be able to:

- 5.1. Organize epidemiological research studies in various aspects of health. For this, he/she should be able to design a study, collect data, analyze it with appropriate statistical tests and make a report.

- 5.2. Identify the health needs and demands of the community and prioritize the problems and formulate a plan of action to manage them under the guidelines of various National Health Programmes. He/she should be able to assess and allocate resources, implement and evaluate the programmes.
- 5.3. Demonstrate the ability to organize prevention and control of communicable and non-communicable diseases.
- 5.4. Organize health care services for vulnerable groups like mothers, infants, under-five children, school children, adolescents, geriatric age group, handicapped children, tribal and displaced populations, etc.
- 5.5. Manage Health Information System and respond appropriately to the information gathered
- 5.6. Assess cost and carry out program budgeting
- 5.7. Implement Public Health laws
- 5.8. Establish surveillance system and respond to Public Health threats, including disasters
- 5.9. Plan Human Resources Development
- 5.10. Able to co-ordinate with and supervise other members of the health team and maintain liaison with other agencies.
- 5.11. Able to plan and implement health education programmes and activities
- 5.12. Able to promote community participation in all programmes.
- 5.13. Aware of the national priorities and the goals to be achieved to implement primary health care.
- 5.14. Able to act as an effective teacher and trainer of Community Medicine.

2. COURSE CONTENTS

1) CONCEPTS IN HEALTH

1. Definition of Health; appreciation of health as a relative concept; determinants of health.
2. Characteristics of agent, host and environmental factors in health and disease and the multifactorial etiology of disease.
3. Understanding of various levels of prevention with appropriate examples.
4. Indices used in measurement of health.
5. Health situation in India: demography, mortality and morbidity profile and the existing health facilities in health services.
6. Difficulties in measurement of health.

2) EPIDIMIOLOGY

1. Use of epidemiological tools to make a community diagnosis of the health situation in order to formulate appropriate intervention measures.
2. Epidemiology: definition, concept and role in health and disease.
3. Definition of the terms used in describing disease transmission and control
4. Natural history of a disease and its application in planning intervention.
5. Modes of transmission and measures for prevention and control of communicable and non-communicable disease, including Integrated Disease Surveillance Project (IDSP)
6. Principal sources of epidemiological data.
7. Definition, calculation and interpretation of the measures of frequency of diseases and mortality.
8. Common sampling techniques, simple statistical methods for the analysis, interpretation and presentation of data frequency distribution, measures of central

- tendency, measures of variability, statistical tests of significance and their application.
9. Burden of diseases in respect to premature mortality due to re emerging communicable diseases and morbidity due to non-communicable diseases.
 10. Need and uses of screening tests.
 11. Accuracy and clinical value of diagnostic and screening tests (sensitivity, specificity, & predictive values).
 12. Epidemiology of communicable and non- communicable diseases of public health importance and their control.
 13. Epidemiological basis of national programmes.
 14. Awareness of programmes for control of non-communicable diseases.
 15. (a) Planning and investigation of an epidemic of communicable diseases in a community setting.
(b) Institution of control measures and evaluation of the effectiveness of these measures.
 16. Various types of epidemiological study designs.
 17. The derivation of normal values and the criteria for intervention in case of abnormal values.
 18. Planning an intervention programme with community participation based on the community diagnosis.
 19. Applications of computers in epidemiology.
 20. Critical evaluation of published research.
 21. GIS Mapping
 22. Mathematical Modeling in Epidemiology

3) EPIDEMIOLOGY OF SPECIFIC DISEASES

The specific objectives of selected communicable and non-communicable diseases of public health importance for which National Disease Control/ Eradication Programmes have been formulated are described here. The idea of formulating objectives for a few diseases is to highlight their importance and to emphasize certain learning outcomes.

Infective hepatitis, ARI, T.B. Malaria, Filariasis, STDs & AIDS, Diarrhoeal diseases, Kala Azar, Mental Health, Coronary heart disease, Blindness, Hypertension, Leprosy, ACCIDENTS, JE, VPDs, Plague, Chickenpox, SARS, avian flu, etc.

1. Extent of the problem, epidemiology and natural history of the disease.
2. Relative public health importance of a particular disease in a given area.
3. Influence of social, cultural and ecological factors on the epidemiology of the disease.
4. Control of communicable and non-communicable disease by:
 - 5.1 Diagnosing and treating a case and in doing so demonstrate skills in:
 - i) Clinical methods
 - ii) Use of essential laboratory techniques
 - iii) Selection of appropriate treatment regimes.
 - iv) Follow-up of cases.
 - 5.2 Principles of planning, implementing and evaluating control measures for the diseases at the community level bearing in mind the relative importance of the disease.
6. Institution of programmes for the education of individuals and communities.
7. Investigating a disease epidemic.
8. Knowledge of the National Health Disease Control Programmes.

9. Level of awareness of causation and prevention of diseases amongst individuals and communities.
10. Control of communicable and non- communicable disease by diagnosing and treating a case and in doing so, demonstrate skills in:
Instituting measures, where necessary, for preventing disabilities/ deformities.
Rehabilitation of the patient.
11. Training of health workers in disease surveillance, control and treatment, health education.
12. Managerial skills in the area of
 - (i) Planning and organization of health services.
 - (ii) Supervision.
 - (iii) Collection and compilation of data,
 - (iv) Maintenance of records,
 - (v) Transmission of data.

4) BIOSTATISTICS

- 1.1 The scope and uses of biostatistics.
- 1.2 Collection, classification and presentation of statistical data.
- 1.3 Analysis and interpretation of data.
2. Obtaining information, computing indices (rates and ratio) and making comparisons.
3. Apply statistical methods in designing of studies.
 - (a) Choosing of appropriate sampling methods and sample size.
 - (b) Applying suitable test of significance.
 - (c) Use of statistical tables.
 - (d) Application of appropriate statistical software (packages, like SPSS, Epi Info, etc.)

5) ENTOMOLOGY

1. Role of vectors in the causation of diseases.
2. Steps in management of a case of insecticide toxicity.
3. Identifying features of and mode of transmission of vector borne diseases
4. Methods of vector control with advantage and limitations of each.
5. Mode of action, dose and application cycle of commonly used insecticides.

6) ENVIRONMENTAL SANITATION

1. (a) Awareness of relation of Environment to health.
(b) Awareness of the concept of safe and wholesome water.
(c) Awareness of the requirements of a sanitary source of water.
(d) Understanding the methods of purification of water on small scale with stress on chlorination of water.
(e) Various biological standards.
2. Concepts of safe disposal of human excreta.
3. Physical, chemical standards; tests for assessing quality of water.
4. Disposal of solid waste, liquid wastes both in the context of urban and rural conditions in the community.
5. Problems in the disposal of refuse, sullage and sewage.
6. (a) Sources, health hazards and control of environmental pollution.
(b) Influence of physical factors- like heat, humidity, cold, radiation and noise – on the health of the individual and community.
(c) Standards of housing and the effect of poor housing on health.

7. Low cost sanitation in rural areas

7) REPRODUCTIVE & CHILD HEALTH (RCH)

1. Need for specialized services for women and children.
2. Magnitude of morbidity and mortality in these groups in a given area.
3. Local customs and practices during pregnancy, childbirth and lactation.
4. Concepts of “high risk” and “MCH package”, child survival and Safe motherhood, integrated Child Development Service Scheme and other existing regional programmes.
5. Under-5: morbidity, mortality, high risk and care.
6. Monitoring of growth and development and use of Road to Health Chart.
7. Immunization
 - All respects (Basics of immunization; immunizing agents; administration, storage and transportation of vaccines; cold chain, side effects & complications etc.)
 - Newer vaccine.
8. Organization, implementation and evaluation of programmes for mothers and children as per National Programme guidelines.
9. Role of Genetics in Community Health and Genetic Counseling at Primary Care Level.
10. National Policy for Children; IYCF; IMNCI

8) DEMOGRAPHY & FAMILY PLANNING

1. Definition of demography and its relation to community Health.
2. Stages of the demography cycle and their impact on population.
3. Definition, calculation and interpretation of demographic indices like birth rate, death rate, growth rate, fertility rates.
4. Reasons for rapid population growth in the world, especially in India.
5. Need for population control measures and the National Population Policy.
6. Identify and describe the different family planning methods and their advantage and shortcomings.
7. Principles of Counseling; Client satisfaction.
8. Medical Termination of Pregnancy Act.
9. Organizational, technical and operational aspects of the National Family Welfare Programme and Participation in the implementation of the Programme. Target Free Approach.
10. Give guidelines for MTP and infertility services.
11. Recent advances in contraception.
12. National Population Policies.

9) HEALTH PLANNING AND MANAGEMENT

1. Public Health Administration, regionalization, comprehensive health care, Primary Health Care, delivery of health care, planning, management, evaluation, National Health Policy, Development of Health Service in India and various committee reports.
2. Components of health care delivery.

- (i) Describe the salient features of the National Health Policy concerning:

- (a) Provision of medical care; (b) Primary health care and Health for All; (c) Health manpower development; (d) Planned development of health care facilities; (e) Encouragement of indigenous systems of medicine.
- (ii) Explain the process of health planning in India by demonstrating awareness of:
 - various important milestones in the history of health planning including various committees and their recommendations.
 - The health systems and health infrastructure at centre, state district and block levels.
 - The inter-relationship between community development block and primary health centre.
 - The organization, function and staffing pattern of community health centre, primary health centre, rural health centre and sub-centre etc.
 - The job descriptions of health supervisor (male and female); health workers; village health guide; Anganwadi workers; traditional birth attendants.
 - The activities of the health team at the primary health centre, community health centre, district hospital.
- 3. Familiarity with management techniques: define and explain principles of management; explain broad functions of management; personnel and materials management.
- 4. The components of health care delivery, For this, he should;
 - Appreciate the need for International Health Regulations and Disease surveillance.
 - Be aware of the constitutional provisions for health in India.
 - Enumerate the major divisions of responsibilities and functions (concerning health) of the union, local and the state governments.
 - Appreciate the role of national, international voluntary agencies in health care delivery.
- 5. Explain general principles of health economics and various techniques of health management e.g., cost-effectiveness, cost-benefit etc.
- 6. Management: Public health program Management, Hospital/Health care delivery system
Administration, Logistic/Material Management, Finance Management Disaster Management etc
- 7. Legal-enforcement in Public Health (PFA Act, PNDDT Act, Organ Transplant Act, Magic Remedial and Advertisement Act, Detention for strict DOTS implementation among drug abusers, alcohol addicts, etc.
- 8. National Rural Health Mission

10) NUTRITION

1. Nutritional problems of the country; Role of nutrition in Health & Disease.
2. Common sources of various nutrients and special nutritional requirement according to age, sex, activity, physiological conditions.
3. Nutritional assessment of individual, families and the community by selecting and using appropriate methods such as: anthropometry, clinical, dietary, laboratory techniques.
4. Compare recommended allowances of individual and families with actual intake.
5. Plan and recommend a suitable diet for the individuals and families bearing in mind local availability of foods, economic status etc.
6. Common nutritional disorders: protein energy malnutrition, Vit. A deficiency, anemia, iodine deficiency disorders, fluorosis, food toxin diseases and their control and management.
7. National Nutritional Policy.

8. National programmes in nutrition and their evaluation.
9. Food adulteration: prevention and control.

11) SOCIAL AND BEHAVIORAL SCIENCES

1. Conduction of a clinico-social evaluation of the individual in relation to social, economic and cultural aspects; educational and residential background; attitude to health, disease and to health services; the individual's family and community.
2. Assessment of barriers in health behavior and identification of obstacles to good health, recovery from sickness and to leading a socially and economically productive life.
3. Development of a good doctor- patient relationship, public relations and community participation for health sectors.
4. Identification of social factors related to health and disease in the context of urban and rural societies.
5. Impact of urbanization on health and disease.

12) SCHOOL HEALTH

1. Problems of school and adolescents; objectives of the School Health Programme.
2. Activities of the Programmes like:
 - (a) Carrying out periodic medical examination of the children and the teachers.
 - (b) Immunization of the children in the school.
 - (c) Health Education.
 - (d) Mid-day meals.
3. Obtaining participation of the teachers in the school health programme including maintenance of records; defining health practices; early detection of abnormalities.
4. Organization, implementation, supervision and evaluation of School Health Programme.
5. Oro-dental Health

13) OCCUPATIONAL HEALTH

1. Relate the history of symptoms with the specific occupation including agriculture.
2. Identification of the physical, chemical and biological hazards to which workers are exposed to while working in a specific occupational environment.
3. Diagnostic criteria of various occupational diseases.
4. Preventive measures against these diseases including accident prevention.
5. Various legislations in relation to occupational health.
6. Employees State Insurance Scheme.

14) HEALTH EDUCATION (BEHAVIORAL CHANGE COMMUNICATION)

1. Communicate effectively with individuals, family and community using tools and techniques of information, education, communication. To do so, the student should:
 - (a) Appreciate principles of communication and barriers to effective communication.
 - (b) Principles, methods and evaluation of health education.
 - (c) List various methods of health education with their advantages and disadvantages.
 - (d) Select and use appropriate media (simple audiovisual aids) for effective health education.

2. Use every opportunity for health education of the individual, family and the community.

15) RURAL HEALTH

1. Describe the roadmap for making health services available at the doorsteps in the villages, in light of the National Rural Health Mission (NRHM).
2. Plan, execute, evaluate health activities in concordance with the stated objectives of the NRHM.
3. Relate health in the village with the Millennium Development Goals that are specific to health, viz.,
 - Goal 4: Reduction in Child Mortality
 - Goal 5: Improve Maternal Health
 - Goal 6: Combat HIV/AIDS, Malaria and other diseases
 - Goal 7: Ensure Sustainable Environment

16) URBAN HEALTH

1. Common health problems (Medical, Social, Environmental, Economic, Psychological) of urban slum dwellers.
2. Organization of health services for slums dwellers.
3. Organization of health services in urban areas.
4. National Urban Health Mission

17) HEALTH ECONOMICS

1. Macro- and micro-economics, Health Financing and Health Insurance

18) TRIBAL HEALTH

1. Tribal Health: Managing reaching to unreached, other areas of recent interest like increased prevalence of HIV infection among tribes of Andaman, Yaws among tribes of Orissa-post-eradication status, Leprosy among tribes of Dangs of Gujarat-post-elimination status

19) TEACHING & TRAINING

1. Able to act as a good teacher/ facilitator. For this, he/she will require:
 - Knowledge of general principles of teaching/ learning, methods of instructions, methods of evaluation.
 - Knowledge of various teaching aids (including audio-visual aids) and skills to use them correctly.

3. SKILLS TO BE ACQUIRED BY THE POSTGRADUATE

PART I: GENERAL SKILLS

The postgraduate student should be able to:

1. Elicit the clinico-social history to desire that agent, host and environmental factors that determine and influence health.
2. Recognize and assist in management of common health problems of the community.
3. Apply principles of epidemiology in carrying out epidemiological studies in the community.
4. Work a team member in rendering health care.

5. Carry out health education for the community.

PART – II: SKILLS IN RELATION TO SPECIFIC TOPICS

1. Communication

The student should be able to communicate effectively with family members at home; patients at clinics or at homes; individuals, family or a group for health educational; peers at specific forums.

2. Team activity

Work as a member of the health team; in planning and carrying out fieldwork like school health.

3. Environmental sanitation

Collect water samples for microbiological evaluation; chlorination of water; estimate the chlorine demand of water; estimate the residual chlorine of water; insecticides; their proper storage and use in control of vectors.

4. Communicable and non-communicable diseases (including social problems)

- a) Eliciting clinico-social history and examining the patient for diagnosis and treatment.
- b) Collection of appropriate material for Microbiological, pathological or biochemical tests.
- c) Fixing, staining, and examining smears-peripheral blood smear for malaria and filariasis, sputum for AFB: slit skin smears for leprosy; Hb estimation; urine and stool examination.
- d) Assessing the severity and / or classifying dehydration in diarrhea, upper respiratory tract infection, dog bite, leprosy.
- e) Adequate and appropriate treatment and follow up of leprosy, malaria, filariasis, rabies, upper respiratory tract infections, diarrhea and dehydration.
- f) Advise on the prevention and prophylaxis of common diseases like vaccine preventable diseases, tetanus, malaria, filariasis, rabies, cholera, intestinal parasites.
- g) Use of proper screening methods on early diagnosis of common diseases.
- h) Take necessary steps in disease outbreak / epidemics /natural disasters-investigation of epidemic, food poisoning; notification: organizing medical care following disasters.

5. Reproductive and Child Health

- a) Antenatal - examination of the mother: application of the risk approach in antenatal care.
- b) Intranatal - conducting a normal delivery; early recognition of danger signals in intranatal period: referral of cases requiring special care.
- c) Postnatal - assessment of the mother and new born, advice about appropriate family planning method: promotion of breast feeding: advise on weaning.
- d) Assessment of growth and development of the child - use of ' Road to Health' card: recording important anthropometric assessments of the child: giving immunization to the child: identifying high risk infant.

6. Biostatistics

- (a) Choose proper sample, sampling method and sample size.
- (b) Apply appropriate tests of significance to make a correct inference.

7. Nutrition

- a) Conducting a diet survey.
- b) Community survey and clinical diagnosis of nutritional deficiencies: Vitamin A deficiency, iodine deficiency, malnutrition.
- c) Making recommendations regarding diet.

8. Occupational Health

- (a) Inspection of work sites
- (b) Recommendation in improving work sites.
- (c) Medical examination of workers.

9. Health care of the community

- (a) Ensuring community participation in health care.
- (b) Arranging intersectoral coordination where necessary.
- (c) Working in liaison with other agencies involved in health care in various

National Health Programmes.

10. Health Management

- (a) Be an effective team leader
 - i) Interact, communicate, educate effectively persons from diverse backgrounds, ages and preferences to promote healthy behaviour through community participation
 - ii) Explain scientific information to public, decision makers and opinion leaders
 - iii) Nurture team spirit and harmonize activities of various members
 - iv) Facilitate inter-sectoral coordination
 - v) Promote and establish partnerships
- (b) Guide and train workers
- (c) Supervise workers and programmes

11. Family Planning

- (a) Counseling on appropriate methods.
- (b) Organize, Implement, supervise & Evaluate family welfare program in an area.

12. Teaching skills

- i) Assess the learning needs of any given group (Student, staff or community)
- ii) Formulate learning objectives
- iii) Plan curriculum and curriculum materials
- iv) Select and implement appropriate learning methods
- v) Evaluate learning experiences

4. TRAINING PROGRAMME

- 4.1) Lecture discussions: on various topics like epidemiology, concepts in Community Medicine, statistics, nutrition, public health administration, research methodology, environmental sanitation, occupational health, international health and health systems.
- 4.2) Clinical Training: In the present context clinical training need be in the following specialties only:
 - Pediatrics
 - Infectious Diseases
 - Dermatology & STD Leprosy

Importance should be given to the learning outcome rather than to the duration of the posting. After an initial posting for familiarization with the procedures and staff of the

concerned department a “credit system” could be followed. In this the candidate would be required to follow up cases both in the wards and in the field. The management of the cases will be discussed with the staff members and “credit” given to the performance of the candidate. The duration of the postings could vary from two to four weeks. The “credit” given could be used for evaluation.

These postings should be in the second year of the course after the candidate has undergone training in epidemiology, sociology, and statistics. This would enable the candidate to have a broader perspective in the management of the cases and to take into consideration the sociological implications and the influence on the community.

4.3) Postings / visits to other departments and offices for gaining knowledge and skills.

Year	Department	Duration	Knowledge & skills
I	Rural Health Centre	2 months	Staffing and functions of health centre, implementation of programmes, maintenance of records and administration.
II	Microbiology	1 month	Laboratory procedures, isolation and identification of organisms from water, transport of specimens
bic health related	Vector Control Research Centre	1 week	Methods of vector control.
	Public Health Lab	1 week	Methods of food sampling and analysis.
	Visit to Municipal Health Office and National Health Programme Offices.		Collection and maintenance of statistics and implementation of programmes
	Other offices		Administration.

Teaching / Learning Methods:

4.4) Practicals	Practical exercises to cover epidemiology, statistics, medical entomology, Clinico-social case study, practical teaching to undergraduates on environmental sanitation, Health Education. Field investigation of outbreaks
4.5) Dissertation	On a topic of public health importance to train the candidate in research methodology. The dissertation is to be approved by the board of examiners.
4.6) PG Presentation	Weekly seminar presentations and in-depth discussion
4.7) Journal Club	Weekly in-depth discussion of articles appearing in public health related scientific journals.
4.8) Others	Inter-departmental postgraduate seminars and discussions with visiting professors. Visits to place of Public Health interest and other training centres e.g. NTI, CLTRI, etc.

5. SCHEME OF EVALUATION

JIPMER shall conduct examination for the candidates at the end of 3 years of postgraduate training.

There shall be four examiners, two external and two internal. The evaluation shall consist of 4 aspects, viz., Theory, Practical, Viva Voce.

A) THEORY (Written Examination)

The theory part shall consist of four papers of 3 hours duration each, containing 2 long essay and 4-6 short essay type of questions. The title of the papers shall be as follows:

Paper I: Epidemiology, Behavioral sciences, Population sciences & Demography, Biostatistics, Environmental Health

Paper II: Epidemiology, prevention & control of Communicable and Non-communicable diseases, Health education.

Paper III: Health Care of Special Groups, Nutrition.

Paper IV: Health Services, Health Administration, Primary Health Care, National Health Programmes.

B) PRACTICAL EXAMINATIONS consisting of:

- a) Problem solving exercises in Epidemiology and Biostatistics
- b) Entomology and other spots
- c) Interpretation of results of water analysis
- d) Family case discussion.
- e) Pedagogy exercise.

C) VIVA VOCE

A general viva voce examination on all topics prescribed in the curriculum.

6. DISTRIBUTION OF MARKS

Marks for evaluating a candidate shall be awarded as follows:

A) Theory (4 papers x 100 marks)	= 400
B) Clinical / Practical and Oral	= 400
Break up:	
Clinico-social family discussion	= 150
Epidemiology / Biostatistics exercises	
Interpretation of water analysis	= 50 (20+20+10)
Spotters	= 50
Pedagogy	= 50
Viva voce	= 100

Grand Total	800

7. LIST OF BOOKS RECOMMENDED FOR M. D. (COMMUNITY MEDICINE)

1. Public Health & Preventive Medicine: John M Last
2. Medical Sociology: W. Peters & H. M. Gilles
3. Survey Methods in Community Medicine J. H. Abramson.
4. Hunter's Disease of Occupation: P.A.B. Raffle Obe
5. Oxford Textbook of Public Health
6. Practical Epidemiology: D. J. P. Barker and A. J. Barker
7. Manson's Tropical Disease: Manson Bahr & Apted
8. Preventive Medicine: O. P. Ghai
9. Hospital Waste Management 2000: Acharya, D.B and Singh M
10. Manual for Control of Hospital infection NACO, M. O. H & F.W, GOI
11. Nutrition and Diet Therapy Evidence Based Application: Lutz.(4th ed. 2008)
12. Basic Clinical Nutrition (2nd ed. 2008)
13. Park's Textbook of Preventive & Social Medicine (18th ed.)
14. Research Methods in Cultural Anthropology: Russell Bernard
15. Textbook of Epidemiology: Leon Gordis, 4th ed.
16. Maxcy-Rosenau Textbook of Public Health & Preventive Medicine
17. Principles of Biostatistics: Marcello & Kimberlee
18. Modern Epidemiology: Kenneth J Rothman
19. Journals of Public Health and related disciplines

8. INSTRUCTIONS TO QUESTION PAPER SETTER

- a) Evaluation of theoretical knowledge would be by four written paper of three hours duration each.
- b) Each paper consists of 2 long essay and 5 short essay type of questions.
- c) Preferably one of the long questions should be of problem solving type.
- d) Each examiner would value all the papers of all candidates.
- e) A particular question may cover more than one topic or level of knowledge simultaneously.

The titles of the papers shall be as follows:

Paper I: Epidemiology, Behavioral sciences, Population sciences & Demography, Biostatistics, Environmental Health

Paper II: Epidemiology, prevention & control of Communicable and Non-communicable diseases, Health education.

Paper III: Health Care of Special Groups, Nutrition.

Paper IV: Health Services, Health Administration, Primary Health Care, National Health Programmes.

The syllabus of the course for examination is given below.

History of medicine; Concepts of health; Principles & practice of epidemiology; Environmental health; Behavioral Sciences; Population sciences & demography; Bio-statistics; Computer applications;	PAPER I
Communicable and non communicable diseases – epidemiology, prevention & control; Health education, IEC (Information, education, communication); Disaster preparedness and responses; Principles of pedagogy.	PAPER II

Health care of special & vulnerable groups: women, children & elderly; school children, occupational groups, Family welfare, Mental health, Nutrition – principles & applied aspects.

PAPER III

Evolution of medical and public health services in India; Role of various Health Committee reports in health care delivery; Health planning & management in India; health systems in India and other countries; Primary health care and the “Health for All” concept; National health programmes; International health; International & voluntary health agencies; health legislation in India; Health management & economics.

PAPER IV

Four model question papers are provided in the following pages.

MODEL QUESTION PAPER

M.D. DEGRE EXAMINATIONS
BRANCH XV - COMMUNITY MEDICINE

Answer ALL questions

Time: 3 hours

Max. Marks: 100

PAPER I

Epidemiology, Behavioral sciences, Population Sciences & Demography, Research Methodology & Bio-statistics, Environmental Health

1. Family should be the unit for providing health services. Discuss. (25 marks)
2. What are the standards recommended by World Health Organization for drinking water quality for developing countries? (25 marks)
3. Write short Notes on: (5 x 10 = 50 marks)
 - a) Method and application of standardization of death rates.
 - b) Integrated vector control methods.
 - c) Influence of high child mortality on fertility.
 - d) Advantages and disadvantages of cluster sampling.
 - e) Predictive value

M.D. DEGREE EXAMINATION
BRANCH XV - COMMUNITY MEDICINE

Answer ALL questions

Time: 3 hours

Max. marks: 100

PAPER II

Epidemiology, Prevention and Control of Communicable and Non-communicable diseases, Health Education, Behaviour Change Communication

1. Discuss the epidemiology & control of rheumatic fever and rheumatic heart disease in India. (25 marks)
2. Describe a plan for disaster preparedness for cyclone at a district level (25 marks)
3. Write briefly on: (5 x 10 = 50 marks)
 - a) Reducing bias in a case control study.
 - b) Social hurdles to primary prevention measures for control of cancers of the oral cavity.
 - c) Approaches you would use to educate people about AIDS.
 - d) Registration of vital events in India.
 - e) Perinatal mortality

M.D. DEGREE EXAMINATION
BRANCH XV - COMMUNITY MEDICINE

Answer ALL questions

Time: 3 hours

Max. marks: 100

PAPER III

Health Care of Special Groups, Nutrition

1. Discuss the epidemiology and prevention of low birth weight. (25 marks)
2. Review critically the organization of School Health Services in the country. Give your recommendations for bringing about improvements in the same. (25 marks)
3. Write briefly on: (5 x 10 = 50 marks)
 - a) Patho-physiology of pneumoconiosis and measures to control dust hazard in industry.
 - b) Third generation intrauterine contraceptive devices
 - c) Principles governing vitamin A prophylaxis.
 - d) Socio medical needs of elderly persons
 - e) Anemia in Pregnancy

M.D. DEGREE EXAMINATION
BRANCH XV - COMMUNITY MEDICINE

Answer ALL questions

Time: 3 hours

Max. Marks: 100

PAPER IV:

Health services, Health Administration, Primary Health care, National Health Programmes, International Health, Health Legislation

1. In a Health centre area the population is 30,000 the birth rate is 30 per 1000 and current immunization coverage rate is 30%. Plan a strategy for improving coverage of immunization (25 marks)

2. Discuss how the guide lines of National Health Policy are reflected in the health care delivery in India (25 marks)

3. Write briefly on: (5 x 10 = 50 marks)
 - a) Role of a school teacher in maintenance of the health of school children.
 - b) Hurdles in the effective implementation of ROME scheme.
 - c) Recommendations of Bhore Committee on under graduate Medical education.
 - d) Inventory control of medicines & supplies in Community Health Centre.
 - e) Universal Immunisation programme

DERMATOLOGY, VENEREOLOGY AND LEPROSY

OBJECTIVES:

At the end of this training a candidate should be able to

1. Diagnose and manage independently common skin diseases, sexually transmitted diseases and leprosy
2. Manage independently and efficiently all medical emergencies related with skin, leprosy and venereal disease.
3. Adopt preventive measures at individual and community levels against communicable and non-communicable skin, venereal diseases and leprosy.
4. Teach requisite knowledge and laboratory skills to other medical / paramedical team members.
5. Adopt a compassionate attitude toward towards the patients (and their families) under his/her charge.
6. Critically evaluate and initiate investigation for solving problems relating to skin (including cosmetic dermatology), venereal diseases and leprosy.
7. The candidate should be able to formulate various topical preparations.

SKILLS TO BE LEARNT:

1. History taking for dermatology, Venereology and leprosy
2. Describe cutaneous findings in dermatological terms in a systematic way
3. Evaluate and manage the common diseases in dermatology and have a broad idea how to approach an uncommon diseases
4. Evaluate and manage STD cases
5. Evaluate and manage HIV positive cases
6. Systematic examination relevant for dermatologic condition
7. Maintain basic skills like pulse, blood pressure chest and cardiac auscultation learnt in MBBS
8. Care of dermatologic emergencies like TEN, Pemphigus, necrotic ENL, angioedema, drug reactions etc.
9. Management of pediatric cases with skin diseases
10. To achieve adequate skills for tests done in side laboratory in day-to-day practice and be familiar with other sophisticated investigations.
11. Able to formulate topical therapies e.g., cream, paste, lotion, ointment

HUMAN VALUES, ETHICAL PRACTICE AND COMMUNICATION ABILITIES:

1. Adopt ethical principles in all aspects of his/her practice. Professional honesty and integrity are to be fostered. Care is to be delivered irrespective of the social status, caste or religion of the patient.
2. Develop communication skills, in particular the skill to explain various options available in management and to obtain a true informed consent from the patient.
3. Provide leadership and get best out of his team in a congenial working atmosphere.
4. Apply high moral and ethical standards while carrying out human or animal research.
5. Be humble and accept limitations in his knowledge and skill and to ask for help from colleagues when needed.
6. Respect patient's rights and privileges including patient's right to information and right to seek a second option.

POSTINGS:

Dermatology : 1 year and 9 months
Venereology : 6 months
Leprosy : 6 months
Side Lab. Procedures : 1 month
Peripheral posting of 2 months in the departments of Pathology, Medicine, Pediatrics, Microbiology, Plastic surgery etc

TEACHING PROGRAMME

Short talks
Seminars
Journal Club
Teaching Ward Rounds
Clinical Case Conference
Dermatopathology Conference

SCHEME OF EXAMINATION

A. Theory: There shall be four question papers, each of three hours duration. Each paper shall consist of two long questions (25 marks each) and third question of short notes (5 in number, each carrying a weightage of 10 marks). Total marks for each paper will be 100. Questions on recent advances may be asked in any or all the papers. Details of distribution of topics for each paper will be as follows:

PAPER-I: BASIC SCIENCES PERTAINING TO DERMATOLOGY, VENERELOGY AND LEPROSY

PAPER-II: INTERNAL MEDICINE IN RELATION TO DERMATOLOGY INCLUDING RECENT ADVANCES IN DERMATOLOGY

PAPER-III: CLINICAL DERMATOLOGY AND THERAPEUTICS

PAPER-IV: LEPROSY AND STDs INCLUDING RECENT ADVANCES

B. Clinical: Clinical / Practical: 300

Type of cases- Long case (Dermatology) – 1 (45 min)
2 Short cases (1 each of STD and leprosy) – 15 min
10 spotters (Varieties of cases included) – 3 min each
Smear preparation, staining and focusing under the microscope – 15 min
Histopathological slides – 5 (3 min each)

C. Viva Voce in Dermatology, STD and leprosy: (30 min) 100
Marks

All examiners will conduct viva voce conjointly on candidate. It will be based on course content, analysis of histopathology slides, instruments used in the specialty, X-rays interpretation, etc

Thus total marks for the MD in Dermatology, Venereology and Leprosy course will be 800.

PAPER-I: BASIC SCIENCES PERTAINING TO DERMATOLOGY, VENEREOLOGY AND LEPROSY

- Structure and development of skin and its appendages
- Basement membrane
- Cell kinetics
- Keratinization
- Percutaneous absorption
- Melanocytes and Langerhan's cells
- Melanin and Melanin formation
- Cutaneous circulation
- Mechanism of sweating
- Temperature regulation
- Cutaneous microbiology, virology, mycology and immunology in relation to Dermatology, Venereology and Leprosy
- Genetics in relation to the skin
- SEBUM
- LIPID carbohydrate and protein metabolism
- Porphyrin
- Inflammation and its mediators
- Pathology in relation to Dermatology, Venereology and Leprosy
- Cytology
- Pharmacology of drugs used in Dermatology, STD and Leprosy
- Structure, physiology and examination of the normal genitalia
- Biology of Treponema pallidum, Neisseria gonorrhoeae, Chlamydia trachomatis, Herpes viruses HIV and genital human papillomavirus.
- Diagnostic tests for skin diseases, STDs and Leprosy
- Cutaneous innervations pathway of skin sensations and anatomy of hands and feet
- Lymphatic drainage of skin and genitalia
- Experimental leprosy
- Principles of clinical diagnosis of skin diseases, STDs and Leprosy

PAPER-II INTERNAL MEDICINE IN RELATION TO DERMATOLOGY INCLUDING RECENT ADVANCES IN DERMATOLOGY

- Purpura
- Disorders due to lipid metabolism (Xanthomatosis)
- Histiocytosis
- Mastocytosis
- Lymphoma and Leukaemias
- Sarcoidosis and other granulomas
- Amyloidosis
- Porphyria
- Pruritus
- Psychocutaneous disorders
- Cutaneous manifestations of systemic diseases
- Skin and nervous system
- Skin and eyes
- Drug eruptions
- Metabolic, endocrinal and nutritional disorders.

- Skin changes and dermatoses in pregnancy
- Skin changes in different ages
- Recent Advances in Dermatology

PAPER-III - CLINICAL DERMATOLOGY AND THERAPEUTICS

- Dermatitis and Eczema
- Papulosquamous disorders
- Acne and Acneiform dermatoses
- Reactions to physical agents
- Photobiology
- Vesiculobullous disorders
- Disorders of skin colour
- Occupational dermatoses
- Disorders of epidermis and epidermal appendages (hair, nail, sweat glands, sebaceous glands)
- Diseases of Dermis and hypodermis
- Disorders of connective tissue
- Disorders of Keratinization
- Disorders of blood vessels and lymphatics
- Disorders of oral cavity and mucous membranes
- Collagen vascular disorders
- Allergic dermatoses
- Genodermatoses
- Tumours of skin (Benign and malignant)
- Cutaneous lymphocytic infiltrates and pseudolymphomas
- Naevi
- Bacterial infections
- Diseases due to Fungi and Yeasts
- Mycobacterial diseases
- Viral dermatoses and Rickettsial infections
- Dermatoses caused by parasites, arthropods and insects
- Topical Therapy Basic Concepts
- Topical and systemic skin therapy
- Surgical and physical therapy, including cosmetology, cosmetic procedures, LASER's in Dermatology and dermatosurgical procedures

PAPER-IV - LEPROSY AND STDs INCLUDING RECENT ADVANCES

A: LEPROSY:

- History of leprosy
- Signs and symptoms and diagnosis of Leprosy
- Classification of Leprosy
- Differential diagnosis of Leprosy
- Complications of Leprosy
- Eye involvement in Leprosy
- Ear, nose and throat involvement in leprosy
- Treatment of Leprosy and its complications
- Leprosy in pregnancy and children
- Epidemiology and control of Leprosy
- Rehabilitation in Leprosy
- Recent advances in Leprosy

B: STDs:

- Syphilis
- Gonorrhoea
- L.G.V.
- Chancroid
- Donovanosis
- Chlamydia infections and non-gonococcal urethritis
- Genital herpes
- Genital Human Papilloma Virus infection (Venereal warts) and molluscum contagiosum
- Pediculosis infection, scabies
- Trichomoniasis and other protozoal infections
- Vulvo-vaginal candidiasis and Bacterial vaginosis
- Acute pelvic inflammatory disease (PID)
- Fitz-Hugh-Curtis Syndrome
- Acute epididymitis, prostatitis and proctitis
- HIV/ AIDS (immunopathogenesis, clinical spectrum, mucocutaneous manifestations, opportunistic infections, antiretroviral therapy, prevention, counseling, post-exposure management)
- Viral hepatitis
- Non-venereal treponematoses
- Non-venereal genital dermatoses
- Other genital dermatoses – balanoposthitis, cervicitis and vaginitis
- Genital ulcer Adenopathy Syndrome
- Arthritis associated with STDs in adult
- Ocular manifestations of AIDS and STDs
- Sexually Transmitted Diseases in reproduction, perinatology and pediatrics
- Premalignant and malignant lesions of genitalia
- Legal aspects of STD's and HIV infections
- Psychosexual disorders
- Treatment of STDs and Syndromic approach to treatment of STDs
- Epidemiology and control of STDs
- Recent advances in STDs

MODEL QUESTION PAPER

M.D. (DERMATOLOGY, VENEREOLOGY AND LEPROSY)

Paper-I - Basic Sciences pertaining to Dermatology, Venereology and Leprosy

Time: 3 Hours

Marks:100

(Answer all Questions)

1. Write an essay on percutaneous absorption. (25)
2. Describe the structure of sweat glands and discuss the mechanism of sweating. (25)
3. Write short notes on: (5 x 10 = 50)
 - a) Lymphatic drainage of female genitalia.
 - b) Ulnar nerve (origin, course and nerve supply)
 - c) Ultra structure of M. Leprae
 - d) Lymphokines
 - e) Dermoepidermal junction

M.D. (DERMATOLOGY, VENEREOLOGY AND LEPROSY)

Paper-II – Internal Medicine in relation to Dermatology including recent advances in Dermatology

Time: 3 Hours

Marks: 100

(Answer all questions)

1. Describe the clinical features and management of xanthomatosis (25)
2. Discuss the clinical features and management of dermatoses of pregnancy. (25)
3. Write short notes on: (5 x 10 = 50)
 - a) Calcinosis cutis
 - b) Acrodermatitis enteropathica
 - c) Fabry's disease
 - d) Bloom's syndrome
 - e) Mastocytosis

M.D. (DERMATOLOGY, VENEREOLOGY AND LEPROSY)

Paper-III – Clinical Dermatology and therapeutics

Time: 3 Hours

Marks: 100

(Answer all questions)

1. Discuss the differential diagnosis of tender subcutaneous nodules and write in detail the pathogenesis feature and management of Erythema nodosum. (25)
2. Discuss the various physical modalities used in the dermatotherapy. (25)
3. Write short notes on: (5 x 10 = 50)
 - a) Blastomycosis like pyoderma
 - b) TEN
 - c) Epidermolysis bullosa
 - d) Acanthosis nigricans
 - e) Adenoma sebaceum

M.D. (DERMATOLOGY, VENEREOLOGY, AND LEPROSY)

Paper-IV: Leprosy and STDs including recent advances

Time: 3 Hours.

(Marks 100)

(Answer all Questions)

1. Discuss aetiopathogenesis and management of tropic ulcers. (25)
2. Write the differential diagnosis of penile sore. How will you investigate and treat such a case? (25)
3. Write short notes on: (5 x 10 = 50)
 - a) Herpes genitalis
 - b) Metastatic complication of gonorrhoea
 - c) Neurosyphilis
 - d) Prevention of AIDS
 - e) Type-II Lepra reaction

RECOMMENDED TEXTBOOKS

Dermatology

1. Burns T, Breathnach S, Cox N, Griffiths C. Rook's Textbook of Dermatology. Seventh edition. Blackwell science. London 2004.
2. Wolff K, Goldsmith LA, Katz SI, Gilchrest BA, Paller AS, Leffell DJ. Fitzpatrick's Dermatology in General Medicine. Seventh edition. McGraw Hill. New York 2008.
3. Moschella SL, Hurley HJ. Dermatology. Third edition. Saunders. Philadelphia 1992.
4. James WD, Berger TG, Elston DM. Andrews' Diseases of the skin Clinical dermatology. Tenth edition. Saunders. Canada 2006.
5. Bologna JL, Jorizzo JL, Rapini RP. Dermatology. Mosby. Spain 2007.
6. Braverman IM. Skin signs in systemic disease. Third edition. Saunders. Philadelphia 1998.
7. Valia RG, Valia AR. IADVL textbook of dermatology. Third edition. Bhalani publishing house. Mumbai 2008.
8. Thappa DM. Textbook of Dermatology, Venereology and Leprology. Second revised edition. Elsevier. New Delhi, 2005.
9. Ghosh S. Recent advances in dermatology. Jaypee Brothers, New Delhi

Venereology

1. Sharma VK. Sexually transmitted diseases and AIDS. Viva books private limited. New Delhi, 2003.
2. Kumar B, Gupta S. Sexually transmitted infections. Elsevier. New Delhi, 2005.
3. Holmes KK, Marah PA, Sparling PF, Lemon SM, Stamm WE, Piot P, Warreheit JN. Sexually transmitted diseases. 4th edition. McGraw-Hill. New York, 2008.

Leprosy

1. Hastings RC, Opromolla DVA. Leprosy. Second edition. Churchill livingstone. Singapore.
2. Jopling WH, McDougall AC. Handbook of leprosy. Fifth edition. CBS publishers. New Delhi, 1996.
3. Dharmendra. Leprosy 2 Volumes – first edition 1985, Samant and company. Mumbai.
4. Bryceson AD, Pfaltzgraff RE. Leprosy. Third edition 1990. Churchill Livingstone. Singapore.

Dermatosurgery

1. Savant SS. Textbook of Dermatosurgery and Cosmetology. Second edition. ASCAD. Mumbai, 2005.
2. Sehgal VN. Dermatologic Surgery Made Easy. Jaypee Brothers, New Delhi, 2006.
3. Roenigk RK, Roenigk HH. Roenigk and Roenigk Dermatologic surgery Principle and Practice. Second edition. Marcel Dekker. New York 1996.

Pediatric Dermatology

1. Schachner LA, Hansen RC. Pediatric Dermatology. Third edition. Mosby, 2003.
2. Harper J, Orange A, Prose N. Textbook of Pediatric Dermatology. Blackwell science. Oxford, 2005.
3. Cohen BA. Pediatric Dermatology. Third edition. Elsevier. China, 2006.

Dermatopathology

1. Elder DE, Elenitsas R, Johnson BL, Murphy GF. Lever's Histopathology of the Skin. Ninth edition. Lippincott Williams and Wilkins. Philadelphia, 2005.
2. Weedon D, Strutton G. Skin pathology. Second edition. Churchill Livingstone. London, 2002.

3. Mysore V. Fundamentals in Dermatopathology. BI Publications, New Delhi.

Contact dermatitis

1. Rietschel RL, Fowler JF. Fisher's contact dermatitis. Fifth edition. Lippincott Williams and Wilkins. Philadelphia 2001.
2. Cronin E. Contact dermatitis. Churchill Livingstone. Edinburgh.

Therapeutics

1. Lebwohl MG, Heymann WR, Berth-Jones J, Coulson I. Treatment of Skin Disease. Comprehensive therapeutic strategies. Second edition 2006. Elsevier. New Delhi.
2. Shelley. Advanced Dermatologic Therapy. Second edition 2001.
3. Wolverton. Comprehensive Dermatologic Drug Therapy. Second edition 2007.

Recommended Journals

1. Indian Journal of Dermatology, Venereology, and Leprology.
2. Indian Journal of Dermatology.
3. Indian Journal of Leprosy.
4. Indian Journal of Sexually Transmitted Diseases.
5. Archives of Dermatology.
6. Journal of American Academy of Dermatology.
7. International Journal of Dermatology.
8. British Journal of Dermatology.
9. Clinical and Experimental Dermatology.
10. Dermatology Online Journal.
11. Internet Journal of Dermatology.
12. Indian Journal of Pediatric Dermatology.
13. Pediatric Dermatology.
14. Dermatologic Surgery (Optional).
15. International Journal of Leprosy
16. Leprosy Review.
17. International Journal of STD and AIDS.
18. Sexually Transmitted Infections.

GENERAL MEDICINE

I. CARDINAL MANIFESTATIONS OF DISEASE

1. Pain
2. Alterations in body temperature
3. Nervous system dysfunction
4. Alterations in circulatory and respiratory function
5. Alterations in gastrointestinal function
6. Alterations in urinary function and electrolytes
7. Alterations in reproductive and sexual function
8. Alterations in the skin
9. Hematologic alterations

II. GENETICS, MOLECULAR MEDICINE

III. CLINICAL PHARMACOLOGY

IV. NUTRITION

V. INFECTIOUS DISEASE

1. Basic consideration in Infectious Disease
2. Clinical syndromes – community acquired
3. Clinical syndromes – nosocomial infections
4. Bacterial disease - General consideration
5. Diseases caused by gram-positive bacteria
6. Diseases caused by gram-negative bacteria
7. Miscellaneous bacterial infections
8. Mycobacterial diseases
9. Spirochetal diseases
10. Rickettsia, Mycoplasma and Chlamydia
11. Viral diseases
12. DNA viruses
13. DNA and RNA respiratory viruses
14. RNA viruses
15. Fungal infections
16. Protozoal and helminthic infections: General considerations
17. Protozoal infections
18. Helminthic infections
19. Ectoparasites
20. HIV infection

VI. DISEASES OF THE CARDIOVASCULAR SYSTEM

1. Disorders of the heart
2. Disorders of the vascular system

VII. DISORDERS OF THE RESPIRATORY SYSTEM

VIII. DISORDERS OF THE KIDNEY AND URINARY TRACT

IX. DISORDERS OF THE GASTROINTESTINAL SYSTEM

1. Disorders of the alimentary tract
2. Liver and biliary tract disease
3. Disorders of the pancreas.

X. DISORDERS OF THE IMMUNE SYSTEM, CONNECTIVE TISSUE AND JOINTS

1. Disorders of the immune system
2. Disorders of the immune-mediated injury
3. Disorders of the joints

XI. HEMATOLOGY AND ONCOLOGY

1. Disorders of the hematopoietic system
2. Clotting disorders
3. Neoplastic diseases

XII. ENDOCRINOLOGY AND METABOLISM

1. Endocrinology
2. Disorders of intermediary metabolism
3. Disorders of bone and mineral metabolism

XIII. NEUROLOGIC DISORDERS

1. The central nervous system
2. Disease of nerve and muscle
3. Chronic fatigue syndrome
4. Psychiatric disorders
5. Alcoholism and drug dependency

XIV. ENVIRONMENTAL AND OCCUPATIONAL HAZARDS

XV. GERIATRICS

- XVI. LABORATORY MEDICINE (RADIOLOGY, ECG, ELECTROPHYSIOLOGY ETC.)

GUIDELINES TO CONDUCT EXAMINATION

SCHEME OF THEORY EXAMINATION

There will be four theory papers.

A. PAPER – I APPLIED BASIC SCIENCES

The aim of the examination is to assess the candidate's understanding of the Basic Sciences as applicable to Internal Medicine.

The six basic sciences to be assessed and weightage (marks) for each are listed below. Each Paper will have 10 short answer questions. Each question carries 10 marks.

No. **BASIC SCIENCE WEIGHTAGE**

10x10= 100 marks

(SECTION –I)

1. Anatomy & Genetics	20
2. Physiology & Biochemistry	30

(SECTION – II)

3. Pharmacology & Therapeutics	20
4. Pathology, Microbiology & Immunology	30

Total	100
-------	-----

- The question should be framed so as to test the student's comprehension of the applied aspects of relevant areas of basic sciences.
- In case a question has more than one component (e.g. morbid anatomy and histopathology) then the break up of marks for each component has to be mentioned in question paper to guide the students.

(PLEASE REFER TO THE ENCLOSED MODEL QUESTION PAPER)

B. PAPERS-II, III & IV:

Paper – II : Internal Medicine including Pediatrics, Psychiatry, Dermatology

Paper – III : Tropical Medicine

1. Infectious and non-infectious diseases of relevance to Indian Subcontinent
2. Environmental and occupational medicine relevant to tropics

Paper – IV: Internal Medicine – recent advances.

Each paper carries 100 marks and is to be answered in 3 hours.

DESIGN OF QUESTION PAPER

Each paper will carry 100 marks and need to be answered in 3 hours. Each paper will have the following:

1. Two comprehensive essay type questions (2 x 25) =50 marks
2. A set of five short answer questions (5 x 10) =50 marks

NOTE

1. Essay type should test the understanding and analytical ability of the candidate in important and relevant areas of internal medicine.
2. (i) In case a question has more than one component (e.g. etiology, clinical features and treatment), the break up of marks should be mentioned in the paper to guide the students.
(ii) A problem oriented question may be given for critical analysis.
3. Please refer to the enclosed model question paper.
4. Psychiatry, Pediatrics, Dermatology questions are to cover those areas relevant to internal medicine. (Neonatal and infantile diseases are excluded).

SCHEME OF CLINICAL AND ORAL EXAMINATION

The examiners should examine the cases individually and prepare a list of acceptable differential diagnosis on clinical grounds and the diagnoses after going through relevant investigations.

NUMBER

- Not more than six candidates should be assessed per day.

FORMAT AND ASSESSMENT

LONG CASE: Need not be confined to nervous system. A case with meaningful history and multi-system findings are equally acceptable and perhaps a better choice.

- Time for examination and write-up : 60 minutes.
- Time for presentation and viva-voce: 20 minutes.

Clinical viva will include discussions on relevant laboratory investigations, images and management plan. It will cover an analysis of the case including diagnostic and therapeutic approaches. It is recommended that essential investigation reports are given to the candidate to test competency as a consultant physician.

SHORT CASES:

- Number of cases per candidate : Three
- Time for examination: 30 minutes for each case
- Time for presentation and viva-voce 10 minutes for each case
- Essential history may be briefly elicited whenever necessary.
- To improve relevance and validity, the candidate may be asked to make a brief write up on the case as a note to the referring doctor.
- To improve validity, the candidate can be given laboratory reports relevant to the case during viva-voce. The competence in clinical skills as well as approach to solving the problem should be taken into account for assessment.

CLINICAL SPOTTERS: Five

Type of cases: Fundus examination of eye, Diabetic foot, Myotonia, Myxedema, Rheumatoid deformity, Leprosy, etc.

Award of marks is to be done individually by examiners at first. At the end, the final marks of the candidate will be decided by consensus.

ORAL EXAMINATION

FORMAT

The following areas are to be assessed:

1. Thesis
2. General viva including recent advances, therapeutics, etc.
3. Discussion on ECG/X-ray and other lab reports including 2-D echocardiographic and CT scan reports.

Recommended Text Books for reading :

1. Davidson's Principles & Practice of Medicine
2. Harrison's Principles of Internal Medicine
3. API Text Book of Medicine
4. Oxford Text Book of Medicine
5. Manson's Tropical Diseases

MODEL QUESTION PAPER

M.D. GENERAL MEDICINE

PAPER – I

Basic Sciences including Applied Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology, Immunology and Pathology.

Time: 3 Hours

Total Marks: 100

Write short answers on the following questions.

Each question carries 10 marks.

(10 x 10)

1. Collateral circulation in a patient with inferior vena cava obstruction.
2. Anatomy of Circle of Willis and indicate the sites of aneurysm formation.
3. Compensatory physiological mechanisms that occur with a patient who has septic shock.
4. Discuss the biochemical changes that occur in a patient with diabetic ketoacidosis.
5. Biochemical abnormalities encountered in order of time sequence in acute myocardial infarction.
6. Important drug interactions with anti-tuberculous drugs.
7. Discuss the pharmacological basis of the therapeutics of a patient with blood pressure of 160/108 mmhg and diabetes mellitus.
8. Discuss the laboratory diagnosis of AIDS.
9. Discuss the immunology of lepra reactions.
10. Pathology of chronic hepatitis.

M.D. PAPER II

General Medicine including Pediatrics, Psychiatry, Dermatology, etc.

Time: 3 hours

Total Marks: 100

1. Write etiology, clinical features, diagnosis and treatment of atypical pneumonia.
(25)
2. Discuss your approach to a 25 year old male patient presenting with acute weakness of all the four limbs. How will you investigate and manage him?(25)
3. Write notes on: (10 x 5=50)
 - a) Etiology and treatment of reflux nephropathy.
 - b) Psychiatric manifestations of collagen vascular disease.
 - c) Management of refractory idiopathic thrombocytopenic purpura.
 - d) Diagnostic approach to growth retardation.
 - e) Treatment of leprosy.

M.D. PAPER III
Tropical Medicine

Time: 3 Hours

Total Marks: 100

1. Discuss the life cycle, clinical manifestations, complications, diagnosis and treatment of strongyloides stercoralis infestation. (25)
2. Discuss clinical features, laboratory diagnosis and treatment of HIV/AIDS in Indian context. (25)
3. Write notes on: (10 x 5 = 50)
 - a) Compare and contrast tropical vs western cardiomyopathy.
 - b) Epidemiology of diabetes mellitus in India.
 - c) Management strategies for an epidemic of cholera.
 - d) Clinical features of organophosphorus poisoning and its treatment.
 - e) Clinical features and diagnosis of tropical sprue.

M.D. PAPER IV

Internal Medicine – Recent Advances

Time: 3 Hours

Total Marks: 100

1. Discuss the recent advances in therapy of various types of epilepsies. (25)
2. Discusses the current therapeutic options available for a patient with evolving myocardial infarction. (25)
3. Write notes on: (10 x 5 = 50)
 - a) Clinical features and diagnosis of mixed connective tissue diseases.
 - b) Drug interactions of newer antituberculous agents.
 - c) Current treatment of Alzheimer's disease.
 - d) Approach to a patient presenting with Raynaud's phenomenon.
 - e) Current management of acute aortic dissection.

PAEDIATRICS

M.D. PAEDIATRICS DEGREE – 3 years of Training Program

1. GOALS

The goals of MD course in Paediatrics are directed towards developing a competent pediatrician who:

- (i) Appreciates and recognizes the health needs of infants, children and adolescents and carries out professional obligations in keeping with principles of National Health Policy and professional ethics;
- (ii) Has acquired the clinical competencies pertaining to delivery of appropriate, cost effective, quality pediatric health care- preventive, promotive, curative and rehabilitative- activities that are required to be practiced in the community and at all levels of health care system;
- (iii) Has acquired skills in effectively communicating with the child, family and the community;
- (iv) Has acquired teaching and training skills in educating medical and paramedical professionals
- (v) Appreciates the need and keeps updating the knowledge and skills pertaining to contemporary advances and developments in medical sciences as related to child health;
- (vi) Has developed scientific temper and is oriented to principles of research methodology and clinical epidemiology.

2. Objectives

At the end of the 3 year- MD course in Paediatrics, the Paediatric Trainee / student should be able to:

- (i) Appreciate and recognize the key importance of maternal and child health in the context of the health priority of the country;
- (ii) Practice Pediatric health care delivery services in keeping with the principles of professional ethics;
- (iii) Identify social, economic, environmental, biological and emotional determinants of child and adolescent health, and institute diagnostic, therapeutic, rehabilitative, preventive and promotive measures to provide holistic care to children;
- (iv) Appreciate the importance of growth and development as the very foundation of Paediatrics and help each child realize her/his optimal growth and development potential;
- (v) Demonstrate adequate level of proficiency and competency in basic clinical skills, e.g. taking clinical history, conducting thorough clinical physical examination including assessment of physical growth and neurodevelopmental and behavioural development and in arriving at the most likely or possible clinical diagnosis, in identifying precipitating or predisposing factors; high risk and low risk groups and good and bad prognostic factors;
- (vi) Plan and perform relevant, cost-effective investigative and therapeutic procedures in confirming the possible diagnosis and excluding the other differential diagnosis;

- (vii) Develop analytical skills in the interpretation of important diagnostic, imaging and laboratory results;
- (viii) Diagnose illness in children based on the analysis of history, physical examination and investigative work up;
- (ix) Plan and deliver comprehensive treatment for illness in children using principles of rational drug therapy and Evidence Based Medical principles;
- (x) Plan and advise measures for the prevention of childhood diseases and disabilities.
- (xi) Plan rehabilitation of children suffering from chronic illness and handicap, and those with special needs;
- (xii) Manage childhood emergencies efficiently
- (xiii) Provide comprehensive care to normal, 'at risk' and sick neonates;
- (xiv) Demonstrate skills in accurate, meaningful and concise documentation of clinical case details, and in collection of periodical and cumulative morbidity and mortality data relevant to the assigned situation;
- (xv) Develop sensitivity and appreciate the emotional and behavioural characteristics and needs of children, and keep these fundamental attributes in focus while dealing with them;
- (xvi) Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities;
- (xvii) Demonstrate effective communication and counselling skills in explaining management options, prognosis and in providing health information and health education messages to patients, families and communities;
- (xviii) Develop self learning skills as a self-directed learner and recognize the need for updating knowledge and clinical practical and technical skills pertaining to his/her professional area of practice; in selecting appropriate and accurate learning resources, and critically analyze relevant published literature in order to practice evidence-based Paediatrics;
- (xix) Demonstrate competencies in the application of basic concepts of research methodology and epidemiology in collection, interpretation and publication of scientific medical data;
- (xx) Facilitate learning of medical/nursing students, practicing physicians, para-medical health workers and other providers as a teacher-trainer;
- (xxi) Play an effective and responsible role in the training and implementation of assigned National Health Programmes;
- (xxii) Organize and supervise the desired managerial and leadership skills;
- (xxiii) Function as an effective and productive member of a team engaged in health care, research and education;
- (xxiv) Recognize the diagnostic and management limitations of the health facility and the need for appropriate and timely referral of children to higher health facilities and speciality care;
- (xxv) Recognize the need for medico-legal registration and referrals of specific cases and maintenance of appropriate documentation of case details and
- (xxvi) Put to practice the principles of medical ethics and maintain the integrity and dignity of the chosen profession.
- (xxvii) Carry out resuscitation, triaging and offer appropriate medical help to affected children during disasters.

3. Syllabus

General Guidelines. During the training period efforts must always be made that adequate exposure and time is given and spent in identifying local child health problems of public health importance and health needs of children in the locality, state and nation.

3.1. Approach to Important Clinical Problems

3.1.1. Growth and development. Principles and factors governing *Growth and development* from conception to completion of adolescence, physiology, deviations and disturbances of G&D, e.g., Short and tall stature, underweight and overweight problems- obesity, Pubertal and adolescent development- normal and abnormal precocious and delayed puberty, specific and global developmental delay , psychological and behavioural development – normal and abnormal – psychological , developmental and learning problems.

3.1.2. Perinatology and Neonatology. Normal newborn, preterm and low birth weight newborn, other high risk and sick newborn states and neonatal diseases including antenatal and prenatal problems and disturbances.

3.1.3. Nutrition. Breastfeeding and Lactation management and complementary feeding, nutritional deficiency and excess states- protein energy malnutrition (underweight, wasting, stunting), vitamin, mineral and other and micronutrient deficiencies, failure to thrive.

3.1.4. Fluid, Electrolyte and Acid-Base. Balance Normal physiology, Normal and Disturbances-Recognition and Management.

3.1.5. Preventive Paediatrics. Childhood immunizations, prevention of communicable diseases, nutritional and environmental problems

3.1.6. Clinical Epidemiology, medical biostatistics principles and Research Methodology and Vital Statistics

3.1.7. Genetics. Genetic principles, modes of genetic inheritance, genetic diseases, dysmorphological states and malformation syndromes and genetic counseling.

3.1.8. Inborn Errors of Metabolism (I.E.M) I.E.M of Protein and aminoacids , carbohydrate, Lipids,etc.,

3.1.9. Infections. Acute onset pyrexia, prolonged pyrexia with and without localizing signs, recurrent infections, Viral, Bacterial,Fungal, Protozoal and metazoal infections and infestations, nosocomial infections, prevention of specific infections and hospital infections

3.1.10. GIT and liver. Embryology, Functions, Disturbances and diseases of GIT- Acute, persistent and chronic diarrhea, abdominal pain and distension, ascitis, vomiting, constipation, gastrointestinal bleeding, jaundice, hepatosplenomegaly and chronic liver disease, hepatic failure and encephalopathy.

3.1.11. Respiratory System. Embryology, Functions, Disturbances and diseases of upper and lower respiratory tract Cough/chronic cough, noisy breathing, wheezy child, respiratory distress, hemoptysis.

3.1.12. Cardiovascular System. Physiology and anatomy of fetal circulation , embryology, Normal and abnormal rate and rhythm patterns, congenital and acquired heart diseases, congestive heart failure, systemic hypertension, arrhythmia, shock.

3.1.13. Renal. Embryology, Functions, Disturbances and diseases of kidneys and bladder Hematuria/dysuria, bladderincontinence, voiding dysfunctions, inguinoscrotal swellings, renal failure (acute and chronic).

3.1.14. Hematooncology. Embryology, Functions blood cellular elements, Disturbances and diseases of blood and lymphoreticular system, anemia, bleeding and coagulation disorders, lymphadenopathy,.

3.1.15. Neuromuscular system. Embryology, Functions, assessment and clinical evaluation, Limping child, convulsions, abnormality of gait, intracranial space occupying lesion, paraplegia, quadriplegia, large head, small head, floppy infant, acute flaccid paralysis, cerebral palsy and other neuromotor disability, headache.

3.1.16. Endocrine Systems. Embryology, functions and disturbances of various endocrinal organs-Pituitary, Thyroid, Parathyroid, Adrenals, Gonads and Pancreas-

3.1.17. Immunological System. Embryological development, types and functions of immunological system and congenital and acquired immunodeficiency states, Autoimmune and collagen vascular disorders.

3.1.18. Skeletal system- Bone and Joint Diseases, trauma, deformities and tumors

3.1.19. Accidents, Poisonings, Insect, reptile and animal bites, environmental medicine

3.1.20. Skin/Eye/ENT. Skin rash, pigmentary lesions, pain/discharge from ear, hearing loss, epistaxis, refractory errors, blindness, cataract, eye discharge, redness, squint, proptosis.

3.1.21. Paediatric Pharmacology. Principles of essential and rational drug therapy, Pharmacokinetics, Pharmacogenomics and Pharmacoepidemiology.

3.1.22-Primary Health Care and other levels of health care

3.1.23- Principles of medical ethics and its application to Paediatrics

3.2.1. Growth and development.

Principles and factors governing *Growth and development* from conception to completion of adolescence, physiology, deviations and disturbances of G&D, e.g., Short and tall stature, underweight and overweight problems- obesity, Pubertal and adolescent development-normal and abnormal precocious and delayed puberty, specific and global developmental delay, psychological and behavioural development –normal and abnormal – psychological, developmental and learning problems.

3.2.2. Neonatology.

Perinatal care, normal newborn, high risk pregnancy and high risk neonates, care in the labor room and resuscitation, low birth weight, pre-maturity, newborn feeding, common transient phenomena, respiratory distress, apnea, prenatal, perinatal and postnatal infections, jaundice, anemia and bleeding disorders, neurologic disorders, gastrointestinal disorders, renal disorders, malformations, thermoregulation and its disorders, neonatal emergencies-metabolic, infections, cardiac, respiratory, gastrointestinal, endocrinal, renal and neurologic - understanding of perinatal medicine and pharmacology.

3.2.3. *Nutrition.*

Maternal nutritional disorders: impact on fetal outcome, nutrition for the low birth weight, breast feeding and lactation management and infant feeding including complementary feeding, IYCF, nutritional deficiency and excess states- protein energy malnutrition (underweight, wasting, stunting), vitamin, mineral and other micronutrient deficiencies, failure to thrive, complementary feeding, trace elements of nutritional importance, obesity, adolescent nutrition, nutritional management in diarrhea, nutritional management of systemic illnesses (celiac disease, hepatobiliary disorders, nephrotic syndrome), parenteral and enteral nutrition in neonates and children.

3.1.4. **Fluid, Electrolyte and Acid-Base Balance.**

Normal physiology, Disturbances - Recognition and Management.

3.1.5. **Preventive Paediatrics.**

Childhood and adolescent immunizations, prevention of communicable diseases, nutritional, adult onset diseases and environmental problems like lead poisoning, fluorosis, endemic goiters, etc.,

3.1.6. **Clinical Epidemiology, medical biostatistics principles and Research Methodology and Vital Statistics**

3.1.7. **Genetics.**

Genetic principles, modes of genetic inheritance, genetic diseases, Chromosomal disorders, single gene disorders, multifactorial/polygenic disorders, dysmorphological states and malformation syndromes and genetic counseling, genetic diagnosis, and prenatal diagnosis.

3.1.8. **Inborn Errors of Metabolism(I.E.M)**

I.E.M of Protein and amino acids, carbohydrate, Lipids, etc.,

3.1.9. **Infections.**

Principles of investigative work-up, collection and handling of specimens, pyrexia, prolonged pyrexia with and without localizing signs, recurrent infections, Viral, HIV Bacterial, tuberculosis, fungal, rickettsial, mycoplasma, Chlamydia, pneumocystis carinii infections, protozoal and metazoal infections and infestations, nosocomial infections, prevention of specific infections and hospital infections, control of epidemics and infection prevention

3.1.10. **Gastrointestinal System, liver and pancreas.**

Embryology, Functions, Disturbances and diseases of GIT- Acute, persistent and chronic diarrhea, abdominal pain and distension, ascitis, vomiting, constipation, gastrointestinal bleeding,. Diseases of mouth, oral cavity and tongue, disorders of deglutition and esophagus, peptic ulcer disease, H. pylori infection, foreign body, congenital pyloric stenosis, intestinal obstruction, malabsorption syndromes, irritable bowel syndrome, ulcerative colitis, Hirschsprung's disease, anorectal mal-formations, liver disorders: hepatitis, hepatic failure, chronic liver disease, metabolic diseases of liver, cirrhosis of

various causes, Wilson's disease, Budd-Chiari syndrome, and portal hypertension, acute, chronic and recurrent pancreatitis.

3.1.11. Respiratory System.

Embryology, pulmonary functions, disturbances and diseases of upper and lower respiratory tract, approach to acute cough/chronic cough, noisy breathing, wheezy child, respiratory distress, hemoptysis, congenital and acquired disorders of nose, infections of upper respiratory tract, tonsils and adenoids, obstructive sleep apnea, congenital anomalies of lower respiratory tract, bronchitis, bronchiolitis, aspiration pneumonia, GER, acute pneumonia, recurrent and interstitial pneumonia, suppurative lung diseases, atelectasis, lung cysts, emphysema and hyperinflation, bronchial asthma, pulmonary edema, bronchiectasis, pleural effusion, pulmonary leaks, mediastinal mass.

3.1.12. Cardiovascular System.

Physiology and anatomy of fetal circulation, embryology, Normal and abnormal rate and rhythm patterns, congenital (cyanotic and acyanotic shunt and obstructive) and acquired heart diseases (rheumatic fever and rheumatic heart disease), congestive heart failure, systemic hypertension, arrhythmia, shock, infective endocarditis, arrhythmias, diseases of myocardium (cardiomyopathy, myocarditis), diseases of pericardium, hyperlipidemia in children.

3.1.13. Renal.

Embryology, functions, evaluation, disturbances and diseases of kidneys and bladder, hematuria/dysuria, bladder incontinence, inguinoscrotal swellings, renal failure (acute and chronic). Acute and chronic glomerulonephritis, nephrotic syndrome, hemolytic uremic syndrome, urinary tract infections, VUR and renal scarring, renal involvement in systemic diseases, renal tubular disorders, congenital and hereditary renal disorders, renal and bladder stones, posterior urethral valves, hydronephrosis, voiding dysfunctions, enuresis, undescended testis, Wilms tumor, fluid-electrolyte disturbances.

3.1.14. Hematooncology.

Embryology, Functions blood cellular elements, Disturbances and diseases of blood and lymphoreticular system, anemia, bleeding and coagulation disorders, lymphadenopathy, Deficiency anemia, hemolytic anemia, aplastic anemia, pancytopenia, disorders of hemostasis, thrombocytopenia, blood component therapy, transfusion related infections, bone marrow transplant/ stem cell transplant, acute and chronic leukemia, myelodysplastic syndrome, Hodgkin disease, non-Hodgkin's lymphoma, neuroblastoma, hyper-coagulable states.

3.1.15. Neuromuscular system. Embryology, Functions, assessment and clinical evaluation, Limping child, convulsions, abnormality of gait, intracranial space occupying lesion, paraplegia, quadriplegia, large head, small head, floppy infant, acute flaccid paralysis, cerebral palsy and other neuromotor disability, headache. Seizure and non seizure paroxysmal events, epilepsy and epileptic syndromes of childhood, meningitis, brain abscess, coma, acute encephalitis and febrile encephalopathies, Guillain-Barre syndrome, neurocysticercosis and other neuro-infestations, HIV encephalopathy, SSPE, cerebral palsy, neurometabolic disorders, mental retardation, learning disabilities, muscular dystrophies, acute flaccid paralysis and AFP surveillance, ataxia, movement disorders of childhood, CNS tumors, malformations.

3.1.16. Endocrine Systems. Embryology, functions and disturbances of various endocrinal organs- Pituitary, Thyroid, Parathyroid, Adrenals, Gonads and Pancreas-Hypopituitarism / hyperpituitarism, Diabetes insipidus, pubertal disorders, hypo- and hyper-thyroidism, hypo- and hyperparathyroidism, adrenal insufficiency, Cushing's syndrome, adrenogenital syndromes, diabetes mellitus, hypoglycemia, short stature, failure to thrive, gonadal dysfunction and intersexuality, pubertal changes and gynecological disorders

3.1.17. Immunological System. Embryological development, types and functions of immunological system and congenital and acquired immunodeficiency states, Autoimmune and collagen vascular disorders.

3.1.18. Skeletal system- Bone and Joint Diseases, trauma, deformities and tumors Major congenital orthopedic deformities, bone and joint infections: pyogenic, tubercular.

3.1.19. Accidents, Poisonings, Insect, reptile and animal bites, environmental medicine

3.1.20. Skin, ENT, Eye

SKIN: Exanthematous illnesses, vascular lesions, pigment disorders, vesicobullous disorders, infections: pyogenic, fungal and parasitic; Steven-Johnson syndrome, eczema, seborrheic dermatitis, drug rash, urticaria, alopecia, ichthyosis.

E.N.T. Skin rash, pigmentary lesions, pain/discharge from ear, hearing loss, epistaxis, Acute and chronic otitis media, conductive/sensorineural hearing loss, post-diphtheritic palatal palsy, acute/chronic tonsillitis/adenoids, allergic rhinitis/sinusitis, foreign body aspiration

Eye: Refractory and accommodation errors, blindness- partial/total loss of vision, cataract, eye discharge, redness, squint, proptosis, night blindness, chorioretinitis, strabismus, conjunctival and corneal disorders, retinopathy of pre-maturity, retinoblastoma, optic atrophy, papilledema

3.1.21. Pediatric Pharmacology. Principles of essential and rational drug therapy, Pharmacokinetics, Pharmacogenomics and Pharmacoepidemiology.

3.1.22-Primary Health Care and other levels of health care

3.1.23- Principles of medical ethics and its application to Paediatrics

3.2.24. Emergency and critical care. Emergency care of shock, cardio-respiratory arrest, respiratory failure, congestive cardiac failure, acute renal failure, status epilepticus, fluid and electrolyte disturbances and its therapy, acid-base disturbances, poisoning, accidents, scorpion and snake bites.

3.2.25. Behavioural and psychological disorders. Rumination, pica, enuresis, encopresis, sleep disorders, habit disorders, breath holding spells, anxiety disorders, mood disorders, temper tantrums, attention deficit hyperactivity disorder, infantile autism.

3.2.26. Social Paediatrics. National health programs related to child health, child abuse and neglect, child labor, adoption, disability and rehabilitation, rights of the child, national policy of child health and population, juvenile delinquency.

3.3. Skills

3.3.1. **History and examination.** History taking including psychosocial history, physical examination including fundus examination, newborn examination, including gestation assessment; thermal protection of young infants, nutritional anthropometry and its assessment, assessment of growth, use of growth chart, SMR rating, developmental evaluation, communication with children, parents, health function-aries and social support groups; and genetic counseling.

3.3.2. *Bedside procedures*

(a) Monitoring skills: Temperature recording, capillary blood sampling, arterial blood sampling.

(b) Resuscitation and Therapeutic skills: Neonatal Resuscitation, Resuscitation of cardiorespiratory arrest and shock states cardiopulmonary resuscitation (pediatric and neonatal), hydrotherapy, nasogastric feeding, endotracheal intubation, administration of oxygen, venepuncture and establishment of vascular access, administration of fluids, blood, blood components, establishment, maintenance and weaning from assisted mechanical ventilation, exchange transfusion and plasmapheresis, parenteral nutrition, intraosseous fluid administration, intrathecal administration of drugs, common dressings, abscess drainage, intercostals underwater seal drainage and basic principles of rehabilitation.

(c) Investigative skills: Lumbar puncture, ventricular tap, bone marrow aspiration, pleural, peritoneal, pericardial and subdural tap, biopsy of liver and kidney, collection of urine for culture, urethral catheterization, supra-pubic aspiration.

3.3.3. **Bedside investigations.** Hemoglobin, TLC, ESR, peripheral smear staining and examination, urine: routine and microscopic examination, stool micro-scopy including hanging drop preparation, examination of CSF and other body fluids, Gram stain, ZN stain, shake test on gastric aspirate.

3.3.4. **Interpretation of** X-rays of chest, abdomen, bone and head; ECG; ABG findings; CT scan.

3.3.5. **Understanding of** common EEG patterns, audiograms, ultrasonographic abnormalities and isotope studies.

3.4. Basic Sciences

Embryogenesis of different organ systems especially heart, genitourinary system, gastrointestinal tract, applied anatomy of different organs, functions of kidney, liver, lungs, heart and endocrinal glands. Physiology of micturition and defecation, placental physiology, fetal and neonatal circulation, regulation of temperature (especially newborn), blood pressure, acid base balance, fluid electrolyte balance, calcium metabolism, vitamins and their functions, hematopoiesis, hemostasis, bilirubin metabolism. Growth and development at different ages, puberty and its regulation, nutrition, normal requirements of various nutrients. Basic immunology, bio-statistics, clinical epidemiology, ethical and medicolegal issues, teaching methodology and managerial skills, pharmacokinetics of commonly used drugs, microbial agents and their epidemiology.

3.5. Community and Social Paediatrics

National health nutrition programs, nutrition screening of community, prevention of blindness, school health programs, prevention of sexually transmitted diseases, contraception, health legislation, national policy on children, adolescence, adoption, child labor, juvenile delinquency, government and non-government support services for children, investigation of adverse events following immunization in the community, general principles of prevention and control of infections including food borne, waterborne, soil borne and vector borne diseases, investigation of an outbreak in a community.

4.0 TEACHING PROGRAM

4.1. General Principles

- Acquisition of practical competencies being the keystone of postgraduate medical education, postgraduate training should be skills oriented.
- Learning in postgraduate program should be essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

4.2. Formal Teaching Sessions

In addition to bedside teaching rounds, at least 5 hours of formal teaching per week are a must. The departments may select a mix of the following sessions:

<i>Journal club/</i>	
<i>Medical and perinatal audit</i>	Once a week
<i>Seminar/lecture</i>	Once a week
<i>Case discussion</i>	Twice a week
<i>Interdepartmental</i>	
<i>case/seminar</i>	Once a week
<i>[Cardiology, Pediatric</i>	
<i>surgery etc.]</i>	

Additional sessions on basic sciences, biostatistics, research methodology, teaching methodology, health economics, medical ethics and legal issues related to pediatric practice are suggested.

Note: These additional sessions may be organized as an institutional activity for all postgraduates.

4.3. Rotations

The postgraduate student should rotate through all the clinical units in the department. In addition, following special rotations should be undertaken:

Must

Neonatology
(including perinatology) - 6 months [maximum 9 months]

Intensive Care/Emergency - 3 months

Posting in Out patient Services of the following specialties is recommended for the duration indicated below:

- | | |
|--|---|
| • Skin | 12 hours (e.g., 3 hours/day for 4 days or 2 hours/day for 6 days) |
| • Pediatric surgery | 24 hours (e.g., 3 hours/day for 8 days) |
| • Physical Medicine and Rehabilitation | 12 hours (e.g., 3 hours/day for 4 days) |
| • Community | 24 hours (e.g., 3 hours/day for 8 days) |

Note: In addition the candidates may be posted to allied specialities such as cardiology, neurology, etc. (depending on facilities available locally) for appropriate training.

Theory

- Paper 1: Basic sciences as applied to Paediatrics
- Paper 2: Neonatology and community Paediatrics.
- Paper 3: General Paediatrics
- Paper 4: Recent advances in Paediatrics

MODEL QUESTION PAPER

M.D. Pediatrics Degree Examination

Paper I – Basic Sciences as Applied to Pediatrics

Time: 3 hours

Max Marks: 100

Write briefly on:

(10 x 10 = 100 marks)

1. Iron Metabolism and management of iron overload conditions in children.
2. Antigenic drift in influenza virus
3. Polysaccharide vaccines
4. Laboratory diagnosis of renal tubular acidosis
5. Nitric oxide
6. Posterior urethral valve
7. Fragile – X – Syndrome
8. Serologic response to Hepatitis B virus infection
9. Adverse drug reactions
10. Monoclonal Antibodies

M.D. Pediatrics Degree Examination

Paper II – Neonatology and Community Pediatrics

Time: 3 hours

Max Marks: 100

1. Discuss the Clinical approach, investigation and management of a neonate with cholestatic jaundice. (25 marks)
2. Write briefly on: (10 X 5 = 50 Marks)
 - a) Persistent ductus arteriosus in newborn
 - b) Periventricular haemorrhage
 - c) Congenital dislocation of hip
 - d) Adoption
 - e) Reproductive and child Health (RCH)-II Programme
3. Discuss the clinical approach and management of a newborn with ambiguous genitalia (25 marks)

M.D. Pediatrics Degree Examination (2008 Scheme)

Paper III – General Pediatrics

Time: 3 hours

Max Marks: 100

1. Discuss the diagnostic approach and management of a 2 year old phenotypic female child found to have a gonad in the inguinal canal at the time of a hernia repair (25 marks)
2. Discuss the common poisonings encountered in Emergency unit of Pediatric hospital under the following heads:
Predisposing factors, warning signs and preventive measures.
Outline treatment of Iron poisoning in children. (25 marks)
3. Write briefly on:
 - a) Role of Leptin in obesity
 - b) Highly Active Anti Retroviral Therapy (HAART)
 - c) Bartter's syndrome
 - d) Diet in Nephrotic Syndrome
 - e) Brain abscess in children(10 x 5 = 50 marks)

**M.D. Pediatrics Degree Examination
(2008 Scheme)**

Paper IV – Recent Advances in Pediatrics

Time: 3 hours

Max Marks: 100

1. Outline the diagnostic approach to a 2 year old child presenting with recurrent hypoglycemic episodes
(25 marks)
2. Describe the salient features, complications and treatment of Kawasaki's syndrome in children.
(25 marks)
3. Writ briefly on:
 - a) ACE inhibitors in pediatric practice
 - b) Childhood depression
 - c) Late sequelae of leukemia therapy
 - d) Diabetes insipidus
 - e) Surgery for congenital heart diseases.

(5 x 10 = 50 marks)

PSYCHIATRY

PREAMBLE:

The post graduate training programme endeavors to give a general and comprehensive exposure to psychiatry. At the end of the training programme, the candidate should be able to recognize the health need of the community should be competent to handle effectively psychiatric problems and should be aware of the recent advances in psychiatry. He /she should acquire the basic skill in teaching medical / paramedical students. He / she is also expected to know the principles of research methodology and modes of consulting library.

PROGRAMME OBJECTIVES:

At the end of the course the students should able to:-

1. Practise his specialty ethically
2. Function as a competent psychiatrist – a physician specialized in the diagnosis, and management of psychiatric disorders (mental, emotional and addictive disorders) with biological therapies, psychotherapies, behaviour therapies and psycho social therapies.
3. Demonstrate sufficient understanding of basic sciences related to his specialty
4. Develop skills of psychiatry practice in psychiatry hospital setting, general hospital setting, community and play the assigned role in the implementation of national mental health programs.
5. Plan and advise measures for the prevention and rehabilitation of patients belonging to his specialty.
6. Become an effective team leader of a multidisciplinary mental health team comprising of psychologist, social workers and psychiatric nursing professionals.
7. Deal with Psychiatric emergencies.
8. Deal with the legal aspects of Psychiatric illness.
9. Develop good teaching skills.
10. Demonstrate competence in basic concepts of research methodology

COMPETENCIES:

a) Theoretical knowledge:

1. A student should have good knowledge of basic sciences as applied to his specialty.
2. Should acquire in-depth knowledge of his specialty subject including recent advances.
3. Should have basic medical knowledge to identify and manage co-existing physical and psychiatric problems.
4. Should be knowledgeable about national mental health program, district mental health program, national mental health act, narcotic drugs and psychotropic substances act, national AIDS control organization, human rights and legal issues pertaining to psychiatry.

b) Clinical / practical skills:

1. Competence in history taking, mental state examination, physical examination, formulating diagnosis, identifying etiology, ordering further investigation, planning comprehensive management including pharmacological treatment.
2. Develop effective communication skills
3. Acquire skills to lead a multi disciplinary team of nurses, psychologists, social workers and other mental health professionals

c) Ethical consideration:

An understanding of general and ethical considerations pertaining to medical and psychiatric practice

d) Research:

He / she should know the basic concepts of the research methodology, and plan a research project. Basic knowledge of statistics is also required.

e) Teaching:

He / she should learn the basic methodology of teaching and develop competence in teaching medical and paramedical students.

POST GRADUATE TRAINING:

Didactic lectures are of least importance; Seminars, Journal clubs, Symposia, Reviews and Guest lectures should get priority for theoretical knowledge. Bedside teaching, grand rounds, interactive group discussion, and clinical demonstration should be the hallmarks of clinical and practical training.

PRACTICAL TRAINING:

Each resident shall be given clinical responsibility as full time assignment to various areas in rotation. The aim of the clinical postings is to develop adequate knowledge, useful skills and desirable therapeutic attitudes in the students.

Schedule of clinical posting for M.D Psychiatry (36 months) :

Ward	10 months
OPD	10 months
Neurology	2 months
Internal medicine	2 months
Consultation – liaison	3 months
Mental hospital	1.5 months
Clinical Psychology	0.5 month
Drug De addiction	2 months
Child and adolescent psychiatry	4 months
Community psychiatry	1 month

The residents will be given full responsibility for the patient care and the record keeping under the supervision of the senior residents and consultant. The residents will be given training in managing emergency cases by posting them on call duties. The resident will also take patients for supervised training on counseling and various types of psychotherapies including Relaxation therapy, Cognitive behaviour therapy and other behaviour therapies. The resident will be exposed to psychometric testing methods and interpretation He / she will also be trained in the use of psychiatric scales.

ACADEMIC ACTIVITIES INCLUDING DISSERTATION

a) Didactic lectures:

Didactic lectures are usually taken during the first six months for the new postgraduate resident to familiarize them with clinical methods like history taking, mental state examination, psychopathology, diagnosis and classification.

b) Seminars :

There should be a weekly seminar attended by the residents as well as the faculty in which the junior residents present material on assigned topic in rotation. It should be followed by discussion in which all trainees are supposed to participate.

c) Case conference:

A case conference should be held every week where a junior resident prepares and presents a case of academic interest by rotation and it is attended by all the members of the department.

d) Journal club:

Journal club is held every week in which a junior resident presents a critical evaluation of a research paper from a journal.

e) Research Forum :

There should be a monthly meeting of one hour each in which the residents present their plan of research as well as the report of the completed work of their projects to the faculty, resident and non-medical professionals who make critical comments and suggestions.

f) Case presentations:

New inpatient and outpatient cases should be routinely worked up in detail by the residents and discussed with the consultant. They are also encouraged to bring their follow up patients to the consultant for presentation and discussion. In addition, the residents are required to present case material at ward rounds.

g) Attendance at special clinics / units as applicable e.g. Child and Adolescent psychiatry Clinic, Marital and Psychosexual Clinic, Community Outreach Clinics, Drug De -Addiction unit etc.

h) Training in ECT administration

I. Theory papers: -

At the end of the 3rd year a candidate has to appear for 4 theory Papers each of 3 hours duration and each paper will carry 100 marks. Each question paper will have 2 essay type questions of 25 marks each and 5 short answer questions each carrying 10 marks. All the four papers will be set and evaluated by Psychiatrists.

Paper -1:- Basic sciences as applied to Psychiatry

Paper- 2:- Psychiatry – including general psychiatry, psycho- pharmacology, psycho – biochemistry, psycho – physiological disorders and liaison psychiatry.

Paper – 3:- Psychiatry – including child psychiatry, community Psychiatry, forensic psychiatry, psychotherapy and Rehabilitation.

Paper – 4: Organic Psychiatry, Medicine and Neurology as applied to Psychiatry and Recent advances.

Model questions for all the four papers are enclosed

II. Practical / Clinical Examination:

The clinical examination consists of the following activities

- a) One long case (Psychiatry)
- b) Two short cases (one Psychiatry & one Neurology)
- c) Spots consisting of EEG, Neuro-imaging and psychological testing instruments
- d) Oral examination

SYLLABUS FOR M.D. (PSYCHIATRY)

No limit can be fixed and no fixed number of topics can be prescribed as course contents. The student is expected to know the subject in depth; however, emphasis should be on the diseases / health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to Psychiatry should get high priority. However a syllabus is given in the following pages which will be updated from time to time.

PAPER – I

Basic sciences as applied to Psychiatry

1. Major brain structures
Sub division – External features – Brain stem – Ventricular system – Blood supply.
2. Functional Neuro Anatomy
Organization of the Central Nervous system with respect to Psychiatry.
3. Neuro development and neurogenesis
4. Receptors, Monoamines, Amino acids and Neuro peptides
5. Neurotrophic factors
6. Intra Neuronal Biochemical signals
7. Basic Electro physiology
Ion channels – Electro physiology of Neuro Transmission, Electro Physiology of psychotropic drug action.
8. Applied Electro Physiology
Deduction and measurement of brain electrical potentials, Electro Encephalogram, Evoke potentials
9. Basic Science of sleep
Brain imaging techniques
10. Psycho Neuro endocrinology
11. Chrono biology
12. Neural endocrine and Immune interaction
13. Genetics
14. Appetite
15. Neural basis of substance abuse

Behavioural Sciences as applied to Psychiatry

1. Growth and development – Developmental process in childhood and adolescence

2. Sensation, perception and cognition
3. Consciousness
4. Aggression : Psychology and Biology
5. Intelligence and aptitude – Theories and measurements
6. Emotional Intelligence
7. Motivation theories – Needs – Frustration of needs
8. Feelings and emotions – Theories – Psychological aspects – Measurements.
9. Psychodynamics and Defense Mechanisms
10. Principle of learning and memory
11. Information processing : Brain models of mind
12. Personality – Theories of personality – Psycho diagnostic tests for assessment of personality – Intelligence and Neuro Psychiatric functions.
13. Sociology and Psychiatry
14. Consumer –Survivor movement
15. Anthropology and Psychiatry
16. Development of social behaviour
17. Group behaviour
18. Communication and inter – personal relationships
19. Public opinion propaganda and prejudices
20. Culture and its role in development of human behaviour
21. Psychosocial work – Mental health.
22. Epidemiology
23. Statistics / Research methodology
24. Evidence based Psychiatry

PAPER – II

GENERAL PSYCHIATRY, CLINICAL ASPECTS OF PSYCHOPHARMACOLOGY AND PSYCHO BIOCHEMISTRY, PSYCHO PHYSIOLOGICAL DISORDERS AND LIAISON PSYCHIATRY:

1. Historical aspects of psychiatry.
2. Signs and symptoms of psychiatric illnesses – psychiatric interview, History and mental state examination.
3. Diagnosis in psychiatry, classificatory systems, psychiatric rating scales, Medical assessment and laboratory testing in psychiatry, clinical neuropsychology , psychiatry report, medical record and medical error.
4. Schizophrenia and affective disorders – epidemiology, aetiology, biochemical and endocrinological aspects, genetic factors, clinical features, somatic and psychosocial treatment, psychotherapeutic aspects.
5. Delusional disorders, other disorders like schizo affective disorders, schizophreniform disorders, brief reactive psychiosis and culture and bound syndromes.
6. Anxiety disorders including panic and generalized anxiety disorders, phobic disorder, obsessive compulsive disorder and post traumatic stress disorders – aetiological factors, clinical signs and symptoms, biological aspects and management.
7. Somatoform disorders and dissociative disorders – conceptual issues, clinical features and management.
8. Other psychiatric disorders including sleep disorders, eating disorders, factitious disorders, adjustment disorders, impulse control disorder etc.
9. Psychosomatic disorders – historical aspects, current theoretical concepts, specific disorders related to various systems like cardiac, G.I.T. etc – stress in psychiatry – chronic pain syndrome – management.

10. Liaison psychiatry – psychiatry and medicine – psychiatric aspects of AIDS, psychiatry and reproductive medicine, Terminally ill patient and family.
11. Biological therapies in psychiatry – pharmacotherapy – electroconvulsive therapy, psycho surgery.

PAPER – III

PSYCHIATRY INCLUDING CHILD PSYCHIATRY, COMMUNITY PSYCHIATRY, FORENSIC PSYCHIATRY, PSYCHOTHERAPY AND REHABILITATION

1. Child psychiatry – introduction, psychiatric examination of children and adolescents, clinical profile of various disorders specific to childhood and adolescence including mental retardation, management aspects.
2. Personality disorders – classification, clinical description and management of various personality disorders.
3. Psycho – active substance use disorders – drug dependence and alcoholism
4. Psycho – sexual disorders – gender identity disorders – paraphilias, sexual dysfunctions.
5. Community psychiatry – conceptual issues – prevention of mental disorders – mental health care service system – integration of mental health into Primary care - care of chronically mentally ill – psychiatric education - Managed care- Quality of life - Balanced care – public attitudes and the problem of stigma – Psychiatry and the media.
6. Emergency psychiatry including suicide, Para suicide and violence
7. Forensic psychiatry – legal issues, ethics – confidentiality and legislation of the land including Mental Health Act, Persons with Disability Act, Narcotic drugs and Psychotropic Substances Act – Human rights of psychiatric patients
8. Geriatric psychiatry – psychosocial aspects of aging, psychiatric examination of elderly patients, psychiatric disorders of late life.
9. Psychotherapies – including various forms of analytical therapies, behaviour therapy, cognitive therapy, group therapy, family therapy, marital therapy, brief psychotherapies – crisis intervention – evaluation of psychotherapy.
10. Organic mental syndromes – signs and symptoms – aetiology, differential diagnosis and management.
11. Miscellaneous: Non compliance, Malingering, Antisocial behaviour, Borderline Intellectual Functioning, Age – related Cognitive Decline, Bereavement (Including death), Academic problems, Identity problems, Religious and Spiritual problems, Acculturation problems, Phase of life problems, Chronic fatigue syndrome, culture bound syndrome, etc.

PAPER – IV

NEUROLOGY AND ORGANIC PSYCHIATRY

1. Methods of history taking: Clinical neurological examination, localization of lesions.
2. Special methods of examination: Lumbar puncture, perimetry and scotometry; tests of VIII cranial nerve function; clinical electroencephalography, clinical electromyography and nerve conduction velocity; neuroradiology including contrast studies; CT Scan and MRI.
3. Disorders of language function and of body image including dyslexias.
4. Disorders of cranial nerves

5. Cranio – cerebral trauma – acute, sub acute and chronic effects, post traumatic epilepsy; vertigo and headache; whiplash injury; post concussional syndromes; intracranial birth injuries.
6. Meningitides including acute and chronic, bacterial, viral fungal, protozoal etc., chronic granulomas including abscess, tuberculoma etc.
7. Viral infections: acute, subacute and slow virus infections, sequence of encephalitis poliomyelitis, rabies; herpes zoster, Neuropsychiatric sequel of HIV infection.
8. Neurosyphilis.
9. Cerebrovascular disorders: Cerebrovascular insufficiency states transient ischaemic attacks; carotid and vertebro basilar insufficiency; intracranial haemorrhage; aneurysms; AVM malformation, puerperal infarction, veins and sinuses etc. cardiovascular state cerebrovascular diseases in miscellaneous infections etc.
10. Increased intracranial tension and herniations; dangers of lumbar puncture etc.
11. Intracranial tumors; primary and metastatic, nasopharyngeal carcinoma etc.
12. Degenerative ‘ disorders: parkinsonian syndromes, involuntary movements, spinocerebellar degenerations; pre senile and senile dementias including normal pressure hydrocephalus, progressive cerebral degeneration of infancy and childhood, Movement disorders including medication – induced movement disorders;
13. Endocrine and metabolic disorders: porphyrias; wilson’s disease, phenylketonuria galactosemia and other aminoacidurias etc. alcohol and the nervous system.
14. Autoimmune and / or allergic disorders: post / para infections encephalitides; neurological features and sequelae of collagen disorders etc.
Deficiency disorders: Protein calorie malnutrition; vitamin deficiency states etc.
15. Paroxysmal disorders: Epilepsy classification aetiology, clinical features; EEG in epilepsy, management etc. Migraine and other vascular headaches temporal arteritis; muscle contraction headache, psychogenic headache etc. Narcolepsy syndrome.
16. Disorders of the spinal cord and cauda equina including spondylotic myelopathy etc.
17. Psychosurgery: principles, methods, indications, complications etc.
18. Stereoecephalotomy: Principles and methods: indications stereotaxic for Parkinsonism and other involuntary movements – epilepsy; pain; behaviour disorders etc.
19. Genetics: - General and with reference to neurology.

M.D. (PSYCHIATRY) DEGREE EXAMINATION
Model question paper

Paper – I: Basic sciences as applied to Psychiatry

Time : 3 hours

Max. Marks: 100

ANSWER ALL THE QUESTIONS

(10 X 10)

- 1.Functions of limbic system
- 2.Neurotrophic factors
- 3.Basic science of sleep
- 4.Brain imaging
- 5.Neural basis of substance abuse
6. Lateral ventricles
7. Biofeedback
8. Tests of correlation
9. Formation of attitudes
10. Reticular activating system.

M.D. (PSYCHIATRY) DEGREE EXAMINATION

Model question paper

Paper – II : Psychiatry - including General Psychiatry, Psycho-pharmacology, Psycho – biochemistry, Psycho – physiological disorders and Liaison psychiatry

Time: 3 Hours

Max. Marks : 100

ANSWER ALL QUESTIONS

1. Discuss the organic concepts of schizophrenia 25 marks
2. Classify somatoform disorders according to I.C.D.10 and discuss the clinical features and management of somatization disorder 25 marks
3. Write Notes on: 50 marks
 - i) First rank symptoms
 - ii) Phototherapy
 - iii) Use of Anticonvulsants in Psychiatry
 - iv) Brief Psychiatric rating scale
 - v) Pharmacological management of panic disorders.

M.D. (PSYCHIATRY) DEGREE EXAMINATION

Model question paper

Paper – III : Psychiatry – Including Child psychiatry, Community psychiatry, Forensic psychiatry, Psychotherapy and Rehabilitation.

Time : 3 Hours

Max. Marks: 100

ANSWER ALL QUESTION

1. Discuss the concept of schizotypal disorder 25 marks
2. Classify psychosexual disorders and discuss the management of ejaculatory dysfunction 25 marks
3. Write notes on: 50 marks
 - i) Grief reaction
 - ii) Criminal responsibility
 - iii) Family therapy
 - iv) Crisis intervention
 - v) Culture bound syndrome

M.D. (PSYCHIATRY) DEGREE EXAMINATION

Model question paper

Paper – IV : Organic Psychiatry, Medicine and Neurology as applied to Psychiatry and Recent Advances

Time : 3 Hours

Max. Marks : 100

ANSWER ALL QUESTIONS

1. Classify dementia, Discuss the management of treatable causes of dementia. 25 marks
2. Discuss the neuropsychiatric aspects of parkinsonism 25 marks
3. Write notes on: 50 marks
 - i) Tardive dyskinesia
 - ii) Frontal lobe syndrome
 - iii) Gille De La Tourette syndrome
 - iv) Neuroleptic Malignant syndrome
 - v) Pseudopapilloedema

Recommended Text books

Psychiatry

1. Andrew sims (2003) Symptoms in the mind, 3rd edition Saunders Elsevier Limited.
2. American Psychiatric Association (2000) Diagnostic and statistical manual of mental disorders – text revision, 4th edition American Psychiatric Association Washington DC.
3. Allan I.F Scott (eds) (2005) The ECT Hand book, Second edition The Royal College of Psychiatrists
4. Gabbard, G, Beck, JS and Holmes J (2005) Oxford textbook of Psychotherapy, Oxford, Oxford University Press.
5. Gelder, MG, Lopez – 1bor, JJJr and Andreasen, NC (eds) (2000) The new oxford text book of Psychiatry, Oxford University Press, Oxford.
6. Government of India. The Mental Health Act. Act 14 of 1987, 1987
7. Government of India. The Narcotic drugs and Psychotropic substance Act. Act 61 of 1985, 1985 (Amended in 1989, Act 2 of 1989)
8. Johnstone EC, Freeman C, Zealley A (eds) (2004) Companion to Psychiatric studies, 7th edition, Edinburgh; Churchill Livingstone
9. Lishman, W.A. (1998) Organic Psychiatry; The psychological consequences of cerebral disorder, 3rd edition Black well, Oxford
10. Levenson, J.L (2004) The American Psychiatric Publishing Text book of Psychosomatic medicine, American Psychiatric publishing Inc. Washington DC.
11. Lowinson JH, Ruiz p, Hillman RB, Langrod JG (eds) (1997) Substance abuse ; A Comprehensive text book 3rd edition Baltimore MD, Williams & Wilkins,
12. Michels R etal (eds) (1991) Psychiatry, JB Lippencott Philadelphia,

13. Ministry of Health and Family Welfare. National Mental Health Programme Booklet DGHS. New Delhi, 1982
14. Robert E Hales, Stuart C. Yudofsky, John A Talbott, (eds) (2005) Text book of Psychiatry, 3rd edn JPB Publishers New Delhi
15. Rutter, M and Taylor E (eds) 2002 Child and adolescent Psychiatry, 4th edition, Blackwell, Oxford
16. Slater E. Roth M, 1986 Mayer-Gross, Slater and Roth's Clinical Psychiatry 3rd edn. Bailliere - Tindall, London, UK
17. Stoudemire A, Fogel BS (eds) 1993, Psychiatric care of the medical patient Oxford University press, New York.
18. Taylor, D, Paton C, Kerwin D (2005) The Maudsley Prescribing Guidelines. Taylor and Francis, London
19. Thornicroft, Gand Szmukler, G (2001) Text book of Community Psychiatry, Oxford University Press, Oxford
20. Tasman, Kay and Lieberman (eds) (2003) Psychiatry, 2nd edition, Wiley
21. Vyas JN, Ahuja Niraj. (eds) (1999) Text book of Postgraduate Psychiatry, II ed JPB Publishes New Delhi
22. World Health Organization (1992) The ICD 10 classification of mental and behavioral disorders, clinical descriptions and diagnostic guidelines, World Health Organization, Geneva
23. Yudofsky SC, Hales RD (eds) (1992) Text book of Neuropsychiatry, 2nd edition. Washington DC, American Psychiatric press.

Neurology

1. Allan H Ropper and Robert H Brown (2005) Adams and Victor's Principles of Neurology, 8th edn Mc Graw – Hill
2. Ashok Gupta (2007) Text book of Pediatric Neurology in Tropics 1st edn i Jaypee Brothers Medical Publishers (P) Ltd.,
3. Bradley, Walter G, (2008) Neurology in Clinical Practice, 5th edn. Elsevier
4. Benson DF, Blumer D (eds) Psychiatric aspects of Neurological disease Grune and Stratton New York Vol. I, 1975 Vol. II, 1979
5. John Philip Patten (1996) Neurological differential diagnosis 2nd edn Springer – Verlag London Ltd.
6. John Spillane (1996) Bickerstaff's Neurological examination in clinical practice 6th edn Blackwell science
7. Mazzoni. (2006) Merritt's neurology Handbook 2nd edn. Lippincott
8. Noshir H Wadia (2005) Neurological practice: An Indian Perspective 1st edn Elsevir
9. Pincus J, Tucker GJ. (1985) Behavioural Neurology. III edn. Oxford University press New York
10. William W Campbell (2005) Dejong's The Neurologic Examination 6th edn Lippincott Williams & Wilkins

Psychology

1. Clifford T. Morgan, (1993) Introduction to Psychology 7th edn, Mc Graw Hill
2. Edward E Smith, Susan Nolen – Hveksenma, Barbara Fredrickson, Geoffarey Lotus (2002) Akinson & Hilgard introduction to Psychology 14th edn, Wadsworth publishing
3. Irwin G. Savason Abnormal Psychology; The problem of Maladaptive behaviour 11th edn, Prentice Hall.
4. John W. Mc David & Herbert Haravi (1967) social psychology individual, groups, societies Harper & Row Publishers, Inc, USA

5. Kupusamy (1994) Introduction to social psychology 3rd edn
6. Robert S, Feldman (2002) understanding psychology 6th edn Mc Graw Hill
7. Robert A Baron Donn Byrne (2000) social psychology 9th edn, Allyn & Bacon.
8. Robert A Baron (2001) Psychology 5th edn Allyn & Bacon

Recommended Journals

1. Indian Journal of Psychiatry
2. British Journal of Psychiatry
3. Psychological Medicine
4. Advances in Psychiatric Treatment
5. American Journal of Psychiatry
6. Archives of General Psychiatry
7. Journal of Clinical Psychiatry
8. Psychiatric clinics of North America
9. Child and Adolescent Clinics of North America
10. Acta Psychiatrica Scandinavia
11. Psychosomatic medicine
12. Indian journal of clinical psychology
13. Annals of Indian Academy of Neurology
14. Journal of Neurology and Neuropsychiatry
15. Archives of Neurology

RADIO – DIAGNOSIS – M D

GOAL

Goal of the course is to orient and train the students on different aspects of diagnostic and interventional radiology in the diseases of various organ systems of the human body. They should be able to apply this training at secondary and tertiary level of medical care.

OBJECTIVES

In order to achieve the goal of this course, following objectives are to be accomplished by the time the candidate completes the 3 years course.

Three broad domains of the objectives are:

1. Cognitive domain (knowledge)
2. Psychomotor domain (Skills)
3. Attitudinal domain (Human values, ethical practice etc.)

Cognitive Domain (Knowledge)

1. Describe aetiology, pathophysiology, and principles of diagnosis and management of common problems including emergencies, in adults and children.
2. Demonstrate understanding of basic sciences relevant to this specialty.
3. Identify important determinants in a case (e.g. social, economic, environmental) and take them into account for planning therapeutic measures.
4. Recognize conditions that may be outside the area of specialty/competence and to refer them to proper specialist or ask for help.
5. Advise regarding the management (including interventional radiology) of the case and to carry out the management effectively.
6. Update oneself by self-study and by attending courses, seminars, conferences and workshop which are relevant to the field of radio-Diagnosis.
7. Carry out guided research with the aim of publishing his/her work and presenting work at various scientific fora.

Psychomotor Domain (Skills)

1. Take a proper clinical history, examine the patient, perform essential diagnostic/interventional procedures and interpret the result to come to a reasonable diagnosis or differential diagnosis in the condition.
2. Provide basic life saving support service in emergency situations.
3. Undertake complete patient monitoring including the care of the patient.

Attitudinal Domain

1. Adopt ethical principles in all aspects of his/her practice. Professional honesty and integrity to be fostered.
2. Develop communication skills in order to explain the various options available in management and to obtain a true informed consent from the patient.

3. Be humble and accept the limitations of his knowledge and skills and to ask for help from colleagues/seniors when needed.
4. Respect patient rights and privileges including patient's right to information and right to seek a second opinion.

COURSE CONTENT

1. BASIC SCIENCE RELATED TO RADIO-DIAGNOSIS

- (a) Radiation physics and Radio-Biology,
- (b) Radiological anatomy and pathology of various organ systems
- (c) Imaging Techniques,
- (d) Radiography.

Includes all aspects of: Fundamentals of electromagnetic radiation, X-Ray production, characteristic properties of X-Rays, units of radiation, radiation measurement, X-Ray equipments, X-Ray films, intensifying screens, other X-Ray appliances, dark room equipments and procedures, II TV, cine fluorography, tomography.

- Quality assurance.
- Radiation hazards and principle and methods of radiation protection.
- Contrast media: types, chemistry, mechanisms of action, dose schedule, routes of administration, their potential adverse reactions and management.
- Clinical applications of important isotopes and instrumentation in Nuclear medicine with advances in both.
- Physics and applications of advanced imaging i.e., Ultrasound, CT, MRI, Angiography (DSA), PET, SPECT, CR, DR, DF, flat panel detector system etc.
- Practical experiments in physics: A list of experiments, which a resident should be able to do and interpret the results, is available in the department.

2. RESPIRATORY SYSTEM

GOAL

At the completion of the course the resident should be able to interpret conventional and advanced (CT, MRI) chest examinations, differentiating normal from abnormal cases and be able to recognize specific imaging pattern of different diseases.

Content Coverage

Diseases of the chest wall, diaphragm, pleura and airways; pulmonary infections; pulmonary vasculature; pulmonary neoplasm; diffuse lung disease; mediastinal disease; chest trauma; post – operative lung and X-Rays in intensive care.

Essential Objectives

1. Should be able to localize the chest pathology into one of the following compartments: pulmonary, pleural, mediastinal, extra-pleural, extra-thoracic, diaphragmatic, infradiaphragmatic.
2. Recognize chest pathology that requires urgent or emergency treatment and describe this in an adequate manner: Pneumothorax, traumatic aortic rupture, esophageal rupture, acute pulmonary embolism, CHF and tracheo-bronchial foreign bodies.

3. Recognize acute and chronic patterns of bacterial and viral pneumonia's, occupational diseases, allergic states.
4. Recognize and acute and chronic cardiac failure patterns and non-cardiogenic edemas.
5. Understand the radiographic features and precipitating causes of adult and infant respiratory distress syndrome.
6. Recognize and describe appropriately various manifestations of benign and malignant neoplasms of the lung.

Evaluation

- Resident's progress through daily observation of work.
- At the end of the rotation an assessment by a small group of faculty.
- Maintain a log book showing techniques learnt during the rotation – to be supervised.

3. GASTROINTESTINAL (GIT) AND HEPATO-BILIARY-PANCREATIC SYSTEM

Goal

At the completion of this course the resident should be able to interpret both the conventional and other newer (ultrasound, CT, MRI, angiography) examinations. This includes examination of GIT i.e., esophagus, upper gastrointestinal study, follow through for small bowel (including small bowel enterolysis) and enema (both conventional and double contrast) for colon. It also includes examination of liver, biliary system and pancreas using all the imaging modalities available to a radiologist including specialized investigations like ERCP, PTC and interventional procedures like abscess drainage, Percutaneous Transhepatic biliary drainage (PTBD, internal and external), tumor embolization, Radiofrequency (RF) ablation etc.

During this posting resident also performs other investigations done using fluoroscopic guidance e.g; hysterosalpingography (HSG); fisulogram, sonogram, T-Tube cholangiography, sialography etc, and he/she should be able to perform and interpret studies using these modalities.

Content Coverage

Diseases and disorders of mouth, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, diseases of omentum, peritoneum and mesentery, acute abdomen, abdominal trauma using conventional and newer imaging methods like CT, MRI, DSA, isotope studies.

Diseases and disorders of hepato-biliary-pancreatic system using conventional & newer imaging methods.

Essential Objectives

1. Learn to evaluate the clinical condition & needs of a patient and to decide the appropriate studies and approach for examining the GIT or hepato-biliary-pancreatic system of a patient.

2. Learn a proper approach to fluoroscopy; this includes developing proficiency in GIT fluoroscopy, mastering the equipment and using proper radiation protection measures (both for the patient and the operator).
3. Learn the basic pathology and patho-physiology of GIT/hepato-biliary-pancreatic diseases.
4. Learn to communicate the findings both at fluoroscopy and in films, in an accurate, succinct and meaningful way.

Evaluation:

- Day to day observation of residents work including documentation and interpretation.
- Assessment by a group of faculty at the end of the rotation.
- Log book will be maintained of the procedures learnt.

4. GENITO-URINARY SYSTEM

Goal

At the completion of this course resident should be able to perform, direct the radiography and interpret the conventional radiological examinations of the urinary tract. These includes: excretory urography (intravenous pyelography); cystograms, micturating cystourethrography (MCU) and retrograde urethrography (RGU).

[HSG is included under GIT rotation].

In addition the resident should be able to perform and interpret other diagnostic imaging modalities and procedures which are used to evaluate urinary tract pathology i.e. ultrasound, CT, MRI, angiography, as well as various interventional procedures like percutaneous nephrostomy, kidney biopsy, stent placement, antegrade pyelography, tumor embolization etc.

Obstetrics and gynaecology ultrasound: separate posting in III year.

Hysterosalpingography: already included with GIT posting.

Content Coverage

Imaging: conventional, ultrasound, CT, MRI, angiography; of various diseases and disorders of genitourinary system. These includes: congenital, inflammatory, traumatic, neoplastic, calculus and miscellaneous conditions.

Essential Objectives

1. Recognize and evaluate emergency conditions involving the urinary tract including trauma, infection, vascular compromise and obstruction.
2. Recognize and understand the patho-physiology of stone disease.
3. Recognize patterns of infectious diseases and the modalities necessary for diagnostic evaluation.
4. Understand the complete evaluation of renal mass lesions and the evaluation of other urinary tract neoplasms, including the detection and staging of the tumor.
5. Recognize the difference between the pattern of diseases affecting the genitourinary tract of adults and that of children and understand and identify the common conditions affecting the paediatric genito-urinary system on imaging.

Evaluation:

- Day to day, based on daily work assessment
- By a group of faculty at the end of the posting.
- Maintain a log book

5. MUSCULO SKELETAL SYSTEM**Goal**

At the end of the course the resident should be able to correctly interpret all the common abnormalities of the bones and joints. He/she should have a good understanding of the common congenital abnormalities, arthritis, bone and joint trauma, neoplastic conditions, metabolic bone disease and inflammatory diseases. He/She should also have an understanding of the role of CT/MRI in all these conditions and should be able to perform and interpret CT/MRI in diseases of musculo-skeletal system.

Content Coverage

Imaging (Conventional, ultrasound, CT, MRI, angiography, Radio-isotope studies) and interpretation of diseases of muscles, soft tissue, bones and joints including congenital, inflammatory, traumatic, neoplastic and miscellaneous conditions.

Essential Objectives

1. Communicate precisely and cogently radiographic descriptions of bone and joint trauma.
2. Differentiate various forms of arthritis and know correlative laboratory and clinical findings.
3. Enumerate the radiographic features that differentiate benign and malignant bone tumors with a basic familiarity of more common tumors.
4. Know radiographic features of acute and chronic osteomyelitis and discitis (including tuberculosis).
5. Recognize differential features of osteoporosis (including Bone Mineral Density or BMD assessment techniques e.g; US, CT, DEXA) including various endocrine and metabolic diseases e.g; osteomalacia, hyperparathyroidism etc.
6. Know the application and interpretation of ultrasound/CT/MRI/angiography in one or more of the above situations.

Evaluation

- Through daily sessions assessment
- By a small group of faculty at the end of posting
- Will maintain a log book

6. CARIOVASCULAR RADIOLOGY/ECHO CARDIOGRAPHY**Goal**

Goal is to provide experience in the role of imaging in cardiovascular diseases by different techniques including cardiac catheterization and cardiac angiography, Digital subtraction

angiography (DSA) and interventional procedures in non cardiac arterial and venous diseases.

Content Coverage

Diseases and disorders of cardiovascular system including congenital conditions and the role of imaging by conventional, ultrasound, Echo, Color-Doppler, CT, MRI, angiography (including DSA) and radionuclide studies. It also includes interventional procedures e.g; ballown angioplasty, embolization etc.

Essential Objectives

1. Understand the anatomy and common pathology of congenital and acquired cardiac conditions.
2. Correlate plain film findings of common congenital abnormalities with those shown by angiography and explain the pathophysiology including abnormal pressure measurements.
3. Correlate plain film findings and the echocardiographic studies of patients with acquired valvular diseases and other common pathologic conditions including pericardial pathology.
4. Understand the role of newer modalities like CT/MRI, in aortic diseases e.g., aorto-arteritis, aortic dissection and aortic aneurysm.
5. Should be able to perform fluoroscopy on patients before and after valve replacement and identify those with complications after valve replacement.
6. Understand the principle and logic behind various interventional procedures carried out in the cardiovascular labs e.g; PTCA, balloon dilatation of valvulr lesions, septostomy etc.

Evaluation

- Day to day assessment
- By a small group of faculty
- Maintain a log book to be checked by faculty in charge

7. NEURORADIOLOGY

Goal

At the end of the course the resident should be able to demonstrate reasonable proficiency in the assistance during performance as well as in the interpretation of all neuro-radiological studies. This includes angiograms, both cerebral and non-cerebral studies, transluminal angioplasties, embolization procedures and myelography. They should also be able to perform and interpret CT and MRI of head and spine.

Content Coverage

Includes imaging (using conventional and newer methods) and interpretation of various diseases and disorders of the head, neck and spine covering congenital lesions, infective lesions, vascular lesions, traumatic conditions and neoplasia. It also includes a nunmberof interventional procedures carried out in the department of neuroradiology.

Essential Objectives

1. Know detailed normal neuro-imaging anatomy on different imaging modalities.
2. Identify pathologic conditions (listed under the content on images acquired using different techniques and communicate the report in a concise manner.
3. Participate in daily neuroradiology conferences held with the neurosurgery or neurology units.

Evaluation

- Day to day based on reporting and procedures performed.
- By a small group of faculty.
- Will maintain a log book to be checked by faculty in neuroradiology.

8. GENERAL RADIOLOGY

Goal

In this rotation the resident learns to evaluate conventional radiographs. This includes radiographs of: chest, abdomen, pelvis, skull, spine, musculo-skeleton and soft tissues. Resident is posted in opd and indoor radiography rooms for this purpose.

During indoor posting, he/she will also have the additional responsibility of directing, evaluating and reporting mammographic procedures including related interventional procedures.

Essential objectives

1. Learns to direct and perform radiography on patients.
2. He/She should be able to decide on further imaging views based on the clinical suspicion and the initial imaging.
3. Write reports on the radiographs obtained in a methodical, concise and precise way and communicate it to the referring unit.
4. Present interesting cases in the departmental meets.

ULTRASOUND (INCLUDING GYNAE/OBSTETRICS)

Goal

- At the completion of this rotation the resident should be able to perform and interpret all ultrasound studies. These studies include : abdomen, pelvis, small parts, neonatal head, color-duplex imaging (including peripheral i.e; extremity arterial and venous studies), obstetrics/gynaecology (in the deptt of Gyn/Obstet) and interventional procedures using ultrasound guidance. The resident should have a thorough knowledge of the common abnormalities of the abdominal/pelvic organs, retroperitoneal structures, neck, chest, extremities and small parts (thyroid/parathyroid, scrotum, orbit, breast).

Essential Objectives

1. Determine or select the appropriate diagnostic procedure for the clinical problem.
2. Demonstrate proficiency in patient scanning using appropriate techniques and instrumentations.

3. Modify the procedure, if required, based upon the observed abnormalities (Pathology)
4. Analyze the result of the diagnostic procedure, make diagnosis and record the findings.
5. Communicate findings, diagnostic and other relevant information to the referring physician.
6. Present interesting ultrasound cases in the departmental conferences/ meetings.

Evaluation

- Ongoing basis using day to day work.
- Presentations in departmental meets
- Maintain a log book
- By a group of faculty at end of the rotation

10. C.T

Goal/Objectives

The goals/objectives to be achieved by the end of this rotation are:

1. Select CT protocol according to the clinical diagnosis. He/She should be able to direct and modify (if required) the performance of the CT examination.
2. Demonstrate knowledge of the CT findings of the common pathologic conditions occurring in the head, neck, chest, abdomen, pelvis, and in the soft tissues and musculo-skeletal system.
3. Resident should be familiar with both the conventional and different modified CT techniques (High resolution, Dual phase, CT angio, BMD, multislice CT etc.)
4. Interpret conventional and modified body CT examinations (including HRCT, dual/triple phase CT, CT portography, virtual CT etc.) with a reasonable degree of accuracy.
5. Demonstrate proficiency in verbal and written reporting of CT findings and differential diagnosis.
6. Demonstrate knowledge of the limitations (and potential fallacies) of CT imaging of various pathologic conditions and be able to perform correlations with other imaging modalities including formulations of recommendations for additional appropriate imaging procedures.
7. Perform CT guided biopsy procedures under guidance of seniors.
8. Present interesting cases of CT in the departmental meetings.

Essential Objectives

1. The resident will review the daily body CT schedule and based upon the known clinical information and review of other radiologic studies of the same patient done earlier, select the most appropriate CT imaging protocol for the each patient. This may include altering an existing CT protocol to provide the most appropriate examination for an individual patient.
2. Develop a working knowledge of the actual performance of the CT examinations. This includes starting intravenous lines, amount and timing of injecting i.v. contrast, and actual operation of CT machine.
3. Review and report all the completed body CT examinations, initially this will be under the supervision of the seniors but later independently – but all reports will be signed by the faculty incharge.

4. Participate and present CT cases in departmental and inter departmental meets.

Evaluation

- On daily basis after observing reporting and working in the CT room
- By a group of faculty
- Maintain a log book under the supervision of faculty incharge.

11. M.R.I

Goal/Objectives

The goals/objectives to be achieved by the end of this rotation are:

1. Select MRI protocol according to the clinical diagnosis. He/She should be able to direct and modify (if required) the performance of the MRI examination.
2. Demonstrate knowledge of the MRI findings of the common pathologic conditions occurring in the head, neck, chest, abdomen, pelvis, and in the soft tissues and musculo-skeletal system.
3. Resident should be familiar with both the conventional and newer sequences
4. Interpret conventional and newer sequence MRI examinations with a reasonable degree of accuracy.
5. Demonstrate proficiency in verbal and written reporting of MRI findings and differential diagnosis.
6. Demonstrate knowledge of the limitations (and potential fallacies) of MRI imaging of various pathologic conditions and be able to perform correlations with other imaging modalities including formulations of recommendations for additional appropriate imaging procedures.
7. Perform MRI guided biopsy procedures under guidance of seniors.
8. Present interesting cases of MRI in the departmental meetings.

Essential Objectives

1. The resident will review the daily body MRI schedule and based upon the known clinical information and review of other radiological studies of the same patient done earlier, select the most appropriate MRI imaging protocol for the each patient. This may include altering an existing MRI protocol to provide the most appropriate examination for an individual patient.
2. Develop a working knowledge of the actual performance of the MRI examinations. This includes starting intravenous lines, amount and timing of injecting i.v. contrast, and actual operation of MRI machine.
3. Review and report all the completed body MRI examinations, initially this will be under the supervision of the seniors but later independently – but all reports will be signed by the faculty in charge.
4. Participate and present MRI cases in departmental and inter departmental meets.

Evaluation

- On daily basis after observing reporting and working in the MRI room
- By a group of faculty
- Maintain a log book under the supervision of faculty incharge.

12. ANGIOGRAPHY AND INTERVENTIONAL RADIOLOGY

Goal

At the completion, the resident should be able to perform the most common non-cerebral angiographic studies. He/she should have a good basic understanding of both; the vascular interventional radiologic procedures such as angioplasty, embolization using various embolizing agents; as well as the various non-vascular interventional procedures such as percutaneous nephrostomy, stenting, abscess drainage, PTC/PTBD, percutaneous biopsy, balloon dilatation of the esophagus etc. He/she should have a good understanding of the various equipments and available catheters and guidewires and other technical aspect of special procedures. In addition he/she should know all the potential risks and complications of these procedures and their management.

Essential objectives

1. Evaluate the requisition for appropriate clinical information to determine if additional information is needed.
2. Determine or select appropriate diagnostic procedure for the clinical problem.
3. Assist and perform appropriate procedures under supervision and modify procedures based on observed abnormalities (pathology).
4. Know the potential risks and complications of procedures performed.
5. Know normal vascular anatomy applicable to angiographic procedures performed and know normal anatomy and landmarks to perform other non-vascular procedures.
6. Present interesting cases in the departmental meets.

Evaluation

- day to day evaluation
- by a group of faculty
- will maintain a log book

13. PAEDIATRIC RADIOLOGY

Goal

Intention is to train residents to perform common radiologic procedures and to be able to interpret paediatric studies in order that they can appropriately deal with examinations of children in a non paediatric hospital environment.

At the completion the resident should be able to interpret most of the conventional and newer paediatric examinations which includes; upper airways, chest, genitor-urinary, gastro-intestinal and musculo-skeletal systems. Resident should be familiar with many of the neurologic conditions encountered in neonates and children. Resident should also be able to perform transfontanelle cranial ultrasound.

Content Coverage:

Common diseases and disorders of different organ systems covering congenital inflammatory, traumatic, neoplastic and other miscellaneous conditions, using both conventional and newer imaging methods.

Essential Objectives

1. Understand the appropriate indications for various imaging procedures and determine that the patient has been properly prepared for the procedure.
2. Know the standard radiographic views for paediatric examinations.
3. Learn to recognize and evaluate imaging manifestations (on conventional and newer methods) of common paediatric conditions occurring in the head/neck, chest, abdomen / pelvis and in the musculo-skeleton.
4. Perform paediatric fluoroscopic examinations with skill and accuracy.
5. Understand and apply the knowledge and principle of radiation protection, both for the child and the operator.

14. RADIOLOGY IN EMERGENCY MEDICINE

Goal

At the end of the course, resident should be able to give an evaluation of the emergency radiographic examinations. He/she should also be familiar with medicolegal cases (MLC) procedures.

Essential Objectives

1. Determine and direct radiography in emergency patients and review and interpret the radiographs.
2. If study is incomplete then determine additional views or repeat views.
3. Know indications for limitations of the common emergency imaging procedures.
4. Communicate findings, diagnosis and other relevant information to the emergency room physician.
5. He/She should be able to perform (some under supervision) and interpret special imaging procedures needed in emergency room e.g; barium studies, excretory urography, CT, Ultrasound, Doppler and Angiography.

15. ONCOLOGIC RADIOLOGY

Goal

At the end of the rotation the resident should be able to interpret radiological investigations in patients with neoplastic diseases (both benign and malignant). He/She should be able to perform, interpret and diagnose these patients. The resident should be able to perform and interpret newer imaging technique like PET-CT, Elastography, RF ablation system etc.

Essential Objectives

1. Understand pathology and patho-physiology of common neoplasms.
2. Learn the algorithmic approach to image these patients based on the suspected disease, its biological behavior and potential and limitations of various imaging modalities.
3. Perform appropriate investigation (both conventional and newer methods), interpret the results and reach at a reasonable diagnosis/differential diagnosis based on the clinical and biochemical results.
4. Learn to communicate the results in a precise way in a written report to the concerned unit.
5. Present interesting cases in the departmental meets.

16. NUCLEAR MEDICINE

Goal

At the completion of this rotation the resident should be able to interpret common nuclear medicine examinations (including cardiac cases). He/she should be able to evaluate the examinations for completion and determine what further images (including non nuclear medicine) need to be done. He/she should have a good understanding of the physical and biological properties of the commonly used radiopharmaceuticals and become familiar with safe handling of isotopes and basic radiation safety measures while dealing with isotopes.

Essential objectives

1. Review all cases performed each day.
2. Interpret the results of the procedure and give an appropriate diagnosis.
3. Observe and help in some common procedures performed in the department (e.g; thyroid, kidney, bone, cardiac scans), understand the principle underlying the procedure and the basis for using a particular isotope in an investigation.

Evaluation

- Day to day by nuclear medicine staff.

DISSERTATION

Thesis

1. Every candidate pursuing MD degree course is required to carry out work on a selected research project under the guidance of a recognized post graduate teacher. The results of such a work shall be submitted in the form of a dissertation.
2. The dissertation is aimed to train a post graduate student in research methods and techniques. It includes identification of a problem, formulation of a hypothesis, search and review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis, comparison of results and drawing conclusions.
3. Chief guide will be from the department of Radio-Diagnosis while co-guides will be from either the department or other disciplines related to the dissertation topic.
4. Every candidate shall submit a thesis protocol to the Dean of the Institute in the prescribed proforma containing particulars of proposed dissertation work four months from the date of commencement of the course. The thesis protocol shall be sent through the proper channel.

Protocol in essence should consist of:-

- (a) Introduction and objectives of the research project.
 - (b) Brief review of literature
 - (c) Suggested material and methods
 - (d) Bibliography
5. Such thesis protocol will be reviewed and the dissertation topic will be registered by the Institute. No change in the dissertation topic or guide shall be made without prior approval of the Dean of the Institute.
 6. Submission of thesis. discussion

Thesis will be submitted at the end of two and a half (2.5) years.

Thesis should consist of

- (a) Introduction
 - (b) Review literature
 - (c) Aims and objectives
 - (d) Material and methods
 - (e) Result
 - (f) Discussion
 - (g) Summary and Conclusion
 - (h) Tables
 - (i) Annexure
 - (j) Bibliography
7. Two copies of dissertation thus prepared shall be submitted to the Dean JIPMER , six months before the final examination.
 8. The dissertation shall be valued by two external examiners appointed by the Institute. Approval of dissertation work is an essential precondition for a candidate to appear in the final MD examination.

Dissertation is graded as follows:

- Highly commendable
- Commendable
- Satisfactory
- Rejected

MD (Radiodiagnosis), Posting Schedule
Total Duration: 3 years
Applied Physics and Basic Sciences

First year	Second Year	Third Year
Conventional Radiolgy (opd) -3 months	Ultrasound (with interventions) -2 months	Emergency Radiology (Casualty) – 2months
Genitourinary -3 months	CT (with interventions) - 2 months	Oncologic radiology (IRCH) - 2months
Conventional Radiology, including Paediatric Radiology (indoor) - 3 Months	Angiography (with interventions) - 2 months	Nuclear Medicine - 1 month
Observer Postings: 1. GIT – 1 Month 2. Ultrasound – 1 Month 3. Ct – 1 month	MRI - 2 months Cardiac Radiology - 2 months Neuroradiology - 2 months	Obstet/Gyn (US) – 15 days Echocardiography - 15 days Ultrasound - 1 month CT - 1 month MRI - 1 month Angiography - 1 month Elective - 2 months
Dissertation submission at the end of 2 ½ years		

Classes on Statistics: A series of lectures held for every one

M.D. BRANCH VIII - RADIODIAGNOSIS

COURSE CONTENT;

- Paper- I : Radiological Anatomy, physiology, Pharmacology, Pathology, Biochemistry, Radiological Physics.
- Paper – II : Imaging of Chest, Cardiovascular System and Musculoskeletal system.
- Paper – III : Imaging of Gastrointestinal tract and abdomen, Urogenital tract, Obstetrics & Gynaecology.
- Paper – IV : Imaging of Central Nervous System, Orbit, ENT, Dental, Soft tissues, Oncology, Endocrine Radiology, Nuclear Radiology, Recent Advances, Interventional Radiology and Miscellaneous.

PAPER – I

ANATOMY: Radiological anatomy consisting of : Relevant embryology of skull, central nervous system, cardiovascular system, respiratory, diaphragm, gastrointestinal tract, genitourinary tract, others; Radiological anatomy of facial planes of neck; pharynx, nasopharynx and larynx; Anatomy of heart and major vessels; Anatomy of ear, orbit, teeth; Anatomy of GIT including oesophagus, stomach, duodenum, small intestine, appendix, large bowel, rectum and its associated vascular supply; Genito – urinary system including kidneys, ureters, bladder, both male and female urethra and associated glands e.g. prostate, and reproductive organs; Sectional anatomy of entire abdomen and mediastinum; The venous and arterial systems of both extremities; Osteology; Joints of both extremities; Spine; Lymphatic system, breast, etc.

PHYSIOLOGY: Physiology of excretion; physiology of ventilation perfusion; pulmonary circulation; the cardiac cycle; the physiology of CSF flow; the physiology of renal hypertension; the physiology of menstrual cycle; the physiology of adrenal, thyroid function; physiology of various endocrine organs, their regulation and radiological correlation.

PATHOLOGY: Pathology of various systems of CNS, musculoskeletal systems, CIT, Diaphragm, GUT, CVS, RS, Reproductive systems (with special emphasis on tumours, infectious processes, congenital anomalies); pathology of radiation injury; pathology of inflammation, repair, necrosis, gangrene; pathology of vascular injury and repair; pathology of ischaemia; pathology of hematopoietic disorders, malignancies related to this system e.g. lymphomas, storage disorders e.g. Gaucher's disease and others.

PHARMACOLOGY: Pharmacology of materials injected into patients for diagnostic purposes including radio-nuclide agents; drugs used in the management of contrast reactions, cardiovascular stabilization of contrast reactions; drugs for pharmacangiography; drugs used during routine procedures such as barium, angiography etc; anticoagulants; drugs used to counter cerebral edema; captopril etc.

BIOCHEMISTRY: Elementary Radiation biology; biochemistry of endocrine glands.

RADIATION PHYSICS: Fundamentals of electricity; heating effect of current – units of measurement of work, energy, power; electromagnetic induction – principles of production of AC & DC, peak values, RMS values and average value of AC; basics of transformers - efficiency of transformers; rectifiers and rectification – timers ; X - ray - production and properties, modern x-ray tubes, quantity of x-ray (Roentgen, RAD, REM) interaction of x-

rays with matters; filters in Radiology; physical principles of x-ray diagnosis; fluorescence – screens; high KV technique; foreign body localization; Basic principles of image intensification, digital and cine radiography, ultrasound, CT scan, MRI, PET-CT, SPECT, CR, DR, DF & flat panel detector. Radioisotopes – production, structure, basic instruments in their use, physical properties; radiation protection - maximum permissible dose – film badge – methods of protection - safe handling of radio-active isotopes – safe disposal of radioactive material.

PAPERS - II, III, IV

1. RADIOGRAPHIC TECHNIQUES AND PROCESSING.
2. PRINCIPLES OF RADIOGRAPHIC/OTHER IMAGING MODALITIES (as defined above – refer definition of Radio – Diagnosis). DIAGNOSIS OF DISEASES OF THE:

BONES & JOINTS: Congenital skeletal anomalies, skeletal dysplasias, chromosomal disorders; periosteal reaction, bone and joint infections, sarcoid; Avascular necrosis of bone, osteochondritis, miscellaneous bone lesions e.g. Caisson's disease, Caffey's disease, progeria, Paget's disease, Leontiasis Ossea, Tuberous Sclerosis; Diseases of joints, arthrography; Tumors and Tumor like conditions of bone; Disorders of the lymphoreticular system and other hemopoietic metabolic and endocrine origin including rickets, osteomalacia, scurvy, osteoporosis, quantitative analysis of bone, hemochromatosis, Wilson's disease, hyperparathyroidism and others; skeletal trauma – general and regional; Radionuclide bone scanning.

CHEST: Normal chest, methods of investigation and differential diagnosis; Mediastinum; The pleura – collapse and consolidation; Tumours of the lung; Inflammatory diseases of the lung; Chronic bronchitis and emphysema, pneumoconiosis; Chest trauma, the post operative chest, intensive care; radiation; The pediatric chest; Miscellaneous lung conditions e.g. sarcoidosis, fibrosing alveolitis, extrinsic alveolitis, pulmonary eosinophilic conditions, asthma, eosinophil granuloma, pulmonary haemorrhage and hemosiderosis, lymphoproliferative disorders, granulomatous such as Wegner's lymphomatoid, bronchocentric, interstitial pneumonias, connective tissue disorders, pulmonary alveolar proteinosis, amyloidosis, bronchial abnormalities such as bronchitis, bronchiectasis etc., adult respiratory distress syndrome, pulmonary ossification, oxygen toxicity, pulmonary alveolar microlithiasis; lungs in chronic renal failure, shock etc.

CARDIOVASCULAR SYSTEM: The normal heart, methods of examination by radiography, ultrasound, angiography, cardiac catheterization, CT scanning, MRI, Radionuclide imaging; the pericardium; the pulmonary circulation; acquired heart disease – e.g. ischaemic, valvular, cardiomyopathies etc., congenital heart disease - general consideration and specific condition – emphasis to be laid on ultrasonographic and angiographic profiles; arteriography and therapeutic angiography; phlebography; the lymphatic system.

GASTROINTESTINAL TRACT AND ABDOMEN: Methods of examination - radiography and contrast, studies, C.T. and endoscopic procedures; salivary glands, pharynx and oesophagus; stomach and duodenum; the small bowel; the colon; the acute abdomen; the biliary tract; the liver, spleen and pancreas; the adrenal glands; the pediatric abdomen; interventional procedures.

UROGENITAL TRACT: Methods of examination including radiography contrast studies, ultrasonography, CT scanning, nuclear medicine and other imaging modalities, congenital

lesions of upper and lower urinary/genital tract; cystic diseases of the kidney, tumours of the kidney tumour of the kidney and ureter; renal calculi, nephrocalcinosis; urinary infection; renal vascular disease, miscellaneous lesions such as hypertension and renal artery stenosis, small artery disease, radiation nephritis, vascular malformations of the renal artery, arteriovenous fistulae, fibrosis, pyeloureteritis cystica, hydroureter of pregnancy; trauma to the urinary tract – renal injury, ureteric injury, lower urinary tract injuries, methods of examination - contrast studies, radionuclide studies, Computed Tomography etc; the bladder and prostate; lower urinary tract obstruction, incontinence, postprostatectomy problems, obstetric and gynaecological imaging with special emphasis on ultrasound of various disorders of these regions; imaging in renal transplantation; interventional procedure.

CENTRAL NERVOUS SYSTEM: Anatomy, pathology and methods of examination including radiography, contrast studies, CT, MRI Doppler studies of carotids and others; the normal skull - radiography of the various views of the skull, various anatomical landmarks within the skull, CT anatomy of the skull and its contents, MRI anatomy of the skull and its contents; the abnormal skull comprising all bony and non-bony lesions of the skull and its contents; intracranial calcifications - normal and pathological; neuro –radiology of the spine with emphasis on myelography, CT and MRI; cranial trauma; infections and inflammation of the brain; diseases of white matter; cranial and intracranial tumours; sellar and parasellar regions; congenital anomalies; cerebrovascular diseases; craniovertebral junction imaging - anomalies and acquired lesions; cerebral blood flow determination; neurosonography ; hydrocephalus - imaging.

ENT/ORBIT/TEETH/SOFT TISSUES : Pharynx and larynx - anatomy, methods of examination of healthy and diseased pharynx and larynx; the paranasal sinuses; petrous temporal bone with emphasis on high resolution CT scanning of this area; the orbit and eye; the teeth and jaws; the soft tissues; breast, mammography, xero-radiography and thermography etc.

MODERN IMAGING/RECENT ADVANCES: CT scanning of CNS/thorax / abdomen/ pelvis/ extremities – emphasis on normal CT anatomy and CT of abnormal structures of various parts of the body; MRI - technical aspects, CNS and spine, recent advances in imaging of thoracic and abdominal lesions - a knowledge of NMR spectroscopy is desirable; PET, SPECT, CR, DR, DF, flat panel detector system-- technical aspects and clinical applications, Radio – isotope imaging, various radio-nuclide agents, their technical aspects and clinical applications, Gamma Camera – technical aspects Ultrasound of - abdomen including major organs like liver, kidney and others, Obstetric & Gynaecological ultrasonography with special emphasis to cardiovascular ultrasonography, peripheral vascular studies, neonatal skull etc., technical aspects of ultrasonography, basis interventional techniques utilizing ultrasonography.

OBSTETRICS RADIOLOGY : Obstetrics/Fetal sonography - basic ultrasound examination of the uncomplicated pregnancy, ultrasound in all the three trimesters of pregnancy, sonographic estimation of fetal age and weight, sonographic evaluation of maternal disorders during pregnancy, fetal CNS abnormalities, fetal genitourinary tract/thorax/abdomen, sonography of multiple gestation, ultrasound evaluation of placenta. Assessment of fetal well being, Duplex Doppler system in obstetrics ultrasound, evaluation of high risk pregnancy, invasive fetal procedures, ectopic pregnancy, IUGR, others.

Obstetrics Radiography: Amniography, Pelvimetry, radiography of maternal abdomen, radiation hazards, fetal death.

GYNAECOLOGICAL RADIOLOGY: PLAIN radiography, hysterosalpingography and other contrast study, the urinary tract in gynaecology, congenital abnormality of female genital tract, inflammatory disease of the female genital tract, uterine tumours, uterus, cysts and tumors of the ovary, intrauterine contraceptive device, CT/MRI of female pelvis, normal anatomy of the female pelvis.

Ultrasonography : Ultrasonic evaluation of the uterus, gestations, trophoblastic disease, the ovary.

IMAGING IN ONCOLOGY.

ENDOCRINE RADIOLOGY.

ULTRASONOGRAPHY OF SMALL ORGANS.

INTERVENTIONAL RADIOLOGY: All imaging guided interventional procedures. Biopsy procedure percutaneous transthoracic/abdominal/musculoskeletal biopsies; percutaneous punctures, decompression and drainage procedure.

SCHEME FOR CLINICAL / PRACTICAL AND ORAL EXAMINATIONS

CLINICAL / PRACTICAL

1. Long case	:		100 marks
2. Short case	:	75 x 2 =	150 marks
3. Spotters	:		50 marks

ORAL : 100 marks

Total : 400 marks

-/MODEL QUESTION PAPERS/-

M.D. DEGREE EXAMINATION – RADIODIAGNOSIS

PAPER - I Including Anatomy, Physiology, Pharmacology, Pathology, Biochemistry, Radiological Physics.

Time : 3 hours

Max.marks : 10 x 10 = 100

Write briefly on:

1. Principles of Radiation protection
2. Non-ionic contrast media
3. Image intensifier
4. Menstrual cycle
5. Development of the diaphragm
6. Saggital anatomy of CNS
7. Physiology of renal hypertension
8. Pathology of bone tumours
9. Developmental anomalies of heart
10. Bronchopulmonary segments

M.D. DEGREE EXAMINATION – RADIODIAGNOSIS

PAPER - I I Imaging of chest, cardiovascular system and musculoskeletal system.

Time : 3 hours

Max.marks : 100

1. Classify congenital heart diseases. Give the radiological features in left to right shunt conditions as seen by various imaging investigations. (25 marks)
2. Classify mediastinal masses. Discuss the role of imaging in their diagnosis (25 marks)
3. Write short notes on:
 - a) Solitary pulmonary nodule
 - b) Aneurysmal bone cyst.
 - c) Psoriatic arthritis
 - d) Pulmonary sarcoidosis
 - e) Perthe's disease.

(10 x 5 = 50 marks)

M.D. DEGREE EXAMINATION – RADIODIAGNOSIS

PAPER - III Imaging of gastrointestinal tract and abdomen, urogenital tract, obstetrics & gynaecology.

Time : 3 hours

Max.marks : 100

1. Discuss the role of imaging modalities in the diagnosis of renal hypertension. (25 marks)
2. Discuss the radiological features of duodenal ulcers. Discuss barium meal study versus endoscopy in the diagnosis of duodenal ulcers. (25 marks)
3. Write short notes on:
 - a) Intra-uterine foetal death
 - b) Transvaginal ultrasonography
 - c) Ectopic pregnancy
 - d) Vesico-ureteric reflux
 - e) Colonic diverticular disease.

(10 x 5 = 50 marks)

M.D. DEGREE EXAMINATION – RADIODIAGNOSIS

**PAPER - IV Imaging of Central nervous system, orbit, ENT, dental, soft tissues,
Oncology, endocrine radiology, nuclear radiology, recent advances, interventional
radiology & miscellaneous.**

Time : 3 hours

Max.marks : 100

1. Discuss the radiological features of sellar masses. (25 marks)
2. Role of various imaging techniques in the evaluation of orbital masses. (25 marks)
3. Write short notes on:
 - a. MR angiography
 - b. Differential diagnosis of swelling of mandible
 - c. Interventional radiological techniques in urinary tract obstruction
 - d. Isotope imaging in hepatobiliary diseases
 - e. Gradient echo imaging.

(10 x 5 = 50 marks)

RADIOTHERAPY

PROGRAM GOALS

The main goal of the radiation oncology residency program is to produce radiation oncologists with the necessary knowledge, skill and attitude to prevent, diagnose and manage various cancers. As a result of training in radiation oncology, the resident should become competent in the use of the various radiation equipments, techniques, treatment planning, radiation dose prescription, treatment verification, treatment delivery; chemotherapy administration and management of related complications.

In order to be considered a competent radiation oncologist, a resident must possess humanistic qualities, attitude and behavior necessary for the development of appropriate patient-doctor relationship.

OBJECTIVES

At the end of 3 years of post graduate training, a resident must acquire knowledge and skill as a result of training under the resident education programme syllabus which includes the following:

1. Basic Sciences related to Oncology

- 1.1** Anatomy
- 1.2** Pathology
- 1.3** Radiation Physics
- 1.4** Clinical Radiobiology
- 1.5** Statistical basis for planning & interpretation of clinical trials.

2. Principles of Oncology

- 2.1** Etiology of Cancer
- 2.2** Epidemiology of Cancer
- 2.3** Cancer Screening and Prevention
- 2.4** Cancer Registries & National Cancer Control Programme
- 2.5** Cancer Chemotherapy
- 2.6** Cancer Biotherapeutics
- 2.7** Imaging in Oncology
- 2.8** Pharmacogenomics

3. Clinical Radiotherapy, Chemotherapy and Targeted Therapy in Management of Malignancies

4. Other Disciplines allied to Radiotherapy and Oncology

5. Palliative Care

6. Research, Training & Administration

1. BASIC SCIENCES

1.1 Anatomy

- 1.1.1** Knowledge of surface anatomy pertaining to Oncology
- 1.1.2** Knowledge of the anatomy of all organs
- 1.1.3** Knowledge of the lymphatic system of all regions
- 1.1.4** Practical familiarity with the radiographic appearance
- 1.1.5** Cross sectional anatomy

1.2. Pathology

- 1.2.1** Definitions of & distinction between different types of growth disorders (i.e. Distinction between hyperplasia, hypertrophy, regeneration, malformation & neoplasia)
- 1.2.2** Malignant transformation

- a) Initiation & promotion stages of carcinogenesis
- b) Mode of origin - monoclonal, polyclonal, unifocal, multifocal
- c) Structural & functional changes in the cellular components
- 1.2.3 Apoptosis and cell signaling pathways
- 1.2.4 Mechanisms of spread
- 1.2.5 Local effects of tumors
- 1.2.6 Local & systemic reactions to tumors
- 1.2.7 Effects of therapy on tumors & normal tissues
- 1.2.8 Criteria for tumor diagnosis - macroscopic, histological & cytological uses & value of biopsy material
- 1.2.9 Nomenclature - solid tumors, lymphomas, leukemias
- 1.2.10 Classification of tumors
- 1.2.11 Structure & organization of tumors - vascular supply, stroma etc.
- 1.2.12 Systems of grading
- 1.2.13 Tumor Markers
- 1.2.14 Tumor Immunology
- 1.2.15 Cytogenetics, Molecular Pathology and Immunohistochemistry

1.3. Radiation Oncology Physics

*The aim of this subject is to provide the future Clinical Oncologist with the knowledge of physics required in clinical practice. An understanding of the principles of planning & carrying out treatment is a necessary prerequisite & will be enhanced by the study of this subject. A familiarity with the **physics of electricity, atomic structure & electromagnetic radiation** will also be required in order to understand parts of the syllabus.*

As they are studied they should be analyzed critically with respect to their implications for accurate dose delivery in clinical radiation therapy. Applicability limitations, advantages, & disadvantages of the various devices & techniques should receive particular attention. Candidates should be encouraged to observe & gain practical experience with the equipment & techniques used in radiotherapy in clinical oncology departments.

- 1.3.1 Structure of Matter
- 1.3.2 Nuclear Transformations
- 1.3.3 Production of X-rays
- 1.3.4 Interaction of Radiation with Matter
- 1.3.5 Measurement of Radiation
- 1.3.6 Radioisotopes and Radiotherapy Equipments
- 1.3.7 Principles of Radiologic physics, Dosimetry and Treatment Planning
- 1.3.8 Photon External Beam Dosimetry and Treatment Planning
- 1.3.9 Physics, Biology and Dosimetry of Brachytherapy
- 1.3.10 Clinical Applications of Brachytherapy –LDR, HDR and PDR
- 1.3.11 Electron Beam Therapy- Dosimetry, Planning and Techniques
- 1.3.12 Three Dimensional Conformal Radiation Therapy- Physics, Treatment Planning and Clinical Aspects
- 1.3.13 Intensity Modulated Radiation Treatment, Planning and Clinical Application
- 1.3.14 Particle Beam Radiotherapy: Clinical Perspectives
- 1.3.15 Magna Field Irradiation
- 1.3.16 Intraoperative Radiation Therapy
- 1.3.17 Stereotactic Irradiation
- 1.3.18 Nonsealed Radionuclide Therapy
- 1.3.19 Radioimmunoglobulins in Cancer Therapy
- 1.3.20 Quality Assurance in radiotherapy (QART)
- 1.3.21 Radiation Protection and Regulatory Aspects
- 1.3.22 Image Guided Radiotherapy (IGRT) and Clinical Aspects

1.3.23 Recent Advancements in Radiation Oncology

1.4. Radiobiology

- 1.4.1 The Physics and Chemistry of Radiation Absorption
- 1.4.2 DNA Strand Breaks and Chromosomal Aberrations
- 1.4.3 Cell Survival Curves
- 1.4.4 Radiosensitivity and Cell Age in the Mitotic Cycle
- 1.4.5 Repair of Radiation Damage and the Dose Rate Effect
- 1.4.6 The Oxygen Effect and Reoxygenation
- 1.4.7 Linear Energy Transfer and Relative Biological Effectiveness
- 1.4.8 Acute Effects of Total Body Irradiation
- 1.4.9 Cell Tissue and Tumor Kinetics
- 1.4.10 Predictive Assay
- 1.4.11 Radiation Carcinogenesis
- 1.4.12 Hereditary Effects of Radiation
- 1.4.13 Effects of Radiation on the Embryo and Fetus
- 1.4.14 Molecular Techniques In Radiobiology
- 1.4.15 Dose Response Relationship for Model Normal Tissues
- 1.4.16 Effect of Radiation on Normal Tissues
- 1.4.17 Time, Dose and Fractionation in Radiotherapy
- 1.4.18 Alternative Radiation Modalities
- 1.4.19 Radioprotectors
- 1.4.20 Radiosensitizers and Bioreductive Drugs
- 1.4.21 Hyperthermia

1.5 Clinical trials - Statistical basis for planning & interpretation

1.5.1 Clinical Trials

- a) Advantages & disadvantages
- b) Retrospective & Prospective studies
- c) Controlled & uncontrolled trials
- d) Single-blind & double-blind studies
- e) Phase I, II & III trials and metaanalysis
- f) Ethics

1.5.2 Planning a trial

- a) Establishing objectives- short term and long term
- b) Determining the appropriate criteria.
- c) Establishing grounds for inclusion and exclusion of patients
- d) Determining how many treatment schedules are to be completed
- e) Determining the treatment schedules and any appropriate modifications
- f) Determining the method of allocation of treatments ; the allocation ratio and the method and timing of randomization
- g) Determining what measures are to be taken, how they will be taken, who will take them, at what time(s) and where they will be recorded
- h) Designing the appropriate forms of documentation
- i) Determining the proposed duration of the trial, either in terms of a fixed closing date, or the entry of a pre-determined number of patients.
- j) Establishing conditions under which the trial may be terminated earlier than planned & procedures for detecting these conditions.
- k) Re-assessing the proposed trial in terms of ethics, appropriateness to the short & long term objectives, feasibility & the availability of resources.
- l) Writing the protocol
- m) Running a pilot study

2. PRINCIPLE OF ONCOLOGY

2.1 Etiology of Cancer

- a) Genetic predisposition, congenital syndromes

- b) Chromosomal abnormalities, hereditary tumours
- c) Protooncogenes, oncogenes, tumor suppressor genes,
- d) Multifactorial causation
- e) Nutritional aspects in cancer causation and prevention.
- f) Environmental causes of cancer
- g) Biological - protozoal, bacterial, viral
- h) Chemical - Classes of carcinogenic chemicals, smoking
- i) Physical - trauma, irradiation (UV rays, other electromagnetic radiation including X rays and Gamma rays and particulate radiations)
- j) Occupational cancers.

2.2 Epidemiology of Cancer

2.3 Cancer Screening and Prevention

2.4 Cancer Registries & National Cancer Control Programme

2.5 Cancer Chemotherapy

- a) Classification and mode of action of cytotoxic drugs
- b) Pharmacokinetics and Pharmacodynamics
- c) Principles of combinations of therapy, dose response curves, sequential and concomitant chemotherapy, sanctuary sites, high dose chemotherapy, and regional chemotherapy
- d) Standard chemotherapy schedules
- e) Drug administration and Precautions in the safe handling of cytotoxic drugs
- f) Drug Toxicity
- g) Supportive care for chemotherapy
- h) Resistance to Chemotherapy
- i) Basic concepts of Chemotherapy and Irradiation Interaction

2.6 Cancer Biotherapeutics

- a) Hormonal Therapy
- b) Differentiation Agents
- c) Monoclonal Antibodies
- d) Interferons
- e) Interleukins
- f) Antiangiogenesis Agents
- g) Molecular Targeted Therapy
- h) Vaccines
- i) Gene Therapy

2.7 Imaging in Oncology

2.8 Pharmacogenomics

3. CLINICAL RADIOOTHERAPY, CHEMOTHERAPY AND TARGETED THERAPY IN MANAGEMENT OF MALIGNANCIES

3.1 Skin Cancer

3.2 Central Nervous System Tumor

3.3 Head and Neck Tumors

3.4 Thoracic Tumors

3.5 Breast Tumors

3.6 Gastrointestinal Tumors

3.7 Liver, Gall bladder and bile duct tumors

3.8 Pediatric Tumors

3.9 Gynecologic Tumors

3.10 Male Genitourinary Tumors

- 3.11 Urinary Tract Tumors
- 3.12 Endocrine Tumors
- 3.13 Lymphoma and Hematological Malignancies
- 3.14 Sarcomas of Bone and Soft tissues
- 3.15 Metastasis of Unknown Origin
- 3.16 AIDS related Malignancies
- 3.17 Oncologic Emergencies
- 3.18 Endocrine aspects of malignancy:- production of hormones by tumors, effect of hormones on tumors, paracrine effects of tumors
- 3.19 Paraneoplastic syndromes
- 3.20 Benign Diseases

4. OTHER DISCIPLINES ALLIED TO RADIOTHERAPY AND ONCOLOGY

4.1 Surgical Oncology

- 4.1.1 Basic principles of surgical oncology, biopsy, conservation surgery, radical surgery, palliative surgery
- 4.1.2 Basics of surgical techniques - head & neck, breast, thorax, abdomen, gynecological, genitourinary, musculoskeletal, CNS
- 4.1.3 Combined treatments: with radiotherapy, chemotherapy, and hormone therapy

4.2 Rehabilitation

4.3 Complementary alternative medicine

5. PALLIATIVE CARE

- 5.1 Guidelines for palliative care
- 5.2 Symptoms of advanced cancer
- 5.3 Different pharmacologic & non-pharmacologic methods
- 5.4 Pain control, WHO guidelines for adults & children
- 5.5 Palliative radiotherapy
- 5.6 Palliative chemotherapy
- 5.7 Home care
- 5.8 Hospice care
- 5.9 Physical, social, spiritual & other aspects

6. RESEARCH, TRAINING & ADMINISTRATION

6.1 Research in Oncology

- 6.1.1 How to conduct a research
- 6.1.2 Guidelines for biomedical research: Animal studies, drug studies, human trial
- 6.1.3 Cancer clinical trials. Phase I/II, III
- 6.1.4 Ethics of clinical research
- 6.1.5 Evidence based medicine

6.2 Training Programme in Radiotherapy and Oncology

- 6.2.1 Participation in the daily routine work of the department including work rounds of patients admitted for radiotherapy, symptomatic treatment for acute and late radiation reactions, administration of cytotoxic drugs, management of chemotherapy induced side effects and complications, cancer pain management and palliative care.
- 6.2.2 Presentation of cases in the reporting sessions of the department
- 6.2.3 Participation in various procedures and techniques (e.g. External Beam Radiotherapy- 2-D & 3- DCRT, IMRT; Brachytherapy- Interstitial, Intracavitary, Intraluminal, Surface; Simulation and Treatment Planning; Mould Room Procedures etc.)

- 6.2.4 Active participation in the Tumor Board meetings with other departments for case discussions.
- 6.2.5 Junior Residents in Radiotherapy must undergo 3 months peripheral postings in other specialities during their 3 years course towards M.D.
- 6.2.6 Participation in CME-conference, symposium, workshop, seminar
- 6.2.7 Active participation in teaching and training programme of undergraduate students.

6.3 Administration in Radiotherapy and Oncology

- 6.3.2 Clinical Oncologist's role as an administrator.
- 6.3.3 How to set up a Radiotherapy and Oncology department, planning of infrastructure, & equipments
- 6.3.4 Role in cancer control programme.
- 6.3.5 Responsibilities towards radiation safety & quality assurance.
- 6.3.6 Administration aspects of training, academic, patient care & research.

TEACHING AND ACADEMIC ACTIVITIES IN DEPARTMENT OF RADIOTHERAPY

- a) Lectures in Radiation Physics, Radiation Protection and Quality Control
- b) Case Discussions, Seminars, Journal Club Presentations

MD (Radiation Oncology), Posting Schedule Total Duration: 3 years

First Year	Second Year	Third Year
(In Rotation) Ward Posting –Monthly OPD Posting- Monthly	(In Rotation) OPD Posting – Monthly Ward Posting – Monthly Simulator Planning – Monthly Brachytherapy- Monthly	(In Rotation) OPD Posting – Monthly Ward Posting – Monthly Simulator Planning - Monthly Brachytherapy- Monthly
Peripheral Posting		Tumor Board Meetings

LOG BOOK

Each candidate should maintain a log book in which the following details will be entered:

1. Treatment planning and procedures performed
2. Presentation in departmental seminars
3. Cases presented in clinical meetings
4. Presentations in journal clubs along with Title, Journal & Issue..
5. Schedule of intradepartmental rotation
6. Details of peripheral postings
7. Conferences attended – National/International
8. Papers presented at conferences with title name of the conference, date of presentation
9. Paper published with title, name & issue of the journal

Internal assessment and Evaluation

Each candidate shall have assessment in terms of

1. Evaluation of the Dissertation project
2. Evaluation of Log book
3. Six monthly assessment (written exam / oral viva)

To be eligible for M.D Final Examination, Resident

1. Should have done submission and got approval of dissertation project
2. Should score satisfactory remarks in internal assessment.

SUGGESTED BOOKS AND AUTHORS

S.No	Name of Book	Author	Edition	Publisher
1	Principle & Practice of Radiation Oncology	Carlos Perez	5 th ,2008	Halperin
2	Cancer (2 Volumes)	Devita	8 th ,2008	LWW
3	ACS Textbook of Clinical Oncology	Murphy	2 nd	
4	The Physics of Radiation Therapy	Faiz M Khan		
5	Radiobiology For The Radiologist	Eric J. Hall	6 th	LWW
6	AJCC Cancer Staging Handbook, American Cancer Society,		6 th	Springer Verlag
7	The Physics of Radiology	H.E.Johns	4 th	Charle.C.Thomas
8	The Physics of Modern Brachytherapy in Oncology	Baltas	1 st ,2007	Taylor & Fracis
9	Clinical Oncology	Abeloff	3 rd ,2004	Elsevier
10	Practical Essentials of Intensity Modulated Radiation Therapy	Chao	2 nd ,2005	LWW
11	Textbook of Radiation Oncology Principles and Practice	G. K. Rath	2 nd	Elsevier
12	Radiation Therapy Planning	Bentel Gunilla C		McGraw-Hil
13	Clinical Radiation Oncology	Gunderson	2 nd ,2007	Elsevier
14	Principles and Practice of Radiation Therapy: Introduction to Radiation Therapy	C. Washington	2 nd	Elsevier
15	Intensity modulated radiation therapy: a clinical perspective	Arno J. Mundt		PMPH-USA
16	Handbook of Evidence-based Radiation Oncology	Eric K. Hansen		
17	Fundamental Physics of Radiology	Meredith & Massey		
18	The Manual of Clinical Oncology	Casciato	5 th .2004	LWW
19	Clinical Target Volumes in Conformal and Intensity Modulated Radiation Therapy	V. Gregorie		
20	Textbook of Radiation Oncology	L. Phillips		Elsevier
21	Bethdsa Hand Book of Clinical Oncology	Abraham	2 nd ,2005	LWW
22	Treatment Planning in Radiation Oncology	Faiz M Khan	2 nd ,2007	LWW
23	Diagnostic and Surgical Imaging Anatomy	H.RicHarnsberger	1 st ,2006	LWW
24	Cancer- Diagnosis and Management	Ackermann		
25	Text Book of Radiotherapy	G. Fletcher		
26	Surface and Radiological Anatomy	A. Halim		
27	Essentials of Surface and Radiological Anatomy	V. Kapur		
28	Handbook of Radiation Oncology: Basic Principles and Clinical Protocols	Bruce Haffty		

SUGGESTED JOURNALS

S.No	Journal Title Journal Home Page	Abbreviation Browse Journal in Medline	ISSN	Publisher
1	Annals of Oncology	Ann Oncol	0923-7534	OUP
2	British Journal of Cancer	Br J Cancer	0007-0920	Churchill
3	Cancer	Cancer	0008-543X	Wiley
4	Cancer Genetics and Cytogenetics	Cancer Genet Cytogenet	0165-4608	Elsevier
5	Clinical Oncology	Clin Oncol (R Coll Radiol)	0936-6555	Elsevier
6	European Journal of Cancer	Eur J Cancer	0959-8049	Elsevier
7	Gynecologic Oncology	Gynecol Oncol	0090-8258	-----
8	Journal of cancer research and therapeutics		0973-1482	Medknow
9	Journal of medical physics			Medknow
10	Indian Journal of Cancer	Indian J Cancer	0019-509X	
11	International Journal of Cancer	Int J Cancer	0020-7136	Wiley
12	International Journal of Clinical Oncology		1341-9625	Springer-Verlag
13	International Journal of Gynecological Cancer	Int J Gynecol Oncol	1048-891X	Blackwell
14	International Journal of Oncology	Int J Oncol	1019-6439 -	
15	International Journal of Radiation Oncology , Biology , and Physics	Int J Radiat Oncol Biol Phys	0360-3016	Elsevier
16	Journal of Cancer Research and Clinical Oncology	J Cancer Res Clin Oncol	0171-5216	Springer-Verlag
17	Journal of the National Cancer Institute	J Natl Cancer Inst	0027-8874	OUP
18	Lancet	The Lancet	0140-6736	Lancet
19	New England Journal of Medicine	New Eng J Med	0028-4793	
20	Radiation Oncology Investigations	Radiat Oncol Investig	1065-7541	Wiley
21	Radiation Research	Radiat Res	0033-7587	—
22	Radiotherapy and Oncology	Radiother Oncol	0167-8140	Elsevier
23	Recent Results in Cancer Research	Recent Results Cancer Res	0080-0015	Springer-Verlag
24	Seminars in Oncology	Semin Oncol	0093-7754	Saunders
25	Seminars in Radiation Oncology	Semin Radiat Oncol	1053-4296	Saunders
26	Radiation Oncology			
27	AROI(TNPY chapter)			

PAPERWISE DISTRIBUTION OF SYLLABUS

Paper I- Radiation Physics, Radiobiology, Basic Medical Sciences related to Oncology and Principles of Oncology

Paper II- Clinical Radiotherapy, Chemotherapy and Targeted Therapy in Management of Malignancies

- a) Skin Cancer
- b) Central Nervous System Tumor
- c) Head and Neck Tumors
- d) Thoracic Tumors
- e) Breast Tumors
- f) Gastrointestinal Tumors
- g) Liver, Gall bladder and bile duct tumors
- h) Pediatric Tumors

Paper III- Clinical Radiotherapy, Chemotherapy and Targeted Therapy in Management of Malignancies

- a) Gynecologic Tumors
- b) Male Genitourinary Tumors
- c) Urinary Tract Tumors
- d) Endocrine Tumors
- e) Lymphoma and Hematological Malignancies
- f) Sarcomas of Bone and Soft tissues
- g) Metastasis of Unknown Origin
- h) AIDS related Malignancies
- i) Miscellaneous

Paper IV- Recent Advances in Radiotherapy and Oncology

INSTRUCTIONS TO EXAMINERS

THEORY

Paper I: 100 Marks

Radiation Physics, Radiobiology, Basic Medical Sciences related to Oncology and Principles of Oncology

Questions related to radiation physics	(4x10)
Questions related to radiobiology	(2x10)
Questions related to basic medical sciences related to oncology	(4x10)

Paper II: 100 Marks

Clinical Radiotherapy, Chemotherapy and Targeted Therapy in Management of Malignancies

Long Notes	(2x25)
Short Notes	(5x10)

Paper III: 100 Marks

Clinical Radiotherapy, Chemotherapy and Targeted Therapy in Management of Malignancies

Long Notes	(2x25)
Short Notes	(5x10)

Paper IV: 100 Marks
Recent Advances in Radiotherapy and Oncology

Long Notes	(2x25)
Short Notes	(5x10)

As far as possible all question papers should be set by the same or a set of examiners. A moderator may ensure the proportionate representation of the topics in all papers.

PRACTICAL/CLINICAL 300 Marks

Spotters- Identification and Description (20x5=100 Marks)

1. Pathological specimens
2. X-ray films, CT and MR Images
3. Isodose charts
4. Cases
5. Instruments and Applicators

Long Case- One 100 Marks

1. Case Documentation-----30 marks
2. Patient Examination -----30 marks
3. Differential Diagnosis-----10 marks
4. Case discussion----- 30 marks

Short Case- Two 2x50 = Marks

1. Case Presentaion and examination-----20 marks
2. Differential Diagnosis-----10 marks
3. Case discussion----- 20 marks

ORAL VIVA 100 Marks

CRITERIA FOR EVALUATION OF MD

S. No.	Description	M.D
1.	THEORY	
	No. of Theory Papers	4
	Marks for each Theory Paper	100
	Total marks for Theory Paper	400
	Passing Minimum for Theory	200/400 (40% minimum in each paper)
2.	PRACTICAL / CLINICAL	300
	Oral	100
	Passing Minimum for Practical/ Clinical including Oral	200/400
	<p><u>Passing Minimum:</u></p> <p>The candidate shall secure not less than 50%marks in each head of passing which should include</p> <p>Theory – aggregate 50% (in addition, in each Theory paper a candidate has to secure minimum of 40%)</p> <p>Practical / Clinical / Viva – aggregate 50%</p> <p>If any candidate fails even under one head, he/she has to reappear for both Theory and Practical/Clinical/Viva examinations</p>	

Model Question Paper

Paper I

Radiation Physics, Radiobiology, Basic Medical Sciences related to Oncology and Principles of Oncology

3 Hours

(10x10 Marks)

ANSWER ALL QUESTIONS

1. Discuss physical characteristics of Electron beam. Mention the clinical application.
2. Interaction of Radiation with matter
3. Conformal radiotherapy
4. Role of Simulator in treatment planning.
5. ALARA Principle
6. Biological basis of HDR and LDR / MDR. Compare advantages and disadvantages.
7. National Cancer Control Programme
8. Concurrent Chemotherapy
9. Anatomy of the nasopharynx and its drainage areas with relevance to the natural history of carcinoma nasopharynx and its treatment
10. Discuss the pathology and staging of mediastinal mass lesions.

Model Question Paper

Paper II

Clinical Radiotherapy, Chemotherapy and Targeted Therapy in Management of Malignancies

3 Hours

(100 Marks)

ANSWER ALL QUESTIONS

1. Discuss the management of Carcinoma breast stage T2N1M0 and role of breast conservation therapy in this stage. (25 marks)
2. Classify the tumors of Lung and discuss the management of small cell lung Cancer. (25 marks)
3. Write Short Notes on: (5x10 marks)
 - a) Treatment of glottic cancer
 - b) Radiotherapy in the management of carcinoma of oesophagus
 - c) Discuss the management of carcinoma base of tongue
 - d) Management of pituitary macroadenoma
 - e) Management of basal cell carcinoma of nose

Model Question Paper

Paper III

Clinical Radiotherapy, Chemotherapy and Targeted Therapy in Management of Malignancies

3 Hours

(100 Marks)

ANSWER ALL QUESTIONS

1. Role of chemoradiation in carcinoma cervix. Discuss the management of squamous cell carcinoma cervix Stage IIB (25 marks)
2. Discuss the management of Seminoma Testis Stage IB. (25 marks)
3. Write Short Notes on: (5x10 marks)
 - a) Management of early Hodgkin disease
 - b) Hormonal management in Prostate cancer
 - c) Radiation therapy in Rectal cancer
 - d) Management of Wilms' tumor
 - e) Management of Osteogenic sarcoma

Model Question Paper

Paper IV

RECENT ADVANCES IN RADIOTHERAPY AND ONCOLOGY

(Including Cancer Chemotherapy)

3 Hours

(100 Marks)

ANSWER ALL QUESTIONS

- 1 Role of PET/CT in Oncology (25 marks)
- 2 Accelerated partial breast radiation in carcinoma breast (25 marks)
3. Write Short Notes on: (5x10 marks)
 - a) Trastuzumab
 - b) Taxanes in cancer management
 - c) HPV vaccine for Carcinoma Cervix
 - d) Rapid arc therapy
 - e) Management of bone metastases

TUBERCULOSIS AND RESPIRATORY DISEASES

PREFACE

Curriculum designing requires systematic approach to plan the educational activities. It states the general and specific objectives indicating selection and organization of content, mention/suggests certain pattern of learning and teaching and a programme of evaluation of learning outcome.

Curriculum is much more than class room instructions or syllabus. All the experiences provided by the institution come under curriculum. Therefore curriculum development is a complex undertaking that involves many kinds of decisions.

Since the curriculum is a dynamic process to meet the needs and objectives which change with the time, a suitable revision from time to time is required so as to support social economic and provisional traditions.

PREAMBLE

A post-graduate student in Tuberculosis and Respiratory Diseases should be able to diagnose and treat efficiently and ethically the common Respiratory related illnesses seen in community. In addition he/she should also recognize and properly manage basic medical diseases and all kinds of diseases related to Tuberculosis and Respiratory System. He/she should be aware of all the recent advances and on-going studies pertaining to his/her specialty as well as the national programmes involving the specialty of TB&RD. He/ she should contribute to the community by training and implementing the preventive measures for certain diseases under his specialty. The PG student should be competent enough to teach medical and paramedical students skillfully to make them understand the subject and conduct research work.

GOALS

1. The aim of the development of Curriculum in MD (Tuberculosis and Respiratory Diseases) and Diploma in Tuberculosis and Chest Diseases (D.T.C.D) is to develop human resources (in the specialty of TB & RD) who shall provide specialized health care to the patients needing respiratory care and services pertaining to Tuberculosis.
2. Teaching and training of future undergraduate and postgraduate medical students and junior doctors in the specialty of TB & RD in different medical colleges, institution and other hospitals.
3. Carry out and guide research to improve the practice of the science of tuberculosis and respiratory diseases in TB & RD specialty.
4. Develop management capability to manage personnel and budgets for the purpose of development of the TB & RD so as to make the health services cost effective.
5. Organize health teams to provide care during natural or manmade calamities receiving the assistance from the specialty of TB & RD.
6. Develop the specialty of TB & RD further through training programmes in order to make it reach the common people.
7. Develop the specialty further as per the national educational goals.
8. Develops holistic approach in preventive, curative and rehabilitative aspects of TB & RD.
9. Develop scientific temper fulfilling social and professional obligations

Specific objectives

10. They should obtain adequate knowledge in basic sciences like Embryology, Anatomy, Physiology, Biochemistry, Micro-biology and general surgical principles related to TB&RD.
1. He/ she should have proper understanding of patho-physiology of most of the illnesses related to the specialty.
2. They should recognize and properly diagnose the ailments pertaining to TB&RD and also other common health problems of community.
3. He/she should gain adequate skills to individually manage TB&RD diseases both medically and surgically as per the need.
4. They should manage all kinds of emergencies in TB&RD independently keeping in the mind the limitations existing in his place of work.
5. They should be able to perform tests and Interventions like Thoracostomy, Polysomnography, Bronchoscopy, Medical Thoracoscopy & Pulmonary Function tests, etc.
6. He/she should learn the basic methodology in teaching medical and paramedical students.
7. He/she should keep a track of current developments in the field of TB & RD.
8. They should be able to conduct research works, keep proper records and prepare reports and presentations of the same.
9. They should have basic knowledge about Biostatistics.

Training Programme

First 6 months (Orientation programme):

1. Attending PG orientation programme. (Covering the main teaching methods, issues relating to establishing rapport with the patients, Ethical issues involved in rendering the patient care services, research methodology)
2. Care of indoor patients under guidance of seniors.
3. Taking case-history, working up indoor cases, writing admission and discharge summaries.
4. Performing Minor-OT procedures in OPD.
5. Attending emergency and referral calls under the supervision of Senior Resident / Assistant Professor / Associate Professor.
6. Attending ward rounds and assisting in carrying out the instructions by senior staff.
7. Attending Out Patient Department patients under the supervision of seniors.
8. Keeping records and maintenance of ward, OPD, and emergency statistics.
9. Preparation of Dissertation protocol and getting it approved by the PG thesis committee and the Ethical committee of the concerned Institute.
10. Posting in other related disciplines. (Preferably during the 1st and 2nd year of the course.)

After 6 months to the end of the course:

1. Presenting indoor patients in ward rounds
2. Attending OPD patients.
3. Doing emergency duties of 24hr duration by rotation among all residents.
4. Presenting seminars, journals, cases on rotation basis.
5. Attending Inter-departmental meetings and planning the management.
6. Ensuring proper management of indoor patients and proper record keeping by juniors.
7. Attending medical care review meetings, Central Academic programmes and other guest-lectures organized by institute.

8. Taking clinical classes for undergraduate students posted in TB&RD.
9. Properly carrying out dissertation work and submitting in scheduled time.
10. Taking interest in research work, publishing review articles / case reports in journals
11. Attending conferences and work-shops.
12. Maintaining a Log Book.

TEACHING SCHEDULE

CLINICAL POSTING:

• General Medicine	1 month
• Cardiology	15 days
• Cardiovascular and thoracic Surgery	15 days
• Radiodiagnosis	15 days
• Anesthesiology	15 days
• Pediatrics	7 days
• Microbiology	7 days
• Social & Preventive Medicine	15 days
• Radiotherapy	15 days
• Tuberculosis Research Center (TRC) Chennai	15 days
• National Tuberculosis Institute (NTI) Bangalore.	15 days

The candidates should be posted in the Outpatient, Inpatient, Emergency room and Intensive Care Unit where he/she learns clinical decision making, therapeutic decision in routine ward work and emergencies.

SKILLS

The following skill should be possessed by candidate appearing for M.D (TB&RD)

Communication skills.

1. Communication skills.
 - a) Communication with peer Group by way of:
 - Case presentation
 - Clinico-pathological exercise
 - Seminars & small conferences.
 - b) Communication with students and colleagues:
 - Undergraduate teaching
 - Demonstrations
 - c) Research Communication:
 - Gathering and compiling data, analysis and presentation Designing a research protocol.
 - Writing a structured abstract.
2. Administrative skills:
 - a) Stores and equipment
 - Knowledge about requirement, estimation of cost and expenditure and equipment and maintenance.
 - Procurement and maintenance
 - b) Knowledge about essential National Health Programmes.
3. Practical and procedural skills.
 - a) General skills
 - b) Specific skills in Respiratory Medicine

GENERAL SKILLS

1. General Medicine: History taking, methodological clinical examination, fundus examination, liver biopsy, L.P. sternal puncture for bone-marrow examination, catheterization and bedside investigations.
 2. Cardiology: Interpretation of ECG in relation to respiratory diseases, Echo, usage of Defibrillator.
 3. Radiology: X-ray reading, positioning, fluoroscopy, barium swallow, bronchography, CT scan and Ultra Sonography.
Optional: MRI, Lung Scan and Pulmonary-angiography.
 4. ENT Anaesthesiology: Intubation, tracheostomy, transtracheal aspiration, sinus examination.
 5. Paediatric Pulmonary diseases: Fluid and electrolyte balance in children.
 6. Cardiovascular and Thoracic Surgery: Bronchoscopy, pulmonary resection, post-operative care and pre-operative evaluation.
- These skills are acquired by the candidates by working in parent and allied departments.

SPECIFIC SKILLS IN RESPIRATORY MEDICINE:

1. Skill to perform diagnostic tests.
 - Sputum examination with ZN stain, examination of the body fluids for AFB and malignant cells.
 - FNAC
 - Evaluation of diagnostic tests
 - Sleep lab and sleep clinic
 - Exercise testing
 - Respiratory muscle function tests
 - Pulmonary function test
 - BCG Vaccination
 - Montoux testing
2. Therapeutic Procedures;
 - Thoracocentesis
 - Tube Thoracostomy
 - Rehabilitation exercise
 - Postural drainage
 - Bronchoscopy aspiration and lavage
 - Plural biopsy
 - Critical care
 - Management issues and basic nursing and asepsis, cross infection and iatrogenic problems.
 - Life support system management
 - Principles of total parenteral (TPS) nutrition.

Apart from these skills, the candidate should possess skill for rapid diagnosis and decision making which is useful in outpatient department and as a part of inpatient management, he/she should have the following skills.

- Case sheet writing, clinical examination, diagnosis, investigation and managements.
- Presenting cases.
- Problem based approach towards day-to-day management
- Bedside diagnostic and therapeutic procedures
- Minor surgical procedures

- Rehabilitation.

SUGGESTED MINIMUM CONTENTS

1. AN ARCHITECTURE FOR PHYSIOLOGICAL FUNCTION

- Development ultrastructure and Anatomy of Respiratory Tract and Lungs.
- Embryology of lungs, heart, mediastinum and diaphragm.
- Development anomalies.
- Surgical and endoscopic and applied anatomy of chest and neck including lymphatic drainage.
- Radiographic anatomy (plain skiagram, CT, MRI, Ultrasound, etc.)

2. PHYSIOLOGICAL PRINCIPLES

- Control of ventilation and role of peripheral and central chemoreceptors & pulmonary mechanics.
- Ventilation, Pulmonary Blood Flow, Gas Exchange, Blood Gas Transport and assessment of pulmonary functions.
- Non-respiratory immunological and endocrine functions of lung.
- Principles of ECG & ECHO.
- Inhalation kinetics and its implication in aerosol therapy, sputum induction etc.
- Acid-base and electrolytic balance.
- Physiology of sleep and their disorders.
- Respiratory reflexes including Cough reflex, lung defence including respiratory surfactant.

3. INTEGRATIONS AND ADAPTATIONS

- Homeostasis and Adaptation to High Altitude, Diving and Oxygen Limitation.
- Regulation and Adaptation of Ventilation in Metabolic Acidosis and Alkalosis, Respiratory Acidosis and Alkalosis.

4. APPROACH TO THE PATIENT WITH RESPIRATORY SIGNS AND SYMPTOMS

- Basic signs and symptoms of lung diseases.
- Pathogenesis evaluation of dysnoea and abnormal breathing patterns.
- Pulmonary manifestations of systemic diseases.

5. DIAGNOSTIC PROCEDURES

- Tracheo Bronchial Secretion/Transbronchal Aspirations
- Endoscopy and Related Procedures (Bronchoscopy: Thoracoscopy, Mediastinoscopy etc)
- ECG, ECHO in Pulmonary Diseases
- Radiographic Evaluation of the Chest and Computer Tomography and MRI
- Gram's stain, Zeihl-Neelsen stain for AFB, Fluroscent Microscope fungus stain, Gomori stain for p.carinii, pap smear for neoplastic cells and yersinia Pestis (Plague).
- Immunological Tests including Mantoux.
- Polymerase chain reaction, D.N.A probe, Bactec tests.
- Thoracocentesis, biopsy, FNAC/FNAB.
- Bronchography, Angiography/Digital Subsutracted/Embolization.
- Spirometry/ABG/Diffusion studies.

6. IMMUNOLOGICAL DISORDERS

- Immune defences of the lung and Cellular Communication in Respiratory Immunity
- Sarcoidosis
- Hypersensitivity Pneumonitis and Pulmonary Manifestations of Collagen-Vascular Diseases
- Eosinophilic Pneumonias and Tropical eosinophilia.
- Granuloma like Wegener's, Churg Strauss etc.

7. INTERSTITIAL DISEASES

- Reactions of the Interstitial Space to Injury
- Pulmonary Fibrosis
- Occupational and Environmental Pulmonary Diseases

8. NON-INFECTIOUS DISORDERS OF THE PULMONARY PARENCHYMA

- Aspiration and inhalational (non-occupational) Disease of the Lung
- Pulmonary Edema
- Drug induced pulmonary diseases.

9. PULMONARY CIRCULATORY DISORDERS

- Pulmonary Hypertension and Cor Pulmonale
- Pulmonary Thromboembolic Disease
- Cardiac Problems in Pulmonary Patient and Pulmonary Diseases Produced by Cardiac Diseases
- Pulmonary Vasculitis

10. OBSTRUCTIVE DISEASES OF THE LUNGS

- Asthma: Epidemiology, General Features, Pathogenesis, Pathophysiology and Therapeutic modalities. Chronic Obstructive Pulmonary Diseases.
- Immunotherapy
- Long term Oxygen therapy
- Inhalation therapy
- Cystic Fibrosis
- Pulmonary Rehabilitation
- Acute Bronchiolitis and Bronchiolitis obliterans.
- Upper airway obstruction.
- Bronchiolitis Obliterans Organising Pneumonia (BOOP)

11. HYPOVENTILATION SYNDROMES AND SLEEP DISORDERS

- Disorders of Alveolar Ventilation
- Sleep Apnea Syndrome
- Obesity

12. NON-TUBERCULOUS INFECTIONS OF THE LUNGS: GENERAL ASPECTS

- Approach to Patient with Pulmonary Infections
- Nosocomial Pneumonias
- Systemic Infection and the Lungs

13. NON-TUBERCULOUS INFECTIONS OF THE LUNGS: SPECIFIC DISORDERS

- Pneumonias Caused by Gram-Positive Bacteria, Gram Negative Aerobic Organisms and Anaerobic Organisms and Anaerobic Infections of the Pleura
- Unusual Bacterial Pneumonias including viral or rickettsial
- Community-Acquired Pneumonia
- Bronchiectasis
- Atypical Pneumonias as Pneumonic Plague
- Fungal infections and Parasitic Infections of the Lungs
- Acquired Immunodeficiency Syndrome and Pneumonias in Immunocompromised Host including Fungal Infections.
- Principles Governing Use of Antibiotics in Pulmonary Infections
- Aspiration pneumonia
- Unresolved pneumonia
- Recurrent pneumonia

14. MYCOBACTERIAL DISEASES OF THE LUNGS

- Epidemiology, Microbiology and Prevention of Tuberculosis.
- Pathogenesis of Pulmonary Tuberculosis and clinical Manifestations and diagnosis of Mycobacterial Disease
- Diseases Caused by Mycobacteria Other than Mycobacterium Tuberculosis
- Treatment of Mycobacterial Diseases of the Lungs Caused by Mycobacterium Tuberculosis
- Revised National Tuberculosis Control Programme
- Treatment of pulmonary tuberculosis in hepatic, renal and endocrine disorders and in pregnancy.
- Multi Drug resistant tuberculosis.
- AIDS & tuberculosis.
- Chemoprophylaxes.

15. CANCER OF THE LUNGS

- Biology of the Lung Cancer: Small Cell and Non-small Cell
- Epidemiology, Pathology, Natural History and Clinical Picture of the Carcinoma of the Lung
- Diagnostic Approach to Pulmonary Nodules
- Small Cell Lung Cancer
- Medical Management and Surgical Treatment of Non-small Cell Lung Cancer and Paraneoplastic syndrome
- Radiation Therapy in the Management of the Carcinoma of the Lung
- Gene Therapy in Cancer Lung
- Benign and malignant Neoplasms of the Lung other than Bronchogenic Carcinoma, thymic and neuro fibromatous tumors. Neoplasms of the Pleura, Chest Wall, and Diaphragm
- Lymphoma and other RE cell malignancy.
- Dysproteinemia
- Prevention of Neoplasia

16. DISEASES OF THE MEDIASTINUM

- Non-neoplastic Disorders of the Mediastinum
- Primary Neoplasms and Cysts of the Mediastinum

17. DISORDERS OF THE PLEURA

- Pleural Dynamics and Effusions
- Nonneoplastic and Neoplastic Pleural Effusions
- Pneumothorax
- Pyothorax and Broncho-pleural fistula.
- Pleural thickening, fibrosis and calcification

18. ACUTE RESPIRATORY FAILURE

- Acute Respiratory Failure: Introduction and Overview
- Adult Respiratory Distress Syndrome: Clinical Features, Pathogenesis, Sequential Morphological Changes and Management
- Acute Respiratory Failure in the Patient with Obstructive Airways Disease
- Respiratory Muscles and Clinical Implications of Respiratory Muscle Fatigue
- Oxygen Therapy
- Respiratory and haemodynamic Monitoring in Acute Respiratory Failure
- Mechanical Ventilation
- Extracorporeal Membrane Oxygenation
- Principles of critical care.
- Nutrition of the lung.

19. SURGICAL ASPECTS OF CHEST MEDICINE

- Pre- and Post-Operative Evaluation and Management of Thoracic Surgical Patient
- Chest Trauma/Trauma related lung Dysfunction.
- Lung Transplantation

20. PRACTICAL ASSESMENT OF PULMONARY PERFORMANCE

- Pulmonary Function Test and its Interpretations in Determining the Disability
- Radionuclides in the Evaluation of Pulmonary Diseases
- Spirometry, compliance, resistance, lung volume, diffusions.
- Blood gas analysis
- Cardiopulmonary exercise testing
- Bronchoprovocation tests
- Pulmonary angiography

21. OCCUPATIONAL LUNG DISORDERS:

- Organic and inorganic dust exposure and their effects.
- Environmental dust measurements, radiation and lung, occupational asthma and occupational cancer.
- Compensation and prevention
- Acute disasters.

22. RESEARCH & CLINICAL EPIDEMIOLOGY:

- Methodology of research (controlled trial, project planning, survey etc.)
- Medical statistics
- National tuberculosis programme

23. MISCELLANEOUS:

- Effects and Hazards of smoking and passive smoking and its prevention in individual and community.
- Aerospace medicine
- Demonstration and use of equipments (Ventilator, Bronchoscope, Capnography, Pulse-oxymeter etc.)

24. AGEING LUNG:

Notes: Special problems of aged.

- All contents should include recent advances & relevance to National programme
- Clinical part includes Epidemiology aspect also.
- Social aspects respiratory medicine is an integral part of respiratory diseases & therefore to be included wherever necessary.

Paper-I: Basic sciences related to respiratory medicine

Paper-II: Tuberculosis including extra-pulmonary and epidemiology

Paper-III: Non tuberculosis respiratory diseases

Paper-IV: Recent advances in respiratory medicine including critical care, immunology and environmental pollution

Annexure I- Model question papers for MD (Tuberculosis and Respiratory Diseases)

Annexure III- List of Recommended Books and Journals for both MD and DTCD

ANNEXURE –I

MD DEGREE EXAMINATION TB and Respiratory Diseases

PAPER I – BASIC SCIENCES RELATED TO RESPIRATORY MEDICINE

Time: Three hours

Maximum : 100 marks

Attempt all question

Use illustration and flowcharts wherever necessary

Write short answers on:

(10 X 10 = 100)

1. Describe with diagrams the ultra structure of cilia in Respiratory Tract. What are the common development defects encountered? Describe ciliary dyskinetic diseases?
2. Adventitious lung sounds
3. Measurement of small airway function
4. Oncogenes and lung cancer
5. Antitussives
6. TH2 Cells
7. Tumor Necrosis Factor
8. Pulmonary vasodilators
9. Levofloxacin
10. Capnography

MD DEGREE EXAMINATION
TB and Respiratory Diseases

**PAPER II – TUBERCULOSIS INCLUDING EXTRAPULMONARY AND
EPIDEMIOLOGY**

Time: Three hour

Maximum: 100 marks

Attempt all question

Use illustration and flowcharts wherever necessary

1. Discuss the clinical features, diagnosis, complication and management of Tuberculous meningitis. (25 marks)
2. Describe the formation of Tuberculous cavity. What is its fate? Describe in detail the complications of tuberculosis in lung. (10 + 15 marks)
3. Write short notes on:
 - a) Electron microscopic structure of Mycobacteria.
 - b) Diagnosis of atypical mycobacterial infection?
 - c) Role of surgery in TB
 - d) Lupus vulgaris
 - e) MGIT

(10 marks each)

MD DEGREE EXAMINATION
TB and Respiratory Diseases

PAPER III – NON –TUBERCULOSIS RESPIRATORY DISEASES

Time: Three hour

Maximum: 100 marks

Attempt all question

Use illustration and flowcharts wherever necessary

1. What is the pathogenesis of Chronic Bronchitis and Emphysema? How will you treat? Acute Exacerbation of Chronic Bronchitis - What are the likely future medications for treating COPD? (8+12+5 marks)
2. a) What are the parasitic diseases of lung?
b) How will you treat for Pneumocystis carinii in an immunocompromised patient? (13 + 12 marks)
3. Write briefly about:
 - a) Fibrinolytic and irrigation therapy in empyema?
 - b) Friedlander's Pneumonia.
 - c) Hamman Rich Syndrome
 - d) Devise a management plan for Pulmonary Artery hypertension?
 - e) Complications of Mechanical Ventilation?

(10 marks each)

MD DEGREE EXAMINATION
TB and Respiratory Diseases

PAPER IV – RECENT ADVANCES IN RESPIRATORY MEDICINE INCLUDING
CRITICAL CARE, IMMUNOLOGY AND ENVIRONMENTAL POLLUTION

Time: Three hour

Maximum: 100 marks

Attempt all question

Use illustration and flowcharts wherever necessary

1. What are the neuromuscular diseases of chest? Elaborate on diagnosis and management? (10 + 15 marks)

2. Enumerate Pulmonary Complications in a patient infected with HIV? What are the findings of bronchoscopy in such a case? Discuss prognosis of the patient with and without antiretroviral therapy? (8+5+12 marks)

3. Explain briefly:
 - a) National Emphysema Treatment Trial
 - b) Thoracoscopy
 - c) Partial liquid ventilation
 - d) Diagnosis and management of avian flu
 - e) Relationship between smoking and ILD.

(10 marks each)

Annexure –III

BOOKS AND JOURNALS

BOOKS RECOMMENDED FOR MD and DTCD				
S no	Book	Author	Edition	Publisher
1	Tuberculosis	Rom and Gary	latest	-
2	Sleep Medicine	Teofilo Lee Chiong	latest	-
3	Principle of chest X ray diagnosis	George simon	latest	-
4	Textbook of pleural diseases	Richard w light and y c garry	latest	-
5	Clinical Mycology	Anaissie, M C Ginnis, P Faller	latest	-
6	Clinical assessment in respiratory care	Wilkins, Sheldon, Krider	Latest	-
7	Respiratory medicine	G John Gibson, Duncan	Latest	-
8	Auscultation skills – breath and heart sounds	Springhouse corporation	Latest	-
9	ICU Manual	A P Jain, Rajnish Joshi, Ashish Goel	Latest	-
10	Pleural diseases	Richard w light	Latest	-
11	Pulmonary rehabilitation	John e Hodgkin, Bartolome Celli, Gerilynm	Latest	-

12	Procedures in respiratory medicine	Warren m gold	Latest	-
13	Asthma_Its pathology and Treatment	Kalonier,Barnes,Persson	Latest	-
14	Diagnostic Bronchoscopy	Peter Stadling	latest	-

15	Dynamic bronchoscopy	m.a.dedkoc	Latest	-
16	Interpretation of Pulmonary function	R E Hyatt, P.D Scanlon	Latest	-
17	Respiratory diseases	Crofton and Douglass	Latest	-
18	Pulmonary function testing-principles and Practice	S.A. Conrod	Latest	-
19	Lung function for clinician	Hughes	Latest	-
20	Textbook of Preventive and Social Medicine	J.E.Park	Latest	-
21	Pharmacology and pharmaco therapeutics Vol I & 2	Satoskar and Bhandarkar	Latest	-
22	The mediastinum	Heitzman	Latest	-
23	Pulmonary diseases and disorders Vol 1 and 2	A P Fishman	Latest	-
24	Harrisons principles of Internal medicine	Braunwald	Latest	-
25	Surgery of the chest	Gibbson	Latest	-
26	Fundamentals of chest Roentgenology	Felson	Latest	-
27	Segmental Anatomy of lungs	Boyden	Latest	-
28	Alberts clinical respiratory medicine	Albert , spiro, Jeld	Latest	-
29	Imaging of diseases of the chest	David M. Hamsell	Latest	-
30	Synopsis of diseases of the chest	Fraser	Latest	-
31	Tuberculosis	Sharma & Mohan	Latest	-
32	Felson's Principle of chest Roentgenology	Goodman	Latest	-
33	Management of Mechanically ventilated patient	Pierce	Latest	-
34	Respiratory care of Anatomy and Physiology	Beachey	Latest	-

35	Macleods clinical Examinations	Douglas	Latest	-
36	Chamberlain's Symptom and sign in clinical medicine	Ogilvie	Latest	-
37	Tuberculosis Management	Toman	Latest	-
38	Computed Tomography and MRI of thorax	Naidich	Latest	-
39	Diagnosis of diseases of chest	FRASER	Latest	----
40	Imaging of diffuse lung diseases	Lynch	Latest	----
41	TB Handbook	WHO	Latest	---
42	Murray and Nadel textbook of respiratory medicine	Madon	Latest	---
43	Cardiovascular and pulmonary physical therapy	DELURK	Latest	---

LIST OF RECOMMENDED JOURNALS for MD and DTCD

- 1) American Journal of Respiratory and Critical Care Medicine
- 2) Chest
- 3) Indian Journal of Chest Diseases and Allied Sciences
- 4) Indian Journal of Tuberculosis
- 5) Lung India
- 6) Respiratory Medicine
- 7) Thorax
- 8) Tuberculosis

CLINICAL DISCIPLINES - M.S. (MASTER OF SURGERY)

GENERAL SURGERY

GOALS / OBJECTIVES

1. To practice surgery safely and effectively, backed by scientific knowledge and sound skills.
2. To have a keen interest in patient care and develop caring attitude.
3. To maintain high ethical standards.
4. To have sufficient understanding of basic sciences related to surgery to diagnose and manage majority of the surgical conditions clinically and with the help of relevant investigations through comprehensive training and experience necessary for independence practice.
5. To exhibit competence in the basic concepts of research methodology and teaching skills.

DURATION

The duration of the course will be 3 years to be followed by the “exit” or specialty examination in General Surgery

CLINICAL POSTINGS

1. Surgical Posting: Each postgraduate (PG) is posted in a surgical unit soon after joining the course
2. Rotations in Specialty Departments is done after the PG has spent six months in learning basic ward work and surgical skills in the surgical unit. This rotation includes a two month posting in Casualty. They may be posted in allied departments like pediatric surgery, urology, cardiothoracic surgery, plastic surgery, neurosurgery, oncology, radiology for a minimum period of four weeks.
3. ICU and anesthesia is for a period of one month.

TEACHING AND LEARNING ACTIVITIES

Most of the teaching is conducted within the unit by the consultants and senior residents of the respective unit. Various learning activities are Journal Club presentations, case presentations, ward rounds and teaching rounds. Seminars are held every week which are attended by the whole department. Each postgraduate presents about two to three seminars every year. Interdepartmental meetings are held weekly with the radiology and pathology department. Interesting cases are discussed in these meetings.

Clinico-pathological conference (CPC) is held every month and Clinical combined rounds and Clinical Grand rounds (CGR) are held weekly. All postgraduates should attend these. They are also encouraged to attend CME's, conferences.

All the activities should be entered in a log book which should be signed by the authorized teacher and head of the department

THESIS

All postgraduates are required to carry out a research project under the guidance of faculty of the department. They are encouraged to select the project of their choice. They must submit the protocol within four months of joining the MS degree course.

CONTENT OF TRAINING

General Objectives of Training

Trainees should develop:-

1. Clinical and operative competence in both emergency and elective general surgery. Additionally they require knowledge and some experience across a wide range of surgery to ensure appropriate referral.
2. The competence to be responsible for both the emergency admissions in general surgery and elective referrals.
3. Appropriate skills in:-
 - a) Basic Gastro-intestinal endoscopy
 - b) Endoscopic surgery
4. A knowledge of the basic sciences related to general surgery including relevant specialist applied anatomy.
5. The ability to teach medical students.
6. The ability to work as a member of a clinical team, bearing in mind the needs of the service and the hospital.
7. An understanding of the particular requirements of day case surgery.
8. Knowledge of palliative care.
9. Knowledge of subjects such as medical ethics, health economics, medico-legal matters, risk management, medical statistics, information technology, disaster management and health service management.
10. A knowledge and experience of clinical audit.
11. An understanding of research methods and review of articles published in the standard medical journals

Syllabus

The following pages comprise schedules of knowledge and operative skills, which provide a syllabus for training in general surgery and its sub-specialties. The knowledge required includes the basic science relevant to each topic. There is no intention to limit knowledge and operative experience. Trainees, as part of their general surgical training, must acquire competence in the scheduled operations but will also have experience of other procedures from the sub-specialty departments.

Knowledge: The Postgraduates are required to acquire sound knowledge of following topics. The list includes topics found in most standard surgical textbooks. The PG's should also be familiar with recent advances and current controversies.

1. **Applied Basic Sciences** include applied anatomy, physiology, biochemistry, microbiology and pathology.
2. **General Surgical Topics** include the following:
 - History of Surgery
 - Fluids and Electrolyte balance/ Acid – Base metabolism
 - Wound Healing and Wound Management
 - Pathophysiology and Management of Shock
 - Principles of Operative Surgery: Asepsis, Sterilization and Antiseptics
 - Surgical Infections and Antibiotics
 - Nutrition and Metabolism
 - Principles of Burn Management
 - Principles of Oncology
 - Principles of Laparoscopy and Endoscopy
 - Haemostasis, Blood Transfusion
 - Trauma: Assessment of polytrauma, triage, basic and advanced trauma
 - Basic Principles of Anaesthesia

- Informed Consent and Medicolegal Issues
- Organ Transplantation
- Molecular Biology and Genetics
- Hernias: Types of hernias, repair techniques
- Breast Diseases: Benign breast disorders, investigations, screening, genetics, Breast Cancer
- Thyroid Disorders: Solitary nodule, investigations, multinodular goitre, Graves disease, malignancies

PERI-OPERATIVE MANAGEMENT 1

Pre-operative Management

- Assessment of fitness for anaesthesia and surgery.
- Tests of respiratory, cardiac and renal function.
- Management of associated medical conditions, eg: diabetes; respiratory disease;
- Cardiovascular disease; malnutrition; anaemia; steroid, anticoagulant,
- Immunosuppressant and other drug therapy.

Infection

- Pathophysiology of the body's response to infection.
- The sources of surgical infection - prevention and control.
- Surgically important micro-organisms.
- Principles of asepsis and antisepsis.
- Surgical sepsis and its prevention.
- Aseptic techniques.
- Skin preparation.
- Antibiotic prophylaxis.
- Sterilisation.

Investigative and Operative Procedures

- Excision of cysts and benign tumours of skin and subcutaneous tissue.
- Principles of techniques of biopsy.
- Suture and ligature materials.
- Drainage of superficial abscesses.
- Basic principles of anastomosis.

Anaesthesia

- Principles of anaesthesia.
- Pre-medication and sedation.
- Local and regional anaesthesia.
- Care and monitoring of the anaesthetised patient.

Theatre Problems

- Surgical technique and technology.
- Diathermy - principles and precautions.
- Lasers - principles and precautions.
- Explosion hazards relating to general anaesthesia and endoscopic surgery.
- Tourniquets - uses and precautions.
- Prevention of nerve and other injuries in the anaesthetised patient.
- Surgery in hepatitis and HIV carriers (special precautions).
- Disorders of coagulation and haemostasis (prophylaxis of thromboembolic disease).

PERI-OPERATIVE MANAGEMENT 2

Skin and Wounds

- Pathophysiology of wound healing.
- Classification of surgical wounds.
- Principles of wound healing.
- Incisions and their closure.
- Suture and ligature materials.
- Scars and contracture.

- Wound dehiscence.
- Dressings.

Fluid Balance

- Assessment and maintenance of fluid and electrolyte balance.
- Techniques of venous access.

Course and Curriculum of M S Surgery 305

- Nutritional support - indications, techniques, total parenteral nutrition.

Blood

- Disorders of coagulation and haemostasis.
- Blood transfusion - indications, hazards, complications, plasma substitutes.
- Haemolytic disorders of surgical importance.
- Haemorrhagic disorders; disorders of coagulation.

Post-operative Complications

- Post-operative complications - prevention, monitoring, recognition, management.
- Ventilatory support - indications.

Post-operative Sequelae

- Pain control.
- Immune response to trauma, infections and tissue transplantation.
- Pathophysiology of the body's response to trauma.
- Surgery in the immuno-compromised patient.

TRAUMA

Initial Assessment and Resuscitation after Trauma

- Clinical assessment of the injured patient.
- Maintenance of airway and ventilation.
- Haemorrhage and shock.

Chest, Abdomen and Pelvis

- Cardiorespiratory physiology as applied to trauma.
- Penetrating chest injuries and pneumothorax.
- Rib fractures and flail chest.
- Abdominal and pelvic injuries.

Central Nervous System Trauma

- Central nervous system: anatomy and physiology relevant to clinical examination of the central nervous system; understanding of its functional disorders particularly those caused by cranial or spinal trauma; and interpretation of special investigations.
- Intracranial haemorrhage.
- Head injuries, general principles of management.
- Surgical aspects of meningitis.
- Spinal cord injury and compression.
- Paraplegia and quadriplegia - principles of management.

Special Problems

- Pre-hospital care.
- Triage.
- Trauma scoring systems.
- Traumatic wounds - principles of management.
- Gunshot and blast wounds.
- Skin loss - grafts and flaps.
- Burns.
- Facial and orbital injuries.

Principles of Limb Injury

- Peripheral nervous system - anatomy and physiology.
- Fractures - pathophysiology of fracture healing.
- Non-union, delayed union, complications.
- Principles of bone grafting.

- Traumatic oedema, compartment and crush syndromes, fat embolism.
- Brachial plexus injury.

INTENSIVE CARE

Cardiovascular

- The surgical anatomy and applied physiology of the heart relevant to clinical cases.
- Physiology and pharmacological control of cardiac output, blood flow, blood pressure, and coronary circulation.
- Cardiac arrest, resuscitation.
- Monitoring of cardiac function in the critically ill patient, central venous pressure, pulmonary wedge pressure, tamponade, cardiac O/P measurements.
- The interpretation of special investigations.
- The management of haemorrhage and shock.
- Pulmonary oedema.
- Cardiopulmonary bypass - general principles, cardiac support.

Respiratory

- The surgical anatomy of the airways, chest wall, diaphragm and thoracic viscera.
- The mechanics and control of respiration.
- The interpretation of special investigations; lung function tests, arterial blood gases, radiology.
- The understanding of disorders of respiratory function caused by trauma, acute surgical illness and surgical intervention.
- Respiratory failure.
- Complications of thoracic operations.
- Adult respiratory distress syndrome.
- Endotracheal intubation, laryngotomy, tracheostomy.
- Artificial ventilation.

Multisystem Failure

- Multisystem failure.
- Renal failure - diagnosis of renal failure, complications of renal failure.
- GI tract and hepatic failure.
- Nutrition.

Problems in Intensive Care

- Sepsis, predisposing factors, organisms causing septicaemia.
- Complications of thoracic operations.
- Localised sepsis, pneumonia, lung abscess, bronchiectasis, empyema, mediastinitis.

Principles of ICU

- Indications for admission.
- Organisation and staffing.
- Scoring.
- Costs.

NEOPLASIA: TECHNIQUES AND OUTCOME OF SURGERY

Principles of Oncology

- Epidemiology of common neoplasms and tumour-like conditions; role of cancer registries.
- Clinico-pathological staging of cancer.
- Pathology, clinical features, diagnosis and principles of management of common cancers in each of the surgical specialties.
- Principles of cancer treatment by surgery, radiotherapy, chemotherapy, immunotherapy and hormone therapy.
- The principles of carcinogenesis and the pathogenesis of cancer relevant to the clinical features, special investigations, staging and the principles of treatment of the common cancers.

- Principles of molecular biology of cancer, carcinogenesis; genetic factors; mechanisms of metastasis.

Cancer Screening and Treatment

- The surgical anatomy and applied physiology of the breast relevant to clinical examinations, the interpretation of special investigations, the understanding of disordered function and the principles of the surgical treatment of common disorders of the breast.
- The breast: acute infections; benign breast disorders; nipple discharge; mastalgia. Carcinoma of breast; mammography; investigation and treatment.
- Screening programmes.

Techniques of Management

- Terminal care of cancer patients; pain relief.
- Rehabilitation.
- Psychological effects of surgery and bereavement.

Ethics and the Law

- Medical/legal ethics and medico-legal aspects of surgery.
- Communication with patients, relatives and colleagues.

Outcome of Surgery

- The evaluation of surgery and general topics.
- Decision-making in surgery.
- Clinical audit.
- Statistics and computing in surgery.
- Principles of research and design and analysis of clinical trials.
- Critical evaluation of innovations - technical and pharmaceutical.
- Health service management and economic aspects of surgical care.

LOCOMOTOR SYSTEM

Musculo-skeletal anatomy and physiology relevant to clinical examination of the locomotor system and to the understanding of disordered locomotor function, with emphasis on the effects of acute musculoskeletal trauma.

Effects of Trauma and Lower Limb

- Effects of acute musculo-skeletal trauma.
- Common fractures and joint injuries.
- Degenerative and rheumatoid arthritis (including principles of joint replacement).
- Common disorders of the lower limb.
- Amputations and prosthesis.

Infections and Upper Limb

- Common soft tissue injuries and disorders.
- Infections of bones and joints (including implants and prostheses).
- Pain in the neck, shoulder and arm.
- Common disorders of the hand, including hand injuries and infections.

Bone Disease and Spine

- Common disorders of infancy and childhood.
- Low back pain and sciatica.
- Metabolic bone disease (osteoporosis, osteomalacia).
- Surgical aspects of paralytic disorders and nerve injuries.

VASCULAR

The surgical anatomy and applied physiology of blood vessels relevant to clinical examination, the interpretation of special investigations and the understanding of the role of surgery in the management of cardiovascular disease

Arterial Diseases

- Chronic obliterative arterial disease.
- Amputations.

- Aneurysms.
- Carotid disease.
- Special techniques used in the investigation of vascular disease.
- Limb ischaemia: acute and chronic; clinical features; gangrene; amputations for vascular disease.
- Principles of reconstructive arterial surgery.
- Atherosclerosis
- Principles of Angioplasty/stenting
- Thrombolysis
- Reno-vascular disease
- Raynaud's/vasospastic disorders
- Lymphoedema
- Cerebrovascular disease
- Vasculitis
- Mesenteric ischaemia
- Graft prosthetics
- Graft surveillance
- Autonomic dysfunction
- Reperfusion injury
- Ischaemic limb Arterial trauma
- Hyper/hypo coagulable state
- Arteriography
- Continuous wave doppler
- Duplex ultrasound

Venous Diseases

- Vascular trauma and peripheral veins.
- Varicose veins.
- Venous hypertension, post-phlebitic leg, venous ulceration.
- Disorders of the veins in the lower limb.
- Deep venous thrombosis and its complications.
- Chronic ulceration of the leg.
- Thrombosis and embolism.

Lymphatics and Spleen

- Thromboembolic disease.
- Spleen; role of splenectomy; hypersplenism.
- Lymph nodes; lymphoedema.
- Surgical aspects of auto-immune disease.
- The anatomy and physiology of the haemopoietic and lymphoreticular systems.
- Surgical aspects of disordered haemopoiesis.

HEAD, NECK and ENDOCRINE

The surgical anatomy and applied physiology of the head and neck relevant to clinical examination, the interpretation of special investigations, the understanding of disorders of function, and the treatment of disease and injury involving the head and neck.

The Head

- Laryngeal disease; maintenance of airway; tracheostomy.
- Acute and chronic inflammatory disorders of the ear, nose, sinuses and throat.
- Intracranial complications.
- Foreign bodies in ear, nose and throat.
- Epistaxis.
- Salivary gland disease.
- The eye - trauma, common infections.

Neck and Endocrine Glands

The surgical anatomy and applied physiology of the endocrine glands relevant to clinical examination, the interpretation of special investigations, the understanding of disordered function and the principles of the surgical treatment of common disorders of the endocrine glands.

- Common neck swellings.
- Thyroid: role of surgery in diseases of the thyroid; complications of thyroidectomy; and the solitary thyroid nodule.
- Parathyroid; hyperparathyroidism; hypercalcaemia.
- Secondary hypertension.
- Pituitary
- Adrenal cortex
- Adrenal medulla
- Gut as endocrine organ
- Endocrine pancreas and the management of:-
- Thyrotoxicosis
- Adrenal insufficiency
- Hyper/hypo thyroidism
- Carcinoid syndrome
- Counselling and screening in familial disease
- Anaesthetic and pharma-cological problems
- Radio-immuno assays
- Imaging techniques
- Histo/cyto pathology

Paediatric Surgical Disorders

- Neonatal physiology: the special problems of anaesthesia and surgery in the newborn; and the principles of neonatal fluid and electrolyte balance.
- Correctable congenital abnormalities.
- Common paediatric surgical disorders: cleft lip and palate; pyloric stenosis; intussusception; hernia; maldescent of testis; torsion; and diseases of the foreskin.
- RIF pain
- Testicular pain
- Paediatric trauma
- Burns
- Intussusception
- Pyloric stenosis
- Hirschprung's disease
- Ano-rectal anomalies
- Tracheo-oesophageal fistula
- Spina bifida
- Congenital small bowel obstruction
- Intestinal malrotation
- Associated anomalies
- Paediatric oncology
- Management of less complex abdominal trauma
- Hydrocephalus

ABDOMEN

The surgical anatomy of the abdomen and its viscera and the applied physiology of the alimentary system relevant to clinical examination, the interpretation of common special investigations, the understanding of disorders of function, and the treatment of abdominal disease and injury.

Abdominal Wall

- Anatomy of the groin, groin and other ventral hernias, acute and elective; clinical features of hernias; complications of hernias.
- Anterior abdominal wall, anatomy, incisions, laparoscopic access.

Acute Abdominal Conditions

- Peritonitis; intra-abdominal abscesses.
- Common acute abdominal emergencies.
- Intestinal obstruction; paralytic ileus.
- Intestinal fistulae.
- Investigation of abdominal pain.
- Investigation of abdominal masses.
- Gynaecological causes of acute abdominal pain.
- Pelvic inflammatory disease.
- Assessment of the acute abdomen
- Appendicitis and right iliac fossa pain
- Peritonitis
- Acute intestinal obstruction
- Intestinal pseudo-obstruction
- Biliary tract emergencies
- Acute pancreatitis
- Strangulated hernia
- Intestinal ischaemia
- Swallowed foreign bodies
- Gastrointestinal bleeding
- Toxic megacolon
- Superficial sepsis and abscesses
- Acute ano-rectal sepsis
- Ruptured aortic aneurysm
- Acute presentations of urological disease
- Acute presentations of gynaecological disease

Abdominal injury

- Assessment of the multiply injured patient
- Triage (major accidents)
- Battle triage and Field hospitals
- Initial management of head injuries.
- Closed abdominal injuries, especially splenic, hepatic and pancreatic injuries
- Closed chest injuries
- Stab and gunshot wounds
- Arterial injuries
- Injuries of the urinary tract
- Initial management of head injuries and interpretation of CT scans
- Initial management of severe burns

SMALL BOWEL AND COLORECTAL DISORDERS

- Neoplasms of large bowel
- Inflammatory bowel disease (inc. medical management)
- Diverticular disease
- Irritable bowel syndrome
- Haemorrhoids
- Anal fissure
- Rectal prolapse
- Acute appendicitis/RIF pain
- Intestinal obstruction
- Intestinal pseudo-obstruction

- Intestinal ischaemia
 - Peritonitis
 - Large bowel and rectal injuries
 - Anal tumours
 - Pelvic autonomic nerves
 - Screening for colorectal cancer
 - Genetics of colorectal cancer
 - Place of radiotherapy and chemotherapy in treatment
 - Anorectal physiology
 - Anorectal ultrasound
 - Faecal incontinence
 - Chronic constipation
 - Intestinal fistulae
 - Colonic bleeding
 - Radiation enterocolitis
 - Other small bowel conditions
 - Colonic obstruction
 - Colonic perforation
- The use of staplers

LAPAROSCOPIC SURGERY

- Laparoscopic anatomy of the abdomen
- Diagnostic laparoscopy
- Physiology of pneumo-peritoneum Dangers of pneumoperitoneum
- Principles of diathermy
- Informed consent for laparo-scopic procedures
- Pre and post operative management of laparoscopic cases
- Port complications
- Technology of video imaging, cameras, insufflator etc.
- The methods of manipulation of images
- Laparoscopic instruments, clips, staplers and port types
- Management of equipment failure
- Ultrasound interpretation, internal and external techniques
- Recognition and management of laparoscopic complications
- Use and dangers of diathermy
- Anaesthetic problems in laparoscopic surgery
- Medico-legal implications of video-endoscopic surgery
- Theory and practice of choledochoscopy
- Theory of different forms of diathermy
- Laparoscopic ultrasound
- Advanced instrumentation and equipment
- Endoscopic suturing devices
- Theory, uses and dangers of lasers and other energy sources e.g. harmonic scalpel
- Creation and maintenance of new endoscopic spaces
- Use of assistance robots and robotic instruments

TRANSPLANTATION with special reference to RENAL AND HEPATIC DISEASE

- Pathology of renal and hepatic disease
- Patho-physiology of renal and hepatic failure
- Peritoneal- and haemo-dialysis
- Management of fluid and electrolyte disorders
- Selection of patients for transplantation

- Post-operative management
- Immuno-pathology of rejection
- Management of rejection
- Immunosuppression
- Opportunist infections
- Immunosuppression and cancer
- Transmission of viral and fungal diseases
- Tissue typing
- The HLA system
- Bladder dysfunction

HEPATOPANCREATOBILIARY SURGERY

- Gallstones and complications
- Biliary stricture
- Obstructive Jaundice
- Neoplasms of the Liver, Biliary Tract and Pancreas
- Pancreatitis, acute and chronic, complications
- Liver injuries
- Portal Hypertension
- Hydatid disease
- ESRD and Liver transplantation

UPPER GI TRACT

- Neoplasms of the upper GI tract
- Management of perforations of the upper GI tract
- Management of intestinal obstruction
- Management of GI bleeding
- Oesophageal motility disorders
- Oesophageal Strictures
- Gastro-oesophageal reflux and its complications
- Peptic ulceration and its complications
- Radiation enteritis
- Abdominal trauma
- Principles of screening for cancer
- The use and limitations of multimodality treatment for upper GI cancer
- Oesophageal motility disorders
- Other small bowel conditions
- Principles of Small bowel resection
- Sutured and stapled anastomoses
- Urinary Tract
- Urinary tract infection.
- Urinary Tract Obstruction
- Haematuria.
- Trauma to the urinary tract.
- Urinary calculi.
- Retention of urine.
- Urinary tract Neoplasms
- Disorders of prostate.
- Pain and swelling in the scrotum.
- Other Scrotal Lesions
- Testicular Neoplasms

NEUROSURGERY

- Cranial, spinal and peripheral nerve tumours
- Head Injury
- Spinal and peripheral nerve injuries
- Hydrocephalus
- Cerebrovascular Accidents
- Infections
- Recent advances

Cardiac and Thoracic Surgery

- Myocardial revascularisation
- Valvular Disorders
- Peripheral vascular disease
- Renovascular disease
- Secondary Hypertension
- Inflammatory Lung Disease
- Chest Wall lesions
- Thoracic Neoplastic Disease
- Chest Trauma
- Pleural Diseases

Orthopaedics

- Principles of Orthopaedic Trauma
- Casts and braces
- Nerve injuries
- Hand Infections
- Principles of Traction
- Amputations
- Principles of Rehabilitation
- Congenital Lesions
- Bone and Joint Infections

SKILLS

Objectives

1. To provide a comprehensive and structured training programme in general surgery and to enable trainees to achieve the training and experience necessary for independent practice.
2. The PG should be able to take proper history, conduct physical examination, perform or request for relevant investigations. He should be able to interpret these investigations to arrive at a working diagnosis.
3. Communicate with patient. Discuss operative plan, possible management options, postoperative complications etc and be able to take informed consent
4. Perform minor operative procedures and common major general surgical operations independently
5. Evaluate and manage trauma and acute surgical emergencies.
6. Undertake Critical care
7. Undertake wound management

Basic Ward Procedures

- Insertion of intravenous cannula, Nasogastric tube, urinary catheters
- Removal of Tubes and Drains
- Abdominal Paracentesis, Pleural Tap
- Venous Cutdown
- Wound dressings

ICU Procedures

- Insertion of CVP line, arterial lines, endotracheal intubation
- Intercostal Drainage
- Tracheostomy
- Knowledge of Ventilators and Monitors
- Prescribing TPN

Minor Surgical Procedures

- Hydrocele surgery, Lymph node biopsy, Excision of superficial swellings, Ingrowing toe nail, Circumcision, Banding of Haemorrhoids, Vasectomy

Emergency Room Procedures

- Diagnostic peritoneal lavage (DPL)
- Suturing of lacerations
- Drainage of abscesses
- Wound Debridement
- Reduction and Plaster application of simple fractures and dislocations
- Anal Dilatation and Sphincterotomy
- Preoperative Workup and Postoperative Care

Major Operative Procedures

A) Perform Independently/ Assistance:

The following list is not exhaustive. The Trainee should try to get the maximal operative exposure possible. The range of exposure will also depend upon the type of surgeries a particular unit (where the Trainee is posted) is performing.

Routine: Open and laparoscopic Cholecystectomy, Groin Hernia Repair, Mastectomy, Breast Lump Excision, microdochectomy, Radical Duct Excision, Hemithyroidectomy, Laparotomy, Diagnostic laparoscopy, Thoracotomy, Cystogastrostomy, Suprapubic cystostomy, Hemicolectomy, Cysts and Sinuses of the Neck, Gastrostomy and feeding jejunostomy, Nephrectomy, Pyelolithotomy, Ureterolithotomy, Orchidopexy, Skin grafting, Varicose vein surgery, vein harvesting, Lumbar Sympathectomy, Small bowel resection, Femoral herniorrhaphy, Umbilical and para umbilical hernia repair, Incisional and parastomal hernia repair.

Emergency: Appendectomy, Laparotomy for intestinal Obstruction, Trauma Laparotomy, Splenectomy, Closure of Peptic Ulcer Perforation, Enteric Perforation, Resection-Anastomosis of bowel, Colostomy, Hemicolectomy, Amputations, Embolectomy, Tracheostomy, Obstructed Inguinal Hernia.

B) Assist/Observe

Vascular

- Reconstructive arterial surgery.
- Aneurysm Surgery

HEAD, NECK, ENDOCRINE AND PAEDIATRIC

The Head

- Parotidectomy, submandibular gland excision

Neck and Endocrine Glands

- Thyroidectomy, parathyroidectomy, congenital or developmental problems
- Adrenalectomy
- Surgery for endocrine pancreatic tumours

Paediatric Disorders

- Common paediatric surgical disorders: cleft lip and palate; pyloric stenosis; intussusception; hernia; maldescent of testis; torsion; and diseases of the foreskin.

ABDOMEN

- Sub-total colectomy
- Diagnostic laparoscopy
- Gastrectomy for bleeding
- Endoscopy for upper GI obstruction
- Laparotomy for perforated colon
- Suture of bleeding peptic ulcer
- Emergency cholecystectomy
- Exploration of scrotum for torsion
- Emergency hernia repair
- Laparotomy for abdominal
- Reduction of paraphimosis
- Laparotomy for small bowel injury
- Diagnostic peritoneal lavage
- Intestinal obstruction
- Splenic repair
- Hartmann's operation
- Operation for ruptured liver
- Pancreatic debridement
- Median sternotomy

Reconstructive Surgery

- Myocutaneous flaps
- Tissue expanders
- Breast reduction

Colorectal

- Therapeutic Endoscopy, colonoscopy
- Anterior resection of rectum
- AP resection of rectum
- Ileorectal anastomosis
- Panproctocolectomy
- Closure of Hartmann's
- Prolapse surgery
- Incontinence surgery
- Sphincter repair
- Recto-vaginal fistula
- Ileo-anal and colonic pouch
- Colo-anal anastomosis
- Operation for intestinal fistula
- Complex fistula-in-ano
- Posterior approach to rectum
- Block dissection of groin
- Operative cholangiography
- Laparoscopic suturing and knotting
- Nephrectomy
- Pyelo and ureterolithotomy
- Pyeloplasty
- Open prostatectomy

Laparotomy for acute abdomen

- Splenectomy
- Oesophageal dilatation
- Operations for upper GI bleeding
- Exploration of common bile duct
- Biliary bypass
- Formation of Roux-en-Y loop
- Oesophagectomy/total gastrectomy
- Pancreatectomy
- Liver resection
- Oesophagectomy
- Total and subtotal
- Gastrectomy
- Heller's myotomy
- Long oesophageal myotomy
- Pharyngeal pouch
- Repair of biliary stricture
- Whipple's procedure
- Pancreatectomy (distal and total)
- Drainage of infected pancreatitis
- Drainage of pancreatic pseudo-cyst
- Liver injuries
- Hydatid disease
- Porto-systemic shunt
- Vascular suture/anastomosis
- Control of venous bleeding
- Balloon thrombo-embolectomy
- Fasciotomy
- Arterial injuries
- Vascular access for dialysis

Evaluation

An examination will be held at the end of three years consisting of three parts, theory, clinical and oral.

Theory

Paper 1: Basic Sciences as applied to general surgery

Paper 2: General Surgery including breast and gastroenterology

Paper 3: Surgery including sub specialities

Paper 4: Surgery including traumatology and recent advances

A minimum of fifty percent of marks aggregate and a minimum of forty percent per section will be required for a pass.

Paper 1: Basic Sciences as applied to general surgery.

This will consist of ten short essay questions each carrying ten marks. There will be three questions in anatomy, three in pathology and one short essay question each in pharmacology, physiology, biochemistry and microbiology.

Paper 2: General Surgery including breast and gastroenterology.

This will cover general surgery, breast and gastroenterology. There will be one long question carrying thirty marks followed by seven short essay questions ten marks each.

Paper 3: Surgery including sub specialities.

This will cover general surgery, endocrinology and other specialities such as pediatric surgery, urology, CTVS, neurosurgery etc. The questions will be those that are relevant to the general surgeon in day to day practice. In depth knowledge of the specialities such as cardiothoracic and neurosurgery will not be required. The format will be the same as paper 2.

Paper 4: Surgery including traumatology and recent advances

This will cover surgery including trauma and recent advances. The format will be the same as paper 2 and 3.

Clinical Examination

There will be four examiners for clinical examination, all of whom will sit together to examine the candidate. There will be **one long case and three short cases.**

A minimum of fifty percent marks exclusive in clinics would be required for a pass.

Not more than five candidates should be examined per day.

Viva voce

There will be four examiners for clinical examination, all of whom will sit together to examine the candidate. The areas covered would be

1. Defence of dissertation
2. Gross pathology
3. Imaging
4. Instruments and operative surgery
5. General viva

RECOMMENDED BOOKS

1. Schwartz : Surgery
2. Sabiston's Text book of Surgery
3. Maingot Abdominal Operations
4. Bailey & Love's Short Practice of Surgery
5. Farquharsons Textbook of Operative Surgery
6. Mastery of Surgery
7. Recent advances in Surgery
8. Greenwood surgery
9. Jamison text book of Surgical Physiology
10. Washington surgical Manual

RECOMMENDED JOURNALS

1. British Journal of Surgery
2. Archives of Surgery
3. Annals of Surgery
4. Journal of Trauma
5. Indian Journal of Surgery
6. A.N.Z Journal of Surgery
7. World Journal of Surgery
8. Surgical clinics of North America
9. Surgery
10. Americal Journal of Surgery

MODEL QUESTION PAPER

SURGERY

PAPER-I : Basic Sciences

Write short notes on

(10 X 10 marks)

1. Lymphatic drainage of the breast and its application in sentinel node biopsy for breast cancer.
2. Blood supply of the colon and rectum and their role in resections of the colon
3. Anatomical basis of myocutaneous flaps
4. The Pathology of salivary gland tumors and principles of surgical management
5. FNAC and its value in surgical pathology
6. Types of cirrhosis liver and its relevance to aetiology of Portal hypertension.
7. Physiology of intestinal motility and its role in postoperative care in abdominal operations
8. Hypercalcemia and its role in bone metabolism
9. Pharmacology Drugs used in treatment of peptic ulcer disease
10. Nosocomial infection and its control

SURGERY

PAPER-II (General Surgery)

1. How will you manage a case of 30 year old alcoholic brought with a history of hematemesis? (25 marks)
2. How will you investigate and manage a 40 year old premenopausal woman presenting with a painless lump in her right breast (25marks)
3. Write short notes on (5 x 10 = 50 marks)
 - a. Pseudocyst of pancreas
 - b. TIPS
 - c. Colonic polyps
 - d. Choledochal cyst
 - e. Ileocecal tuberculosis

SURGERY

PAPER-III (General surgery including specialities)

1. A 25 year old female presenting with prominent eyes and neck swelling of one month duration. How will you investigate and manage this patient? (25 marks)
2. A 40 year old cook from a hotel presents with history of a non healing ulcer of the leg. How will you manage this patient? (25 marks)
3. Write short notes on (5 x 10 = 50 marks)
 - a. Hirschsprung Disease
 - b. Torsion testis
 - c. Extradural hemorrhage
 - d. Myocutaneous flaps
 - e. Thoracic outlet syndrome

SURGERY

PAPER-IV (General Surgery including traumatology and recent advances)

1. A motor vehicle driver involved in a road traffic accident is brought to casualty in shock with complaints of abdominal pain. How will you manage him? (25 marks)
2. Describe segmental anatomy of liver and the current concepts in liver transplantation (25 marks)
3. Short notes on (5 x 10 = 50 marks)
 - a. Flail Chest
 - b. Radiofrequency ablation
 - c. Endovascular surgery
 - d. Trans rectal Ultrasound
 - e. Robotic Surgery

OBSTETRICS & GYNAECOLOGY

- I. Departmental Objectives
- II. Contents
- III. Recommended Reading
- IV. Evaluation

INTRODUCTION

By the end of a 3 years Postgraduate course, the resident will be expected to work as a consultant in the speciality of Obstetrics & Gynaecology. This will require thorough knowledge of the fundamentals. He/she should be reasonably acquainted with the recent advances and operative procedures. He/She should be able to make decisions regarding patient management and adopt favourable ethical attitudes. During this period he/she will also acquire skills needed for education of undergraduate students and planning of research projects.

I DEPARTMENTAL OBJECTIVES

A Postgraduate resident should be able to achieve objectives in the following domains:-

A. COGNITIVE DOMAIN

1. Learn the basics of the subjects of Obstetrics and Gynaecology, covering all conditions likely to be met in obstetric practice in our country.
2. Provide effective prenatal care depending on the clinical condition of the mother, including nutrition, immunization and risk assessment.
3. Learn in greater detail about common problems like hypertension complicating pregnancy, intrauterine growth restriction, cephalo pelvic disproportion, obstructed labour and puerperal sepsis.
4. Appreciate the indications and methods of induction of labour
5. Acquire thorough knowledge of gynaecologic conditions of public health importance such as cancer cervix and other gynaecologic diseases likely to affect pregnancy.
6. Gain knowledge of other branches of medicine which are relevant to Obstetrics and Gynaecology with special stress on Diabetes mellitus, Hypertension, Cardiac Disease, Anaemia, Lower urinary tract disorders and Medical and surgical causes of acute abdomen.
7. Aware of medico-legal aspects of practice of Obstetrics and Gynaecology.
8. Able to diagnose and manage normal pregnancy, labour and puerperium and recognize any departure from normal in the above.
9. Able to competently manage cases of abortion, spontaneous and induced including ectopic gestation and gestational trophoblastic diseases.
10. Diagnose and manage preterm labour and assess the fetal well being, maturity and birth weight and to use that information in deciding the obstetric management.
11. Develop decision making skills by utilizing the clinical and laboratory data.

12. Able to diagnose and manage acute abdomen, haemorrhage in obstetrics & Gynaecology and other emergencies i.e eclampsia.
13. Able to medically treat common gynaecologic diseases specially using
 - i) Antibiotics
 - ii) Hormone therapy including contraception
 - iii) Ovulation inducing agents
 - iv) Antineoplastic drugs
14. Understand the need for common obstetric operative interventions i.e episiotomy, forceps, ventouse, caesarean section, dilatation and evacuation etc.
15. Understand the importance of population control,contraception and different methods of contraception
16. Understand the physiology of menstruation and manage common menstrual abnormalities
17. Identify common adolescent and paediatric gynaecological problems and their management
18. Learn common causes of infertility and their management and assisted reproductive techniques
19. Acquire knowledge about common gynaecological problems like leucorrhoea, sexually transmitted infections, displacements, fibroid, endometriosis etc
20. Learn about screening and diagnosis of gynaecological malignancies including that of breast
21. Acquaint oneself with common gynaecological operative procedures
22. Learn the proper method of handling data and presenting statistics in a scientific and orderly fashion in seminars, symposia and papers.
23. Utilise journals and reference works effectively.

B. AFFECTIVE DOMAIN

1. Appreciate the fact that women and children are especially a vulnerable group as regards health problems.
2. Appreciate particularly the problem of patients of advanced and terminal disease and to develop a sympathetic attitude to them and their relatives.
3. Understand the psychological aspects of gynaecologic diseases in general and infertility and unwanted pregnancy in particular.
4. Develop the ability to view the patient's condition in a wider social perspective and to adjust therapy to suit her social and financial reality.
5. Understand the importance of good medical care in preventing most of the morbidity and mortality in obstetrics and gynaecology.
6. Develop skills to communicate with patients and their relatives and to elicit a thorough history and explain regarding investigations & management
7. Understand that obstetrics and gynaecology forms a hotbed for ethical issues and follow necessary precautions needed for an ethical practice

C. PSYCHOMOTOR DOMAIN

1. Able to **select** cases for the following obstetric procedures and able to perform them independently and confidently: -
 - i) Lower segment caesarean section including cases of obstructed labour and malpresentations.

- ii) Outlet and low forceps delivery
- iii) Vacuum extraction
- iv) Assisted Breech Delivery
- v) External cephalic/ internal podalic version.
- vi) Manual removal of placenta and exploration of uterine cavity
- vii) Management of atonic and traumatic Post Partum Haemorrhage

2. Able to **perform** safe and effective Medical termination of Pregnancy upto 20 weeks of gestation using the methods of

- i) Suction Evacuation / MVA
- ii) Dilation and Evacuation
- iii) Extra amniotic instillations & other newer methods like medical abortion

3. Able to **perform** the following gynaecological surgical procedures:-

- i) D & C / FC, Menstrual Regulation
- ii) Polypectomy
- iii) Minilap tubectomy
- iv) Vaginal Hysterectomy with pelvic floor repair
- v) Abdominal Hysterectomy for 'Straight-forward' cases
- vi) Salpingectomy for ectopic pregnancy ; Salpingo-ovariotomy,
- vii) Amputation of Cx/Manchester repair/Conisation

4. Able to competently **assist** in the following:

- i) Gynaecological Oncology surgery
- ii) Gynaecological-urological surgery
- iii) Tubal microsurgery
- iv) Caesarean Hysterectomy
- v) Hysterectomy in 'difficult cases'
- vi) Minilap tubectomy, laparoscopic sterilization
- vii) Diagnostic Laparoscopy
- viii) Colpocentesis/colpotomy, laparotomy for septic abortion
- ix) Cervical encerclage

5. Able to **manage** the post-operative and intra-operative complications.

6. Able to **assist/perform** the following investigations:-

- i) Obstetric Ultrasonography for - pregnancy diagnosis
 - pregnancy dating
 - Early pregnancy bleeding
 - Antepartum Haemorrhage
 - Biophysical profile
 - fetal anomalies
- ii) Gynaecological USG for adnexal mass, uterine pathology & follicular monitoring
- iii) Hysterosalpingography/ sonohysterosalpingography
- iv) Colposcopy
- v) Cystoscopy

7. Able to resuscitate an asphyxiated newborn by emergency measures and recognize signs requiring referral of a baby for specialized care.

II CONTENTS

OBSTETRICS

Must Know

1. Obstetrics – Aims & Vital Statistics
2. Embryology - Applied – Fertilisation, Implantation and fetal development
3. Morphological and functioning development of fetus.
4. Maternal adaptation to pregnancy.
5. Management of normal pregnancy
 - i) Prenatal care
 - ii) Techniques to evaluate fetal growth and health
 - iii) Conduct of normal labor and delivery
 - iv) Labour Analgesia and Anaesthesia
6. Management of labour
 - i) The normal pelvis
 - ii) Attitude, Lie, Presentation and position of the fetus
 - iii) Parturition: Biomolecular and Physiologic processes
 - iv) Mechanisms of Normal labour
 - v) The Newborn Infant
 - vi) The Puerperium
7. Complications of pregnancy
 - i) Abortion, gestational trophoblastic disease
 - ii) Ectopic Pregnancy
 - iii) Diseases and Abnormalities of the placenta and fetal membranes.
 - iv) Congenital malformations and inherited disorders
 - v) Diseases, Infections and Injuries of the fetus and newborn infant
 - vi) Multifoetal Pregnancy
 - vii) Hypertensive Disorders in Pregnancy including eclampsia
 - viii) Obstetrical Haemorrhage
 - ix) Abnormalities of the Reproductive Tract
 - x) Preterm and post term pregnancy and inappropriate foetal growth
8. Abnormal labour
 - i) Dystocia due to abnormalities of the expulsive forces and precipitate labour
 - ii) Dystocia due to abnormalities in presentation, position & development of the fetus.
 - iii) Dystocia due to pelvic contraction
 - iv) Dystocia due to soft tissue abnormalities of the Reproductive Tract
 - v) Techniques for Breech Delivery and occipito posterior
 - vi) Injuries to the Birth Canal – Perineal tears, cervical / vaginal lacerations, rupture uterus
 - vii) Abnormalities of the third stage of labour
9. Operative Obstetrics
 - i) Forceps/vacuum delivery and related techniques
 - ii) Caesarean Section and Caesarean Hysterectomy
 - iii) Destructive operations
10. Abnormalities of the Puerperium
11. Medical, surgical illness complicating pregnancy
12. Family welfare including Post Partum Programme.

13. Other National programmes applicable to obst & gyn
14. Drugs in pregnancy
15. Current concepts in the management of preterm labour
16. Conservative management of Ectopic gestation
17. Ante partum monitoring of fetus at risk
18. Chromosomal abnormalities in the fetus and genetic counseling
19. Prenatal diagnosis & intrauterine therapy.
20. Immunology of pregnancy & other obst complications
21. Imaging in obstetrics
22. Medico legal aspects pertaining to obst & gyn

GYNAECOLOGY

Must know

1. Anatomy and embryology of female reproductive tract
2. Ovarian function and physiology of menstruation.
3. Disorders of breast
4. Malformations and maldevelopment of female genital tract
5. Sex determination, asexuality and intersexuality
6. Trophoblastic tumours
7. Injuries to female urogenital tract
8. Genital prolapse
9. Other displacements of the uterus& pelvic organs
10. Torsion of the pelvic organs
11. Infections
12. Epithelial abnormalities of the genital tract
13. Endometriosis and allied states
14. Tumours of the vulva
15. Tumours of the vagina
16. Tumours of the cervix uteri
17. Tumours of the corpus uteri
18. Tumours of the fallopian tube
19. Tumours of the pelvic ligaments
20. Tumours of the ovary
21. Genital cancer screening& prevention
22. Amenorrhoea, Scanty and infrequent menstruation
23. Abnormal uterine bleeding, DUB, Postmenopausal bleeding
24. Dysmenorrhoea
25. Other menstrual phenomena
26. Vaginal discharge, sexually transmitted infections
27. Pruritus vulvae
28. Low Backache
29. Problems of sex and marriage
30. Infertility and sub fertility
31. Contraception
32. Sterilization, termination of pregnancy
33. Urinary problems in gynaecology
34. Sex hormone therapy
35. Physiotherapy in Gynaecology
36. Preoperative and postoperative management; postoperative complications
37. Hysterectomy and its aftermath
38. Infertility & Assisted reproduction techniques
39. Advances in the diagnosis and management of urinary incontinence

40. Steroid hormone receptors in gynaecological cancers
41. Role of GnRH analogues in Gynaecology
42. New approaches to male and female contraception
43. Endometrial ablation & other conservative surgeries in gyn
44. Laparoscopic surgery
45. Radiotherapy & chemotherapy in gyn cancer
46. Immunology and Immunotherapy of gynaecological cancers.
47. Hormone Replacement Therapy.
48. Imaging techniques in gynaecology.

III. RECOMMENDED READING

A:BOOKS *

1	Williams Obstetrics – Cunningham et al 22 nd Edition – McGraw Hill	2005
2	Practical Guide to High-risk pregnancy & delivery Fernando Arias – 3 rd Edition S. Daftary, A.G Bhide– Elsevier	2008
3	Turnbull's Obstetrics by Chamberlain 3 rd Edn- – Churchill Livingstone Harcourt Publishers	2001
4	Mudaliar & Menon's Clinical Obs –S. Gopalan & Orient Longman	2005
5	Manual of Obs – Shirish Daftary & Sudip Chakravarti – 2 nd Edition - Elsevier	2005
6	Medical disorders during pregnancy – 3 rd Edition – William Barne & Marshall Lindheim - Mosby	2000
7	Obstetrics Normal & Problem pregnancies – 4 th Edition – Gabbe – Elsevier	2002
8	High risk pregnancy – Management Options – 3 rd Edition – James, Steer, Weiner, Gonik – Elsevier	2006
9	Medical Disorders in Obstetric Practice – 4 th Edition – Michael de Swiet - Blackwell	2002
10	Practical Obstetric problems (Ian Donald)- 6 th Edn – BI Publication, Delhi	
11	Munro Kerr's Operative Obstetrics – 10 th Edn – Balliere Tindall U.K. – AITBS Delhi	2000
12	Danforth's Obstetrics & Gynaecology – 9 th Edition – 2003 Lippincott Williams & Wilkins	2003
13	Shaw's Text Book of Gynaecology - 13 th Edn. – Elsevier	2004
14	Shaw's Text Book of Operative Gynaecology – 6 th Edition – Elsevier.	2004
15	Jeffcoate's principles of Gynaecology – International Edition – Arnold	2001
16	Te Linde's Operative Gynaecology – 9 th Edn – Lippincott Williams & Wilkins	2003
17	Berek & Novak's Gynaecology – 14 th Edition – Lippincott Williams & Wilkins -	2007
18	Clinical Gynaecologic Endocrinology and Infertility - 7 th Edn Speroff & Fritz, Lippincott	2005
19	Clinical Gynaecologic Oncology: Disaia JP, Creasman TM, 5 th Edn. The C.V. Mosby Company, 1989.	1997
20	Year Book of Obst., Gyn. & Women's Health – Lee P. Shulman- Elsevier & Subsequent ed	2007
21	Recent Advances in Obstetrics & Gynaecology. Bonner J: 23,	

	Harcourt Publishers. & subsequent ed	
22	Progress in Obstetrics & Gynaecology, Studd 17, Elsevier & subsequent ed	
23	Obstetrics & Gynaecology for Postgraduates (Vol.I,II) – Orient Longman (Ratnam, S.S.Rao, BK Arulkumaran	2001
24	Clinical methods in Obst & Gyn – a problem based approach – AshaO, RaghavanS, HabeebullahS 2 nd Ed Orient Longman	2007

* Latest editions of the above books recommended

B: JOURNALS

1. Journal of obst & gyn India
2. British Journal of obstetrics& Gynaecology
3. American Journal of obstetrics& Gynaecology
4. International Journal of obstetrics& Gynaecology
5. Obstetric & gyn Survey
6. Gynae Oncology
7. Obstetric & gyn Clinics of N. America
8. Clin Obst & Gyn

TEACHING / LEARNING METHODS

- i) Seminars/Synposia
- ii) Journal Clubs
- iii) Group Discussions
- iv) Clinical rounds/combined case discussions
- v) Case Presentations/ Bed side teaching
- vi) Maternal care review meetings
- vii) Perinatal meetings
- viii) Clinico-pathological meetings
- ix) Attending conferences, CMEs ,workshops etc
- x) Operation theatre:
 - assist procedures
 - operate under supervision
 - operate independently as per above
- xii) Emergencies – Participation in diagnosis, decision making & management
 - In the community – visits to RHC/camps

Active involvement in patient care in

- General Gynae. – OPD
- Antenatal clinic
- Postnatal clinic
- Infertility clinic
- Cancer Clinic etc .

POSTINGS:

There should be rotation amongst all units at least once

Labour room posting; 3 months (minimum)

Obst Ward (in antenatal, Postnatal wards) – 15 months

Gynae Ward (including Family planning) – 15 months

Peripheral postings:

Neonatology : 1 month

Anaesthesiology: 1 month

Oncology : 1 month

If USG is not undertaken in the dept, candidates may undergo 2 weeks' training in the dept of Radiodiagnosis.

Optional: Visit to other institutions for 1-2 weeks' training in Reproductive medicine.

IV. EVALUATION

After 3 years written examination, 4 papers – 100 marks each (Total 400) Paper I (Basic sciences) will have 6 essay/semi essay questions of 15-20 marks each. Paper II, III, IV will have **2 essay questions and 6 shorts notes**. Each essay question will carry 20 marks and short notes 10 marks.

Paper I	:	Basic Sciences
Paper II	:	Obstetrics and neonatology
Paper III	:	Gynaecology and Contraception
Paper IV	:	Recent Advances + Medical and surgical Problems related to Obst & Gyn.

CLINICALS

a) Obstetrics: 150 marks

One long case - 100 marks

One short case – 50 marks

(Post natal case can also be given)

b) Gynaecology: 150 marks

One long case (100 marks) and

One short case (50marks) or

Two semi long cases (75 marks each)

ORALS:

100 marks which consists of Obst & gyn VIVA: 100 marks.

This includes FIVE spots: 25 marks

And general viva (75 marks) from

i) dummy&pelvis ii) contraception iii) X-ray/USG iv) specimens / instruments v) FHR tracings or partogram / gravidogram tracings

INSTRUCTIONS TO EXAMINERS

Paper I : 100 marks

1. Questions must have clinical application
2. Questions may be from different basic sciences.
 - a) Anatomy including Genetics, Embryology
 - b) Physiology
 - c) Biochemistry
 - d) Microbiology
 - e) Pathology
 - f) Pharmacology

Paper II: 100 marks

Obstetrics & neonatology

All aspects of Obstetrics including

- Antenatal care
- Preventive aspects
- Social Obstetrics

Neonatology & social obstetrics should carry about 20% marks

Paper III:100 marks

Gynaecology and contraception: should cover

- 1) General Gynaecology
- 2) Uro Gynaecology
- 3) Gynae Oncology
- 4) Reproductive Biology, endocrinology
- 5) Contraception Should carry about 20% marks

Paper IV: 100 marks

- 1) Recent advances in Obst & Gynae about 50% marks
- 2) Medical Surgical Problems related to Obst & Gynae about 50% marks

As far as possible all question papers should be set by the same or a set of examiners. A **moderator** may ensure the proportionate representation of the topics in all papers.

Model Question Papers

PAPER I – BASIC SCIENCES

3 Hours

(10 x 10 = 100 marks)

ANSWER ALL QUESTIONS

1. Describe the surgical Anatomy of Pelvic Floor. What are the specific supports which hold the viscera in position?
2. Describe Feto placental circulation. What are the changes that occur at birth?
3. Write about the physiology of micturition in human female. What is the Pathophysiology of genuine stress incontinence?
4. Enumerate the infections that can be vertically transmitted? Briefly discuss prevention of parent to Child Transmission of Human Immuno deficiency Virus (HIV).
5. Write an essay on Iron metabolism in pregnancy.
6. Classify hypoglycemic agents. Discuss the principles of pharmacotherapy of diabetes in pregnancy.
7. Pathology of ovarian germ cell tumours
8. Uterine anomalies and its clinical importance
9. Antihypertensives during pregnancy
10. Common pathogens in pelvic inflammatory disease.

PAPER II – OBSTETRICS AND NEONATOLOGY

3 Hours

(100 marks)

ANSWER ALL QUESTIONS

1. Discuss the aetiopathology and management of Preterm Labour. (25 marks)
2. List the causes of Breech Presentation. What are the factors determining perinatal outcome in breech Presentation? Discuss the merits and demerits of planned caesarean section in Breech Presentation. (25 marks)
3. Write Short notes on: (5x10 marks)
 - a) Reproductive Child Health Programme
 - b) Care of a growth restricted newborn
 - c) Biophysical Profile
 - d) Predisposing factors and prevention of Postpartum Haemorrhage
 - e) Diagnosis of pregnancy

PAPER III – GYNAECOLOGY AND CONTRACEPTION

3 Hours

(100 marks)

ANSWER ALL QUESTIONS

1. Discuss clinical features and management of Endometriosis. (25 marks)
2. Discuss the management of early stage Carcinoma Cervix. (25 marks)
3. Write Short notes on: (5x10 marks)
 - a) Placental Site Trophoblastic Tumour
 - b) Treatment of Vault Prolapse
 - c) Secondary Abdominal Pregnancy
 - d) Barrier Contraceptives
 - e) No Scalpel Vasectomy

PAPER IV – RECENT ADVANCES & MEDICAL AND SURGICAL PROBLEMS RELATED TO OBST & GYN.

3 Hours

(100 marks)

ANSWER ALL QUESTIONS

1. Describe the indications for heart valve replacement in pregnancy. How will you manage a pregnant woman with a prosthetic heart valve? (25 marks)
2. What are the recent concepts about Pathophysiology of Polycystic Ovarian Syndrome (PCOS)? How will you manage a hirsute young married girl with PCOS? (25 marks)
3. Write Short notes on: (5 x 10 marks)
 - a) Tension Free Vaginal Tape
 - b) Differential diagnosis of acute abdomen in third trimester of pregnancy
 - c) Posterior urethral valve in the fetus
 - d) Twin to Twin Transfusion Syndrome
 - e) Emergency Contraception

OPHTHALMOLOGY

COURSE CONTENT:

- PAPER I: Applied Basic Sciences in Ophthalmology
- PAPER II: Clinical Ophthalmology including refraction
- PAPER III: Clinical Ophthalmology including surgical procedures
- PAPER IV: Recent Advances including investigative therapeutic procedure, Community Ophthalmology including national programme, rehabilitation of blind.

SYLLABUS

Paper I: Applied Basic Sciences in Ophthalmology

I. ANATOMY AND PHYSIOLOGY

- a) Anatomy of the eye and ocular adnexa
- b) Embryology of the eye and adnexa
- c) The visual pathways
- d) Anatomy and Physiology of motor mechanism
- e) Physiology of vision, colour vision, accommodation
- f) Binocular vision and its development
- g) Maintenance of intra ocular pressure
- h) The Neurology of vision (Visual pathway, papillary pathways and reaction) dark adaptation.
- i) Optics – elementary Physiological optics, optics of retinoscopy and other dark room procedures and ophthalmic equipments.
- j) Physiology of aqueous humour and its circulation and maintenance of intraocular pressure.
- k) Maintenance of corneal transparency.
- l) Tear circulation
- m) Blood aqueous barrier.

II. PATHOLOGY AND MICROBIOLOGY

- a) Pathology of ocular and adnexal lesions (Inflammatory, neoplastic, lens specification etc)
- b) Microbiology of common organism affecting the eye – Bacteria Staph. Strepto – pneumococci, gonococci diphtheria, Morax axenfield bacillus, AFB, Lepra bacilli, pseudomonas etc
- c) Virus – Herpes Zoster, Simplex, adenovirus, trachoma, HIV etc.
- d) Parasites, protozoa and fungi causing ocular lesion e.g., toxoplasma amoebiasis, toxocariasis, treponema, cysticercus, hydatid, microfilaria aspergillus, penicillium, candida etc.

III. BIOCHEMISTRY

- a) Vitamin A and its metabolism
- b) Glucose metabolism

- c) Aqueous composition
- d) Biochemical aspects of cataract (Senile and diabetic)
- e) Thyroid function tests
- f) Tear film and its composition.

IV. PHARMACOLOGY

Pharmacology of drugs used in Ophthalmology

- a) Autonomic drugs – Sympathomimetic, Sympatholytics, cholinergic, Anticholinergic agents etc.,
- b) Antibiotics and chemotherapeutic agents used in ophthalmology
- c) Anti-inflammatory agent – steroid and non-steroidal agents
- d) Anti virals and antifungals used in ophthalmology
- e) Local anaesthetics
- f) Dyes used in ophthalmology – fluorescein, rose Bengal etc.
- g) Tear Substitutes
- h) Drugs used to reduce intra ocular pressure (systemic and topical agents)
- i) Ocular penetration of systemically administered drugs and topical agents.
- j) Anti-mitotic agents and immunosuppressives

V. OPTICS

PAPER II: Clinical Ophthalmology including refraction

PAPER III: Clinical Ophthalmology including surgical procedures

PAPER IV: Recent Advances including investigative therapeutic procedure, Community Ophthalmology including national programme, rehabilitation of blind scheme for clinical and oral examination.

SCHEME FOR CLINICAL AND ORAL EXAMINATION

1. Clinical examination: It will consist of one long case, two short cases, 2 fundus examination, one case for refraction.
2. Oral: It will consist of examination of one histopathology slide, one microbiology slide, pathology specimen, x-rays and charts – field defects, diplopia charting, instruments and general viva.

INSTRUCTIONS TO PAPER SETTER

1. Each paper will have maximum of 100 marks and will be of 3 hours duration.
2. Paper I will consist of 10 short essay type questions each of 10 marks.
3. Paper II, III and IV will consist of 3 questions; two long questions – each carries 20 marks; and the third question will consist of 6 short notes each of 10 marks.

M.S OPHTHALMOLOGY

PAPER I (APPLIED BASIC SCIENCES IN OPHTHALMOLOGY)

Time: 3 Hours

Marks: 100

Write short Notes on:

(10 X 10= 100)

- a) Describe the ocular and orbital venous drainage.
- b) Describe the factors responsible for corneal transparency
- c) Describe the aqueous outflow pathways discuss the pathophysiology of primary open angle glaucoma.
- d) Physiological basis of night vision
- e) Describe the neural pathways responsible for direct and consensual reflex
- f) Steroid pulse Therapy
- g) Indocyanin Angiography
- h) Rhinosporadiosis
- i) Prisms in Ophthalmology
- j) Uses of perfluorocarbons in Ophthalmology

M.S OPHTHALMOLOGY

PAPER II

(CLINICAL OPHTHALMOLOGY INCLUDING REFRACTION)

1. Describe in detail the effects of ocular perforating injury and its management
25 Marks
2. Merits and demerits of small incisions cataract surgery and IOL
25 Marks
3. Write short notes on: 5 X 10 = 50 Marks
 - a) Management of congenital glaucoma
 - b) Aetiopathogenesis of neovascularisation of Iris, its impact and management
 - c) Indications and method of transfrontal orbitotomy
 - d) Vogt koyanagi Harada's syndrome
 - e) AV Phenomenon in squint

M.S OPHTHALMOLOGY

PAPER III

(CLINICAL OPHTHALMOLOGY INCLUDING SURGICAL PROCEDURES)

Time: 3 Hours

Marks: 100

1. Discuss in detail the management of endophthalmitis
25 marks
2. Management of Diabetic Retinopathy
25 marks
3. Write short notes on 5 X 10 = 50 marks
 - a) Plus disease in retinopathy of prematurity
 - b) Pars planitis
 - c) Localising signs of intra cranial tumours
 - d) Genetic counselling in retinoblastoma
 - e) Ocular changes in pregnancy induced hypertension

M.S OPHTHALMOLOGY

PAPER IV

(RECENT ADVANCES INCLUDING INVESTIGATION, THERAPEUTIC PROCEDURES, COMMUNITY OPHTHALMOLOGY INCLUDING NATIONAL PROGRAMME, REHABILITATION OF BLIND)

Time: 3 Hours

Marks: 100

1. Corneal Surgery for refractive errors 25 marks
2. Recent advances in treatment of primary open angle glaucoma 25 marks
3. Write short notes on: 5 x 10 = 60 marks
 - a) Uses of intravitreal gases in retinal detachment surgery.
 - b) Coagulative lasers in ophthalmology.
 - c) Optical coherence tomography (OCT).
 - d) Amniotic membrane in ophthalmology.
 - e) National programme for the control of blindness.

ORTHOPEDIC SURGERY

Course Content

A. Basic Sciences related to Orthopaedics

- i) Anatomy including Embryology and genetics as applied to Musculoskeletal System
- ii) Physiology and Biochemistry as applied to Musculoskeletal System including blood coagulation, immunity, fluid and electrolyte balance
- iii) Pathology and Microbiology as applied to Musculoskeletal System
- iv) Forensic Medicine as applied to Musculoskeletal System
- v) Pharmacology as applied to Musculoskeletal System
- vi) Basic Principles of Physical Medicine and Rehabilitation
- vii) Basic Principles of Bone Banking and Tissue Transplantation
- viii) Biomaterials and Biomechanics as applied to Musculoskeletal System
- ix) Radiology and Radiotherapy as applied to Musculoskeletal system
- x) General Principles of Research Methodology including writing and publication / presentation of research papers/dissertation/thesis

B. Musculoskeletal diseases

Epidemiology, Etiology, Pathology, Clinical Features, Diagnosis, Differential diagnosis, Complications and Management including Prevention and Rehabilitation of the following:

- i) Developmental diseases and congenital anomalies affecting musculoskeletal system
- ii) Dystrophies pertaining to musculoskeletal system
- iii) Dysplasias of musculoskeletal system
- iv) Neurologic diseases affecting musculoskeletal system
- v) Degenerative diseases of musculoskeletal system
- vi) Arthropathies
- vii) Infective diseases of musculoskeletal system
- viii) Tumors and tumor-like conditions of musculoskeletal system

C. Traumatology

- i) General Principles of Diagnosis and Management of Injuries to Musculoskeletal system and their complications.
- ii) Epidemiology, Mechanism, Clinical Features, Diagnosis, Complications, Management including Prevention and Rehabilitation of Musculoskeletal Injuries in all age groups
- iii) Diagnosis and Management of Sports Injuries
- iv) Management of Polytrauma
- v) Principles of 'First Aid', 'Basic Trauma Life Support' and 'Advanced Trauma Life Support'
- vi) Management of Mass Casualties
- vii) Medical Response and Preparedness in Disasters

D. Recent advances

1. Recent advances (as Documented in Indexed Medical Journals) pertaining to the subject contents of papers A, B, C.

MODEL QUESTION PAPERS

M.S. ORTHOPAEDICS – PAPER I
(APPLIED BASIC SCIENCES)

ANSWER ALL QUESTIONS

Time: 3 Hours

Total Marks: 100
(10 X 10 marks)

1. Name the anatomical structures that are related to the hip joint. Illustrate with a suitable diagram.
2. Classify Nonsteroidal Anti-inflammatory Drugs
3. What is ultrasonography? List its use in orthopaedics.
4. What are the pathological types of Osteosarcoma? Give the salient pathological features of each type.
5. What are different types of therapeutic exercises? Give indications of each.
6. Medicolegal issues of Orthopaedic Trauma
7. What is deep vein thrombosis? Mention drugs used for prevention along with dosage.
8. What are the principles of cancer Chemotherapy? Classify anti-cancer drugs.
9. Extra corporeal Irradiation
10. Phase III clinical trials

M.S. ORTHOPAEDICS – PAPER II
(MUSCULOSKELETAL DISEASES)

Time: 3 Hours

Total Marks: 100

ANSWER ALL QUESTIONS

1. A 2 year old girl brought with delayed walking and unilateral painless limp. On examination she had shortening, limitation of abduction.
 - i) What is the most likely diagnosis?
 - ii) Discuss Etiopathology, Clinical features and Radiology of this condition
 - iii) How will you manage this patient? (25)
2. Discuss the Pathology, Radiology and surgical treatment of Osteoid Osteoma (25)
3. Write short answers on: (5 X 10 = 50)
 - a) Synovial fluid analysis
 - b) Give causes and clinical features of Carpal Tunnel Syndrome
 - c) Pathomechanism of deformities of knee in Poliomyelitis
 - d) Classify and outline management of Proximal Focal Femoral Dysplasia
 - e) Management of Brodie's Abscess
 - f) Radiologic Features of Paget's Disease of Bone

M.S. ORTHOPAEDICS – PAPER III
(TRAUMATOLOGY)

Time: 3 Hours

Total Marks: 100

ANSWER ALL QUESTIONS

1. Classify pelvic fractures. Discuss clinical features of unstable pelvic fracture. Give an algorithm for management of pelvic fracture in emergency department. (25)
2. Discuss the principles of Triage in mass casualties. (25)
3. Write short answers on: (10 X 5 = 50)
 - a) ACL reconstruction techniques
 - b) Classify and give prognosis of Physeal injuries
 - c) Types of SCI and their evaluation according to ASIA.
 - d) Pronation-external rotation injury of ankle and its management
 - e) Technique of cast bracing for mid-diaphyseal fracture of leg bones

MS ORTHOPAEDICS – PAPER IV
(RECENT ADVANCES)

Time: 3 Hours

Total Marks: 100

ANSWER ALL QUESTIONS

1. Discuss the changes that have taken place in the design and structure of implants used for internal fixation of fractures since the advent of AO technique. Give the rationale for each change. (25)
2. Discuss the various bioabsorbable implants and their usage in clinical practice (25)
3. Write short answers on: (5 X 10 =50)
 - a) Endoskeleton type prosthesis
 - b) Locking plate
 - c) Bone substitutes
 - d) Management of spasticity
 - e) Non-pharmacologic management of osteoporosis

E.N.T.

Preamble

A post-graduate student in Oto-Rhino-Laryngology should be able to diagnose and treat efficiently and ethically the common Ear, Nose and Throat related illness seen in community. In addition he/she should also recognize and properly manage basic medical diseases and all kinds of diseases related to Ear, Nose, Throat, Head and Neck. He/she should be aware of all the recent advances and on-going studies pertaining to his/her specialty as well as the national programmes involving the speciality of E.N.T. He/ she should contribute to the community by training and implementing the preventive measures for certain diseases under his specialty. The PG student should be competent enough to teach medical and paramedical students skillfully to make them understand the subject and conduct research work.

General objectives

At the end of three years of post-graduate training, the student should have:

- Fair knowledge about the basic medical ailments related to specialty.
- Practice their profession efficiently and ethically.
- Develop skills to maintain rapport with the patients.
- Take part in National health programs and take active role in prevention and rehabilitation of ENT related diseases.
- Develop basic teaching skills and be competent enough to work as a teacher in educational institutes.

Specific objectives

1. They should obtain adequate knowledge in basic sciences like Embryology, Anatomy, Physiology, Biochemistry, Micro-biology and general surgical principles related to Oto-Rhino-Laryngology.
2. He/ she should have proper understanding of patho-physiology of most of the illnesses related to the specialty.
3. They should recognize and properly diagnose the ailments pertaining to ENT and also other common health problems of community.
4. He/she should gain adequate skills to individually manage ENT diseases both medically and surgically as per the need.
5. They should manage all kinds of emergencies in Oto-Rhino-Laryngology, head and neck independently keeping in the mind the limitations existing in his place of work.
6. They should be able to perform common audio-vestibular tests like Pure Tone Audiometry, Impedence Audiometry, BERA, Vestibular Function tests, etc.
7. He/she should learn the basic methodology in teaching medical and paramedical students.
8. He/she should keep a track of current developments in the field of ENT.
9. They should be able to conduct research works, keep proper records and prepare reports and presentations of the same.
10. They should have basic knowledge about Biostatistics.

Training Programme

First 6 months (Orientation programme):

11. Attending PG orientation programme (covering the main teaching methods, issues relating to establishing rapport with the patients, Ethical issues involved in rendering the patient care services, research methodology)

12. Care of indoor patients along with pre-operative and post-operative care under guidance of seniors.
13. Taking case-history, working up indoor cases, writing admission and discharge summaries.
14. Doing wound care and tracheostomy care in wards.
15. Performing Minor-OT procedures in OPD.
16. Attending emergency and referral calls under the supervision of Senior Resident/Tutor/Lecturer.
17. Attending elective and emergency OT for acclimatization.
18. Attending ward rounds and assisting in carrying out the instructions by senior staff.
19. Attending Out Patient Department patients under the supervision of seniors.
20. Keeping records and maintenance of ward, OPD, OT and emergency statistics.
21. Preparation of Dissertation protocol and getting it approved by the PG thesis committee and the Ethical committee of the concerned Institute.
22. Posting in other related disciplines like Neurosurgery, Radiotherapy, Plastic surgery and Anesthesia. (Preferably during the 1st year of the course.)

After 6 months to the end of the course:

1. Presenting indoor patients in ward rounds 4days a week.
2. Attending OPD patients.
3. Attending elective OT regularly.
4. Doing emergency duties of 24hr duration by rotation among all residents.
5. Presenting seminars, journals, cases on rotation basis.
6. Attending cancer clinics and planning the management.
7. Ensuring proper management of indoor patients and proper record keeping by juniors.
8. Attending mortality meetings, Central Academic programmes and other guest-lectures organized by institute.
9. Taking clinical classes for undergraduate students posted in ENT.
10. Properly carrying out dissertation work and submitting in scheduled time.
11. Taking interest in research work, publishing review articles / case reports in journals
12. Attending conferences and work-shops.
13. Maintaining a Log Book.

Teaching methods:

1. Bedside rounds by faculty members.
2. Seminars /Group discussions/Symposia on important topics once a week.
3. Journal clubs: Discussion of at least one important journal each from Otology, Rhinology and Laryngology / Head & Neck once a week.
4. Case presentations: Discussion of one important major case at least once a week.
5. Discussing complicated cases with senior members in OPD.
6. Surgical training in operation theatre.
7. Cadaveric Temporal bone dissection.
8. Discussion of common important topics in Scientific Society meetings / Central academic programmes / Clinico-pathologic meetings.
9. Detailed discussion of death cases in monthly mortality meetings held by institute / departments.
10. Biostatistics classes.

Syllabus: Annexure 1

Examination pattern:

Theory:

Four papers that are divided as below:

- Format: Paper 1 will have 10 short answer questions
 - 2 Long questions of 25marks each
 - 5 Short questions of 10marks each
- Paper I – Applied Basic Sciences (approximately 60% weightage on Anatomy and Physiology and 40% on other applied basic sciences related to Oto-rhinolaryngology & Head & Neck surgery and General Surgical principles)
- Paper II – Ear, Neuro-otology and Audiology
- Paper III – Rhinology, Laryngology, Head & Neck Surgery
- Paper IV – Recent advances in relation to Oto-rhinolaryngology and Head & Neck surgery including Genetics and General Surgical Principles.

Instructions to the paper-setters:

1. The external examiners (PG teachers) as appointed by JIPMER will be asked to set two sets of question papers.
2. The questions as far as possible should be within the prescribed syllabus for the particular paper.
3. Greater representation may be given for questions pertaining to more common conditions in E.N.T. practice.
4. Questions should be framed so as to assess the candidate's ability to recall, comprehend and solve problems.
5. There should be a Chairman of Board of papers/ Chief internal examiner to moderate the two sets of question papers and JIPMER will decide on the set of question papers for the final examinations.
6. The Question-paper setters are requested to kindly adhere to the course mentioned under different sections of the Syllabus (Annexure 1) while making Question papers, for e.g. Section I in Paper 1, Section II in Paper 2, Section III in Paper 3 and Section IV in Paper 4.

Practical Examination: (Clinical & Oral)

Clinical:

- One Long case (100marks)
 - Three short cases (200)
- Total: 300marks

Viva:

- Radiology (20marks)
 - Instruments (20marks)
 - Audiology (20marks)
 - Pathology specimens and operative surgery (20marks)
 - Viva voce (20marks)
- Total: 100marks

Annexure 1

Syllabus

Section I:

Embryology: Development of Ear (External ear, Middle ear cleft, Inner ear); Development of nose and paranasal sinuses; Development of oral cavity, pharynx, larynx, trachea and esophagus; Development of Thyroid, Parathyroids, Salivary glands, pituitary.

Anatomy: Osteology of Frontal, Parietal, Temporal, Occipital, Sphenoid, Ethmoid, Lacrimal, Nasal bones; Anatomy of ear (external ear, middle ear, inner ear, central auditory and vestibular pathways); Anatomy Nose, Paranasal sinuses and Orbit; Anatomy of oral cavity, pharynx, larynx, tracheo-bronchial tree and esophagus; Anatomy of neck including Parapharyngeal spaces and Retropharyngeal spaces; Temporal fossa and Infratemporal Fossa; Anatomy of Salivary glands; Anatomy of Thyroid, Parathyroid, Pituitary; Anatomy of Skull base; Anatomy of cranial fossa including Cerebello-pontine angle.

Physiology: Perception of sound; Physiology of Equilibrium; Physiology of Nose and Paranasal sinuses; Physiology of smell; Physiology of ear and Nose during flight and diving; Physiology of salivary glands; Physiology of Speech; Physiology of Respiration; Physiology of Deglutition.

Radiology: General radiologic principles (Plain skiagram, Contrast skiagram, CT, MRI, USG); Radiology of Ear; Radiology of Nose, Paranasal sinuses and Orbit; Radiology of Neck and Chest; Radiology of Skull Base; Radiology of Brain.

Pharmacology of drugs commonly used in ENT: Pharmacokinetics, Pharmacodynamics and adverse effects of Antihistaminics, Decongestants, Steroids (especially Topical), Antimicrobial agents, Cancer Chemotherapeutic agents, Antifungals, Antivertiginous drugs, NSAIDs, etc; Electrolyte and fluids.

Biochemistry: Fluid and electrolyte balance, Biochemistry of Perilymph, Endolymph, CSF, etc.

Other applied basic sciences like Allergy and Immunology related to ENT; Microbiology in relation to ENT; Principles of Cancer immunology; Principles Radiotherapy in Head & neck cancer; Hematology in relation to ENT; Regional anesthesia and general anesthesia in relation to ENT; Routine biochemical investigations; Principles of nuclear medicine; Photodynamic therapy; Pathophysiology of diseases related to ENT.

General surgical principles: Basic surgical techniques; Suture materials in surgery; Sterilization techniques; Wound healing; Burns; Shock and fluid management; Blood transfusion.

Section II : (Otology, Neuro-otology and Audiovestibulometry)

Otology: Congenital and Acquired diseases with special emphasis on the inflammatory diseases common in community and its rehabilitation aspects.

Symptoms (otalgia, tinnitus, vertigo, deafness) and signs related to ear diseases; Clinical examination of the ear; Pathophysiology of inflammatory conditions of ear; Patho-physiology of inner ear diseases; Infection of external ear, tumors of external ear, congenital EAC atresia and other diseases of external ear; Ear trauma (external, middle and inner ear); reconstructive surgery of ear; Serous otitis media; Acute suppurative Otitis media; Chronic suppurative Otitis media (Tubotympanic and Atticoantral with special reference to Cholesteatoma); Complications of Suppurative otitis media; Otosclerosis; Deaf child; Genetics of hearing; Glomus tumors; Disorders of Facial nerve; Temporal bone disorders including malignancy; CSF Otorrhoea; Oto-endoscopy; Tympanoplasty; Various types of Mastoidectomy; Facial nerve surgeries; Surgeries for Glomus tumors; Temporal bone resection; Stapes surgeries.

Neuro-otology: Vertigo (Etiology, Pathophysiology, Classification, Investigation, Treatment and Rehabilitation); Tinnitus (Etiology, Pathophysiology, Investigations and Management); BPPV; Vertebro-basilar insufficiency; Meniere's disease; CPA tumors; Inflammatory lesions of Auditory and Vestibular nerve; Presbycusis and other SNHL; Sudden onset SNHL, Noise induced hearing loss; Oto-toxicity; Rehabilitation of Deaf patients including BAHA, Cochlear implantation, Brainstem implantation.

Audiology: Pure Tone Audiometry; Impedance Audiometry; Tone-decay; SISI; ABLB; Other tests for recruitment; Tests for Functional deafness; Speech Audiometry; Auditory Evoked Response Audiometry; Bekesy Audiometry; Oto-acoustic emissions; Electro-cochleography; Assessment of Deaf child.

Vestibulometry: Clinical tests like Positional tests, Gaze test; Romberg's test; Stepping test; Craniocorpography; Electronystagmography; Posturography, etc.

Section III: (Nose, Throat, Head & Neck Surgery)

Nose: Signs and symptoms of nasal diseases; Facial pain and Headache; Examinations of nose; Diseases of external nose; Facial trauma; Congenital diseases of Nose; Aesthetic surgeries of Nose (Rhinoplasty); Nasal septum; Septal correction surgeries (Septoplasty); Foreign bodies of nose; Rhinolith; Myiasis; Epistaxis; Pathology of smell; Allergic rhinitis; Vasomotor rhinitis; Acute and chronic inflammatory conditions of nose; Nasal polyposis; Tumors of Nose; Granulomatous disease of Nose.

Paranasal Sinuses: Acute and chronic sinusitis; fungal sinusitis; Complications of Sinusitis; Tumors of Paranasal sinuses; Antral lavage; Caldwell Lucs surgery; External Ethmoidectomy; Various Maxillectomies; Frontal sinus surgeries; Lateral Rhinotomy; Mid-facial degloving; Craniofacial surgeries; Endoscopic sinus surgery.

Others: Obstructive sleep apnea; CSF Rhinorrhoea; Trans-sphenoidal hypophysectomy; Orbit in relation to ENT; Optic nerve in relation to ENT.

Throat: Signs and symptoms of throat disorders; Examination of throat; Endoscopy of upper aero-digestive tract; Disorders of Oral cavity, Acute and chronic tonsillitis; Adenoids; Acute and chronic pharyngitis; Acute and chronic laryngitis; Disorders of Speech and Voice; Upper airway obstruction and management including Tracheostomy; Trauma of larynx; Stenosis of larynx;

Congenital lesions of larynx; Laryngocele; Vocal cord paralysis; Neurological disorders of Pharynx; Pharyngeal Diverticulum; Benign and Malignant tumours and tumor like conditions of oral cavity, oropharynx, hypo-pharynx and larynx; Phonosurgery; Laryngectomies; Pharyngectomies; Surgeries of Oral cavity and Oropharynx with reconstruction.

Nasopharynx: Clinical examination; Nasopharyngeal Angiofibroma; Tumors of Nasopharynx; Various approaches to Nasopharynx.

Esophagus: Dysphagia; Foreign body; Tumors.

Head & Neck: Acute and Chronic cervical lymphadenopathy; Benign neck disease; Metastatic neck diseases; Neck dissection; Diseases of Thyroid gland; Thyroidectomy; Inflammatory diseases of Salivary glands; Benign and Malignant salivary gland tumours; Parotidectomies; Submandibular gland surgeries; Infections of Para-pharyngeal space and Retropharyngeal space; Tumors of Para-pharyngeal space and Infra-temporal fossa; Approaches to Para-pharyngeal space and Infra-temporal fossa; Diseases of jaw; Mandibulectomies; Reconstructive surgery of Head & Neck.

Section IV: (Recent advances including Genetics and Basic Surgical principles)

Recent advances: Recent developments in diagnosis, pathogenesis and treatment of ENT disorders; Advances in skull base surgery; Advances and applications of endoscopic sinus surgery and Oto-endoscopy; Laser in relation to ENT; Cochlear implantation and Brainstem implant; Phonosurgery; Radiofrequency ablation; Harmonic scalpel; Cryosurgery; Role of Oncogenes in Head and Neck cancers, Gene therapy and immune therapy in relation to ENT; Recent advances in cancer chemotherapy; Robotic surgery; IMRT (Intensity Modulated Radiotherapy); Image guided surgery; Facial nerve stimulators; SPECT (Single Positron Emission Computerized Tomography), PET (Positron Emission Tomography), CTA (CT Angiography), MRI (Magnetic Radiation Imaging) and MRA (Magnetic Radiation Angiography).

General surgical principles: Basic surgical techniques; Suture materials in surgery; Sterilization techniques; Wound healing; Burns; Initial management of Polytrauma cases; Facio-maxillary surgery; Reconstructive surgery in Head & Neck; Shock and fluid management; Blood transfusion.

Annexure 2

Text Books:

01. Scott-Brown's Otolaryngology and Head & Neck surgery.
02. Cumming's Otolaryngology and Head & Neck surgery.
03. Stell & Maran's Head & neck surgery.
04. Shambaugh's Surgery of the ear.
05. Stamberger's Functional Endoscopic Sinus Surgery.
06. Clinical Audiovestibulometry by Anirban Biswas.

Referral Books:

01. Paparella's Otolaryngology and Head & neck surgery.
02. The Sinuses by Paul J. Donald.
03. Surgery of the skull base by Paul J. Donald.
04. Brackman's Otologic surgery.
05. Montgomery's Surgeries of upper respiratory system.
06. Ballanger's Diseases of nose, throat and ear.
07. Rob & Smith's Clinical surgery of ear, nose and throat.
08. Jackson's Bronchoesophagology.
09. Bluestone's Pediatric otolaryngology.
10. Kleinsasser's Microlaryngoscopy and Endolaryngeal microsurgery.
11. Ludman's Diseases of ear.
12. Harnsberger's Head & neck imaging.
13. Jatin P Shah's Head & neck surgery.
14. Bailey and Biller's Surgery of Larynx.
15. Nasal and Sinus Surgery by Steven C. Marks.

Annexure 3

List of Journals:

1. Oto-laryngology and Head & Neck Surgery.
2. Journal of Laryngology and Otology
3. Laryngoscope
4. Archives of Otolaryngology Head & Neck Surgery.
5. Indian Journal of Oto-rhinolaryngology and Head & Neck Surgery.
6. Otolaryngologic Clinics of North America.
7. Annals of Otology, Rhinology and Laryngology.
8. Journal of Facio-maxillary surgery.
9. Asian Journal of Ear, Nose and Throat.
10. Ear, Nose and Throat journal.

Annexure 4

Model Question Papers:

Paper I

Applied Basic Sciences

1. Anatomy of Middle ear. (10X10 Marks)
2. Describe various phases of deglutition.
3. Role of Digital Subtraction Angiography in ENT.
4. Photodynamic therapy.
5. Ethmoid bone.
6. Role of topical steroids in Rhinology.
7. Pathophysiology of Diphtheria.
8. PET-CT Imaging
9. Cisplatin
10. Regional anaesthesia in ENT

Paper II

Ear, Neuro-otology and Audiology

1. Classify Otosclerosis. Describe in brief about the contra-indications of surgery in Otosclerosis. Write management of Perilymph Fistula. 5+10+10
2. Classify Vertigo according to duration of episode. Write about pathophysiology of Meniere's disease and its surgical management. 5+10+10
3. Write short notes on: 10×5
 - a) Combine Approach Tympanoplasty.
 - b) Sigmoid Sinus Thrombosis.
 - c) Treatment of Vestibular Schwannoma.
 - d) ABLB.
 - e) Sudden onset SNHL.

Paper III

Rhinology, Laryngology, Head & Neck Surgery

1. Write about the Grading, Theories of origin and surgical management of Nasopharyngeal Angiofibroma. 5+10+10
2. Classify Metastatic neck nodes. Describe in details the management of Metastatic neck disease with unknown primary. 5+20
3. Write short notes on: 10×5
 - a) Laryngocele
 - b) Allergic Fungal Rhinosinusitis.
 - c) Management of Carcinoma Pyriform Sinus.
 - d) Vasomotor Rhinitis.
 - e) Complications of Tracheostomy.

Paper IV

Recent Advances in ENT

1. Classify Lasers. Write short note on CO2 Laser. Write various applications of Laser in ENT. 5+10+10
2. Classify Shock. Write the management of septic shock following Endoscopic Sinus Surgery. 5+10+10
3. Write short notes on: 10×5
 - a) Indications and Contra-indications of Cochlear implantation.
 - b) Image Guided Surgery.
 - c) Role of Pectoralis Major flap in Head and Neck reconstruction.
 - d) Suture materials used in surgery.
 - e) Organ preservation protocol in Laryngeal Cancer.