Academic Regulations

Program structure & Detailed Syllabus

2017

For

Under Graduate Programme (B.Tech)

INFORMATION TECHNOLOGY

(Applicable For Batches Admitted From 2017 – 2018)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY
(AUTONOMOUS)

DUVVADA - VISAKHAPATNAM – 530049

(An Autonomous Institute, Accredited by NAAC, Affiliated to JNTUK, Kakinada, AP)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY

(AUTONOMOUS)

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ACADEMIC REGULATIONS

(VR 17)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY (AUTONOMOUS)
VISAKHAPATNAM

ACADEMIC REGULATIONS for B. Tech. (Regular)

(Applicable for the batches admitted 2017-18 onwards)

The Admission of students into B. Tech. course shall be as per the Govt. of Andhra Pradesh rules.

1. Award of B. Tech. Degree

A student will be declared eligible for the award of the B. Tech. degree if he/she fulfils the following academic regulations.

a. Pursue a program of study for not less than four academic years and not more than eight academic years.
b. For lateral entry scheme admission: Pursue a program of study for not less than three academic years and not more than six academic years.
c. For the award of a degree, regular candidate has to register for 189 credits and shall secure 189 credits.
d. Lateral entry candidate has to register for all the courses from second year onwards and secure all the credits registered for.

2. Courses of Study

The following courses of study are offered at present for specialization in the B. Tech. Course.

S. No.	Course Code	Programme & Abbreviation
01	01	Civil Engineering (CE)
02	02	Electrical and Electronics Engineering (EEE)
03	03	Mechanical Engineering (ME)
04	04	Electronics and Communication Engineering (ECE)
05	05	Computer Science and Engineering (CSE)
06	12	Information Technology (IT)
07	19	Electronics and Computer Engineering (E.Com E)

And any other Course as approved by the authorities of the Institute from time to time.

3. Registration: A student shall register for courses in each semester as per the courses offered by the concerned department.

4. Curricular Program

The Curriculum of the four-year B. Tech Course has been designed to achieve a healthy balance between theory & lab hours, industry experience and to develop technical skills required for a career in the industry or a career in research.

5. Distribution and Weightage of Marks

i. The performance of a student in each semester shall be evaluated Subject-wise with a maximum of 100 marks for theory courses and 100 marks for practical course. The project work shall be evaluated for 200 marks.

ii. For theory course the distribution shall be 40 marks for Internal Evaluation and 60 marks for the End Semester Examinations.

Distribution of marks for theory course, practical course and Design/Drawing is detailed below:

5.1. Internal 40 marks for theory course shall be awarded as follows:

i) 25 marks for MID exams
ii) 10 marks for continuous assessment
iii) 5 marks for Attendance

MID marks shall be calculated with 80% weightage for best of the two MIDs and 20% weightage for other MID exam.

5.2. For practical courses (Laboratory): There shall be continuous evaluation during the semester. Each Lab exam is evaluated for 100 marks. 50 marks shall be awarded for internal examination and 50 marks shall be awarded for external examinations.

5.2.1. Internal marks shall be awarded as follows

i) Day to day assessment– 20 Marks
ii) Record – 10 Marks
iii) Internal laboratory exam– 20 Marks

5.2.2.The semester end examinations shall be conducted by the teacher concerned and external examiner

5.3. For the courses having design and/or drawing, (Such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 40 marks for internal evaluation.

5.3.1. Internal marks shall be awarded as follows:

i) 20 marks for Day-to-day assessment
ii) 15 marks for internal exam
iii) 5 marks for Attendance

There shall be two internal examinations in a semester and the internal marks shall be calculated with 80% weightage for best of the two internals and 20% weightage for other internal exam.
5.3.2. External examination shall be conducted for 60 marks.

5.4. Industrial Visit: The industrial visit shall be carried out in their domain during the summer vacation after the second year second semester. A student has to submit a report which will be evaluated for 100 marks and will be submitted to an internal evaluation committee comprising Head of the Department or his / her nominee and two senior faculty of the department including the industrial visits coordinator/ supervisor.

5.5. Industry- Oriented Mini Project: The Industry oriented mini project is carried out during the third year second semester vacation. The students have an option to choose their own area of interest

which may be related to the course work. Mini project report is evaluated for 100 marks in fourth year first semester before the first mid-term exam. Assessment is done by the supervisor /guide for 40 marks based on the work and mini project report. The remaining 60 marks are allocated for presentation by the student to a committee comprising of the project supervisor and senior faculties members nominated by Head of the Department.

5.6. MOOCs: It is an online course (Minimum of 12 weeks) to promote advanced knowledge suitable for placement and research.

To award credits, the student should get certificate after they have registered for written exam and successfully passed

(Or)

College will conduct the written examination/Viva-voce and award the credits and grades.

In case a student fails in any online course, he/she may be permitted to register for the same course or an alternate course decided by the department committee. The internal marks secured earlier will be nullified if the course is changed. The assessment procedure of MOOCs course remains same as general theory course.

Note: The registered course must not be same as any of the courses listed in the program structure of their regulation till final year including electives.

5.7. Technical Seminar: For Technical seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his/her understanding over the topic, and submit to the department, which shall be evaluated by the Departmental Committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

5.8. Comprehensive Viva: The Comprehensive Viva aims to assess the students' understanding in various subjects he / she studied during the B.Tech course of study. Comprehensive Viva is conducted for a total of 50 marks. It shall be conducted in IV Year II Semester. The Comprehensive Viva–Voce will be conducted by a Committee consisting of Head of the Department, & senior faculty members of the Department.

5.9. Internship: Internships help students to acquire in depth knowledge about a particular topic related to the program of study. Such extensive work is expected to create a platform for a job or further research in the chosen area. Interested students may opt for a full semester Internship during the fourth year second semester. Such students shall be exempted for equivalent theory course credits during that semester and the corresponding credits are awarded through the Internship. A self-study report, duly authorized by the industry supervisor / guide, shall be submitted at the end of the fourth year second semester. Internship report is evaluated for 400 marks in total. Internal assessment is done by the academic supervisor/guide for 100 marks based on the work and presentation of the internship report. The assessment for 300 marks is evaluated and awarded by a panel of members consisting of Head of the Department, Senior Faculty and Industry Expert.

5.10. Main Project: Out of total 200 marks for the project work, 80 marks shall be for Internal Evaluation and 120 marks for the external assessment. The Internal Evaluation shall be on the basis of two mid-term project reviews conducted during the progress of the project. The End Semester Examination (Viva-Voce) shall be conducted by the committee consists of an External Examiner,

Head of the Department (internal examiner) and a senior faculty of the Department. The evaluation of project work shall be conducted at the end of the IV year.

5.11. Audit courses: All audit courses will be "Pass/Fail" type with no credit points allotted. The result of the student in the audit course will be notified in the marks memo. A student must pass all the audit courses registered to be eligible for the award of B. Tech. degree.

List of audit courses will be notified from time to time. An indicative list of courses is as shown below.

a) Professional Ethics & Human Values b) Any Foreign Language c) Journalism d) Finance e) Legal Sciences f) Social Sciences g) English for Special Purposes h) Fine Arts i) Clinical Psychology j) Intellectual Property Rights & Patents etc.

6. Attendance Requirements:

6.1. It is desirable for a candidate to have 100% attendance in the class in all the courses. However, a candidate shall be permitted to appear for the end semester examination if he/she has a minimum of 75% aggregate attendance in the semester. Student will not be permitted to write Mid examination if the attendance percentage is less than 75 % during the stipulated instruction duration. However, Academic Monitoring Committee shall review the situation and take appropriate decision.
Note: Special cases for students having extraordinary performance at National and International level will be considered by the Academic monitoring committee.

6.2. Condonation of shortage of attendance may be considered on Medical grounds maximum up to 10%, if the student provides the medical certificate to the HOD immediately after he / she recovers from the illness. Medical Certificate submitted afterwards shall not be permitted. Shortage of attendance equal to or above 65% and below 75%will be condoned on payment of fee as fixed by the competent authority and the student concerned will be permitted to take the end semester examination. ***This privilege is given only three times for regular student and only two times for lateral entry student during the entire program of study***.

6.3. Shortage of attendance may be considered for the students who participate in prestigious sports, co and extra-curricular activities if their attendance is in the minimum prescribed limit.

6.4. A student will be promoted to the next semester if satisfies attendance and credits requirement.

7. Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements.

For any course, student is considered to be passed upon securing minimum 35% marks in the external examination alone and minimum 50% marks from both internal and external examination put together

8. Promotion Policy:

To promote to III year, a student has to secure minimum 50% of total credits from I & II-year courses
To promote to IV year, a student has to secure minimum 50% of total credits from I, II & III-year courses
In case of Lateral entry students, to promote to IV year, a student has to secure minimum 50% of total credits from II & III-year courses

9. Supplementary examinations: Supplementary examinations for the odd Semester shall be conducted with the regular examinations of even semester and vice versa. In case a student fails in online courses/ industrial lecture(s), he/she may be permitted to register for another course/lecture(s).

10. Examinations and Evaluation

10.1. General guidelines

i. All the semester end examinations are conducted for duration of three hours
ii. External examination shall be conducted for 60 marks consist of five questions of internal choice carrying 12 marks each.
iii. For laboratory examinations, the evaluation is done by internal examiner and one external examiner.

10.2. Revaluation

There is a provision for revaluation of theory courses if student fulfils the following norms.

The request for revaluation must be made in the prescribed format duly recommended by the Chief Superintendent of Examinations through Additional Controller along with the prescribed revaluation fee.

11. Grading System:
CGPA

Marks Range (in %)	Letter Grade	Level	Grade Point
≥ 90	O	Outstanding	10
≥80 to <90	A	Excellent	9
≥70 to <80	B	Very Good	8
≥60 to <70	C	Good	7
≥50 to <60	D	Satisfactory	6
<50	F	Fail	0
		Absent	-1
		Withheld	-2
		Malpractice	-3

Computation of SGPA

The following procedure is to be adopted to compute the Semester Grade Point Average. (SGPA) and Cumulative Grade Point Average (CGPA):

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

SGPA (Si) = Σ(Ci x Gi) / ΣCi

Where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th}course.

Computation of CGPA

- The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$CGPA = \Sigma(Ci \times Si) / \Sigma Ci$$

Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.

- Equivalent Percentage = (CGPA – 0.75) X 10

12. Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he/she shall be placed in one of the following three classes:

Class Awarded	CGPA to be secured	
First Class with Distinction	≥ 7.75 without course failures during entire duration of study	**CGPA secured from 189 Credits.**
First Class	≥ 6.75 to <7.75	
Second Class	≥ 5.75 to < 6.75	

13. General Instructions

i. Where the words 'he', 'him', 'his', occur, they imply 'she', 'her', 'hers', also.

ii. The academic regulations should be read as a whole for the purpose of any interpretation.

iii. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, Academic Council is final.

iv. The college may change or amend the academic regulations or syllabi from time to time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institution.

14. Transitory Regulations

i. The student has to continue the course work along with the regular students of the respective semester in which the student gets re-admission.

ii. The student has to register for Substitute / Compulsory courses offered in place of courses studied earlier.

iii. The mode of internal evaluation and end-semester examinations shall be on par with the regular students, i.e., the student has to follow the mode of internal evaluation and the then question paper model for the end-semester examinations along with the regular students of the respective semester in which the student gets re-admission. The marks secured in the internal and end-semester examinations will be pro-rated in accordance with the regulations under which the student was first admitted.

iv. For the courses studied under earlier regulations but failed, the student has to appear, pass and acquire credits from the supplementary examinations as and when conducted. The question paper model shall remain same as the one in which the student took examination during previous regulations.

v. The promotion criteria based on attendance as well as credits shall be in accordance with the regulations under which the student was first admitted.

vi. All other academic requirements shall be in accordance with the regulations under which the student was first admitted.

vii. The decision of the Principal is final on any other clarification in this regard.

viii. Transcripts: After successful completion of the entire program of study, a transcript containing performance of all academic years will be issued as a final record. Partial transcript will also be issued up to any point of study to a student on request, after payment of requisite fee.

15. Minimum Instruction Days

The minimum instruction days for each semester shall be 16 weeks

There shall be no branch transfers after the completion of the admission process.

16. Withholding of Results

If the student has not paid the dues, if any, to the Institute or in any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

Note: All other regulations including attendance requirements related to four year B. Tech Regular program will be applicable for B.Tech. Lateral Entry Scheme.

17. Malpractices Rules

DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

S.No	Nature of Malpractices/ Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to

	practical) in which the candidate is appearing.	appear for the remaining examinations of the courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	If the candidate smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	If the candidate uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	If the candidate refuses to obey the orders of the Chief Superintendent/Assistant - Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester/year. The candidates also are

	outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	If the candidate leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	If the candidate possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college, expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and. a police case

		will be registered against them.
10	If the candidate comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that semester/year examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Academic committee of the Institute for further action to award suitable punishment.	

18. UGC RECOMMENDED PUNISHMENT FOR RAGGING

i. Suspension from attending classes and academic privileges
ii. Withholding/withdrawing scholarships/fellowship and other benefits.
iii. Debarring from appearing in any test/examination or other evaluation process
iv. Withholding results
v. Debarring from representing the institution in any regional, national or international meet, tournament, youth festival etc.
vi. Suspension/expulsion from the hostel
vii. Cancellation of admission
viii. Rustication from the institution for period ranging from 1 to 4 semesters.
ix. Expulsion from the institution and consequent debarring from admission to any other institution for a specified period.
x. Fine may extend up to Rs. 2.5 lakh.

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DEPARTMENT OF INFORMATION TECHNOLOGY
PROGRAM STRUCTURE (VR 17)

I Year - I semester

S. No	Course Code	Course Title	L	T	P	Credits
1	1000171101	English –I	3	1*	0	3
2	1000171102	Engineering Mathematics –I	3	1*	0	3
3	1000171103	Engineering Mathematics – II	3	1*	0	3
4	1000171105	Computer Programming using C	3	1*	0	3
5	1000171106	Engineering Drawing	3	1*	0	3
6	1000171107	Applied Physics	3	1*	0	3
7	1000171121	English - Communication Skills Lab- I	0	0	3	2
8	1000171122	Engineering Physics Laboratory	0	0	3	2
9	1000171128	Computer Programming Laboratory	0	0	3	2
Total Credits						**24**

I Year - II Semester

S. No	Course Code	Course Title	L	T	P	Credits
1	1000171201	English – II	3	1*	0	3
2	1000171203	Engineering Mathematics – III	3	1*	0	3
3	1000171211	Applied Chemistry	3	1*	0	3
4	1000171212	Environmental Studies	3	1*	0	3
5	1000171215	Object Oriented Programming through C++	3	1*	0	3
6	1000171216	Engineering Mechanics	3	1*	0	3
7	1000171221	English - Communication Skills Lab -2	0	0	3	2
8	1000171227	Engineering Chemistry Laboratory	0	0	3	2
9	1000171229	Object Oriented Programming Lab	0	0	3	2
Total Credits						**24**

II B.Tech I Semester

S.No	Course Code	Course Title	L	T	P	Credits
1	1005172101	Statistics and R Programming	3	1*	0	3
2	1005172102	Mathematical Foundations of Computer Science	3	1*	0	3
3	1005172103	Digital Logic Design	3	1*	0	3
4	1012172104	Software Engineering	3	1*	0	3
5	1005172105	Data Structures through C	3	1*	0	3
6	1012172106	Python Programming	3	1*	0	3
7	1005172121	Data Structures through C Lab	0	0	3	2
8	1012172122	Python Programming Lab	0	0	3	2
Total Credits						**22**

II B.Tech II Semester

S.No	Course Code	Course Title	L	T	P	Credits
1	1012172201	Computer Graphics	3	1*	0	3
2	1012172202	Java Programming	3	1*	0	3
3	1012172203	E- Commerce	3	1*	0	3
4	1012172204	Computer Organization & Architecture	3	1*	0	3
5	1012172205	Object Oriented Analysis and Design using UML	3	1*	0	3
6	1012172206	Language Processors	3	1*	0	3
7	1012172221	Unified Modeling Language Lab	0	0	3	2
8	1012172222	Java Programming Lab	0	0	3	2
9	1012172231	Industrial Visit	0	0	0	2
Total Credits						**24**

III B.Tech **I Semester**

S.No	Course Code	Course Title	L	T	P	Credits
1	1012173101	Human Computer Interaction	3	1*	0	3
2	1012173102	Advanced Java Programming	3	1*	0	3
3	1012173103	Database Management Systems	3	1*	0	3
4	1012173104	Unix Programming	3	1*	0	3
5	1005172206	Operating Systems	3	1*	0	3
6	1012173121	Advanced Java Programming Lab	0	0	3	2
7	1012173122	Unix and Operating Systems Lab	0	0	3	2
8	1012173123	Database Management System Lab	0	0	3	2
9	1099172103	Professional Ethics & Human Values	0	3	0	0
		Total Credits				**21**

III B.Tech **II Semester**

S.No	Course Code	Course Title	L	T	P	Credits
1	1005173201	Computer Networks	3	1*	0	3
2	1005173202	Web Technologies	3	1*	0	3
3	1012173201	Software Testing Methodologies	3	1*	0	3
4	1012173202	Data Ware housing & Data Mining	3	1*	0	3
5	**Elective – I:**					
	1012173203	a) Social Networks and Semantic Web	3	1*	0	3
	1012173204	b) Biometric Systems				
	1012173205	c) Neural Networks				
	1012173206	d) Operation Research				
6	**Open Elective :**					
	1005173204	a) Artificial Intelligence	3	1*	0	3
	1012173207	b) Introduction to Digital Signal Processing				
	1005173205	c) Embedded Systems				
	1003173203	d) Robotics				
7	1012173221	Data Mining Lab using WEKA	0	0	3	2

8	1005173223	Web Technologies Lab	0	0	3	2
9	1012173222	Software Testing Lab	0	0	3	2
10	1099173101	IPR & Patents	0	2*	0	0
Total Credits						**24**

S. No	Course Code	Course Title	L	T	P	Credits
1	1012173241	Industry Oriented Mini Project	0	0	0	2

IV B.Tech **I-Semester**

S. No	Course Code	Course Title	L	T	P	Credits
1	1005174101	Cryptography and Network Security	3	1*	0	3
2	1012174101	Mobile Computing	3	0	0	3
3	1005174103	Big Data Analytics	3	0	0	3
4	1099172106	Managerial Economics and Financial Analysis	3	0	0	3
5	**Elective – II**		3	0	0	3
	1012174102	A) Advanced Operating Systems				
	1012174103	B) Information Retrieval Systems				
	1004174105	C) IoT & its Applications				
	1012174104	D) Multimedia Programming				
6	**Elective – III**		3	0	0	3
	1012174105	A) Management Information Systems				
	1005174105	B) Software Project Management				
	1005174102	C) Machine Learning				
	1012174106	D) Decision Support System				

7	1005174121	Cryptography and Network Security Lab	0	0	3	2
8	1005174122	Big Data Analytics Lab	0	0	3	2
Total Credits :						**22**

IV B.Tech **II- Semester**

S. No	Course Code	Course Title	L	T	P	Credits
1	1005174203	Distributed Systems	3	0	0	3
2	1005174106	Cloud Computing	3	0	0	3
3	1099172203	Management Science	3	0	0	3
4	**Elective – IV**		3	0	0	3
	1005174205	A) Concurrent and Parallel Programming				
	1012174201	B) Cyber Security				
	1005174201	C) Fundamentals of Block Chain Technology				
	1012174202	D) Software Quality Assurance				
(OR)						
	1012174281	Internship	0	0	0	12
5	1012174251	Technical Seminar	0	3	0	2
6	1012174261	Comprehensive Viva	0	0	0	2
7	1012174231	Main Project	0	0	0	10
Total Credits :						**26**

GRAND TOTAL CREDITS: 24+24+22+24+21+26+22+26 = 189

PROGRAM STRUCTURE

FOR

I - B.TECH

I & II SEMESTERS

DEAPRTMENT OF INFORMATION TECHNOLOGY
PROGRAM STRUCTURE

I Year - I semester

S. No	Course Code	Course Title	L	T	P	Credits
1	1000171101	English –I	3	1*	0	3
2	1000171102	Engineering Mathematics –I	3	1*	0	3
3	1000171103	Engineering Mathematics – II	3	1*	0	3
4	1000171105	Computer Programming using C	3	1*	0	3
5	1000171106	Engineering Drawing	3	1*	0	3
6	1000171107	Applied Physics	3	1*	0	3
7	1000171121	English - Communication Skills Lab- I	0	0	3	2
8	1000171122	Engineering Physics Laboratory	0	0	3	2
9	1000171128	Computer Programming Laboratory	0	0	3	2
Total Credits						**24**

I Year - II Semester

S. No	Course Code	Course Title	L	T	P	Credits
1	1000171201	English – II	3	1*	0	3
2	1000171203	Engineering Mathematics – III	3	1*	0	3
3	1000171211	Applied Chemistry	3	1*	0	3
4	1000171212	Environmental Studies	3	1*	0	3
5	1000171215	Object Oriented Programming through C++	3	1*	0	3
6	1000171216	Engineering Mechanics	3	1*	0	3
7	1000171221	English - Communication Skills Lab -2	0	0	3	2
8	1000171227	Engineering Chemistry Laboratory	0	0	3	2
9	1000171229	Object Oriented Programming Lab	0	0	3	2
Total Credits						**24**

DETAILED SYLLABUS

FOR

I - B.TECH

I SEMESTER

Course Code		L	T	P	Credits
1000171101	**ENGLISH – I**	3	1	0	3

Course Objectives

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To enable the students to study and comprehend the prescribed lessons and subjects more effectively related to their theoretical and practical components.
- To develop the communication skills of the students in both formal and informal situations.
- Practice critical thinking to develop innovative and well-founded perspectives related to the students' emphases. Build and maintain healthy and effective relationships.
- To convey a credible message and create concise messages using a structured writing process.
- To develop effective interpersonal communication skills.

Course Outcomes

After completing this Course, the student should be able to:

- Use English language, both written and spoken, competently and correctly.
- Improve comprehension and fluency of speech.
- Gain confidence in using English in verbal situations.
- Display competence in oral, written, and visual communication.
- Communicate ethically.
- Demonstrate positive group communication exchanges.

	Course outcome	**Cognitive Level as per Bloom's Taxonomy**	**PO**
CO1	Enhance English Language by relating the ideas of eminent personalities.	Understanding	PO6,PO9, PO10, PO12
CO2	Articulate the technological advancements fluently.	Applying	PO10, PO12
CO3	Inculcate the art of thinking and writing clearly and logically.	Applying	PO10, PO12
CO4	Enact various themes through team work and learn the usage of vocabulary through humourous texts.	Analyzing	PO10, PO12

Detailed Text: English Essentials

1. **In London**-M. K.Gandhi
2. **The Knowledge Society**- A. P. J. AbdulKalam
3. **Principles of Good Writing -** L. A.Hill
4. **Man's Peril –**BertrandRussell
5. **Luck –**MarkTwain

Non-Detailed Text: Panorama

1. War – LuigiPirandello
2. The Verger – SomersetMaugham

PRESCRIBED TEXTBOOKS:

1. **English Essentials** by Ravindra Publishing House
2. **Panorama** by Oxford UniversityPress

SUGGESTED TEXT BOOKS:

1. **You Can Win** by ShivKhera
2. **English for Engineers and Technologists** by Orient BlackSwan
3. **Objective English** by R. S. Agarwal,S.Chand.co

REFERENCE BOOKS:

1. "Practical English Usage" by Michael Swan, 3rdEdition,OUP.
2. "Intermediate English Grammar" by Raymond Murphy,CUP.
3. "Study: Reading" by Eric H.Glendinning, 2ndEditionCUP.
4. "Business Correspondence and Report writing" by R.C Sharma,TataMc Grawhill

Course Code		L	T	P	Credits
1000171102	**ENGINEERING MATHEMATICS-I**	3	1	0	3

Course Overview:

This course deals with differential equations and its application with more focus on advanced Engineering Mathematics. This course helps the students to learn relevant mathematical tools which are required in the analysis of problems in engineering and scientific professions. Topics included in this course are differential equations of first order and their applications, higher order linear differential equations and their applications, functions of single variable and their applications and multiple integrals, Laplace transforms and their applications. The mathematical skills derived from this course form a necessary base for analytical and design concepts encountered in the program.

Course Objectives:

1. To explain mathematical modelling with the knowledge of differential equations.
2. To discuss higher order differential equations and its applications to solve engineering problems.
3. To evaluate maxima and minima of function of several variables.

Course Outcomes:

1. Solve basic engineering problems described by first order differential equations.
2. Determine solutions to higher order linear homogeneous and non homogeneous differential equations with constant coefficients.
3. Apply the techniques of multivariable differential calculus to determine extreme and series expansions etc. of functions of several variables.
4. Extend the concept of integration to two and three dimensions and support it through applications in engineering mechanics.
5. Appraise the Laplace transform technique and use it to solve various engineering problems.

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Solve linear differential equations of first and higher order.	Understanding	PO1,PO2, PO3, PO12
CO2	Determine extrema and series expansions of functions of several variables.	Applying	PO1, PO2,PO4, PO12
CO3	Determine double integral, triple integral to find area and volume..	Applying	PO1, PO2, PO3, PO12
CO4	Appraise Laplace transform to solve various engineering problems.	Analyzing	PO1, PO2, PO12

UNIT-I: MEAN VALUE THEOREMS:

Mean Value Theorems - Rolle's Theorem - Lagrange's mean value theorem – Cauchy's mean value theorem(without proofs)

ORDINARY DIFFERENTIAL EQUATIONS:

Exact equations and equations reducible to exact form- Linear equations- Bernoulli's equation.

Applications: Orthogonal trajectories ,Simple Electric Circuits.

UNIT-II: LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER:

Linear differential equations of second and higher order with constant coefficients, Non-homogeneous term of the type. $Q(x) = e^{ax}$, sin ax, cos ax, x^n, $e^{ax}V(x)$, $x^nV(x)$ – Methodof variation of parameters.

Applications: LCR Circuits

UNIT-III: FUNCTIONS OF SEVERAL VARIABLES:

Functions of several variables – Partial Differentiation –Euler's Theorem-Total Derivative –Change of variables - Jacobian -Functional dependence – Taylors theorem for functions of two variables.

Applications: Maxima and Minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT-IV: MULTIPLE INTEGRALS:

Introduction: Review of Coordinate Systems (Cartesian, Polar, Parametric, Spherical, Cylindrical) -multiple integrals - double and triple integrals – change of variables – Change of order of Integration.

Applications: Areas and Volumes of Simple curves (Cartesian)

UNIT-V: LAPLACE TRANSFORMS:

Introduction - Laplace transforms of standard functions – Shifting Theorems - Transforms of derivatives and integrals - multiplication by t^n - division by t – Unit step function –Dirac delta function. Laplace transform of Periodic functions.

Introduction - Inverse Laplace transforms–Properties- Convolution theorem (without proof).

Applications: Solution of ordinary differential equation with constant coefficients (Initial Value Problems)using Laplace transforms.

TEXT BOOKS:

1. Higher Engineering Mathematics – 43rd Edition by Dr. B. S. Grewal, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, Erwin Kreszig, 8th Ed, Wiley Student Edition.
2. Engineering Mathematics, Greenburg, 2nd Ed, Pearsoneducation.
3. A Text book of Engineering Mathematics, N.P.Bali, Laxmi Publications (P)Ltd.
4. Advanced Engineering Mathematics, B. V. Ramana, TataMcGrawHill Publishing Co.Ltd.
5. Engineering Mathematics, P.Sivaramakrishna Das, C.Vijayakumari , 2017 Pearson Education Services Pvt. Ltd

Course Code		L	T	P	Credits
1000171103	**ENGINEERING MATHEMATICS-II**	3	1	0	3

Course Overview:

The entire course material is divided into 5 modules covering duly recognized areas of theory and study. This course includes the topics of advanced Engineering Mathematics with more focus on the mathematical tools required to analyze the problems of Engineering & Scientific Professions. Some important topics of this course are Solutions of Algebraic and Transcendental Equations, Interpolation, Numerical integration and Numerical solution of ordinary differential equations, Fourier series and Fourier transforms. The main aim of this course is to provide a platform to the students to think, design, formulate and derive any problem encountered in real life situation.

Course Objective:

1. To formulate and apply numerical techniques for root finding, interpolation.
2. To estimate definite integrals using Newton-Cotes quadrature formula.
3. To compute numerical solution of ordinary differential equations.
4. To determine the Fourier coefficients of a given function.
5. To analyze the characteristics and properties of Fourier transforms.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Determine numerical solution of non-Linear equation
2. Compute Interpolating polynomial for the given data
3. Explain Numerical Solution of ODE and Numerical Integration.
4. Construct Fourier series expansion of periodic functions
5. Determine Fourier transform, Fourier sine and cosine transform of function.

	Course outcome	**Cognitive Level as per Bloom's Taxonomy**	**PO**
CO1	Determine numerical solution of non Linear equation	Understanding	PO1,PO2, PO12
CO2	Compute Interpolating polynomial for the given data	Applying	PO1, PO2,PO12

CO3	Explain Numerical Solution of ODE and Numerical Integration.	Applying	PO1, PO2, PO4, PO12
CO4	Construct Fourier series and Fourier transforms for functions	Analyzing	PO1, PO2, PO3, PO5, PO6, PO12

UNIT-I:

SOLUTIONS OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS & INTRODUCTION TO FINITE DIFFERENCES:

Bisection method - Regular-falsi method - Iteration method - Newton-Raphson method. Finite differences: Forward, Backward and Central differences - Other difference operators and relations between them - Differences of a polynomial – To find missing terms.

UNIT-II:

INTERPOLATION

Newton's forward interpolation, Newton's backward interpolation, Gauss Forward and Backward interpolation, Interpolation with unequal intervals – Newton's divided difference - Lagrange's interpolation.

UNIT-III:

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS AND NUMERICAL INTEGRATION:

Single step methods: Taylor's series method –Picard's Method - Euler's and modified Euler's Methods - Fourth order Runge-Kutta method for solving first order equations. Numerical Integration: Trapezoidal Rule, Simpson's $1/3^{rd}$Rule, Simpson's $3/8^{th}$Rule.

UNIT-IV:

FOURIER SERIES: Introduction- Determination of Fourier coefficients – Even and Odd functions –Change of interval– Half-range sine and cosine series - Practical Harmonic Analysis.

UNIT-V

FOURIER TRANSFORMS:

Fourier integral theorem (only statement) – Fourier sine and cosine integrals – Fourier transforms-Fourier Sine and Cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

TEXT BOOKS:

1. Higher Engineering Mathematics – 43rd Edition by Dr. B. S. Grewal, Khanna Publishers, New Delhi.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, Erwin Kreszig, 8thEd, Wiley Student Edition.
2. Engineering Mathematics, B.V.Ramana, Tata McGrawHill.
3. Mathematical Methods –Dr.Ravindranath&Dr. P. Vijaya Lakshmi, Himalaya Publications.
4. Engineering Mathematics, P. Sivaramakrishna Das, C.Vijayakumari , 2017 Pearson Education Services Pvt.Ltd.

Course Code		L	T	P	Credits
1000171105	COMPUTER PROGRAMMING USING C	3	1	0	3

Course Objectives:

- Understanding the basics of the computers and background.
- Drawing flowcharts and Formulating algorithmic solutions to problems and implementing in C language.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
  Understanding pointers and dynamic memory allocation.

Course Prerequisites:

Students should have knowledge of

- Basics of Computer Components.
- Distinction between software and hardware.

Course Outcomes:

Students will be able to:

- Understand the fundamentals of computers, solving the problems using flow charts, algorithms and pseudo code.
- Write, compile and execute simple programs in C language.
- Use different data types and operators in C language.
- Design programs involving decision structures, loops, functions and passing parameters to functions.
- Develop programs using arrays, structures and pointers.
- Understand the dynamic memory allocation functions using pointers.
- Understand the basics of file operations, reading, writing and updating the files.

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Write compile and debug Programs in C language	Understand	PO1,PO2, PO3
CO2	Use operators, data types and write programs	Understand	PO1,PO2
CO3	Select the best loop construct for a given problem	Analyzing	PO3,PO5
CO4	Design and implement C programs	Analyzing	PO1,PO2 PO3,PO4, PO12

UNIT-I

Computer Basics – What is a computer, History of computers, Characteristics of computers, Classification of computers, Applications of computers, Components and functions of a Computer System: hardware and software concept, input/output devices, memory concept and secondary memories, Number System, Computer languages, Flow Charts, algorithms and pseudo code.

Introduction to C programming- Background and characteristics of C, Structure of a C Program, Input/Output Statements in C, writing C programs, compiling and executing C programs.

UNIT-II

Programming Style – Tokens of C, Keywords, Variables, Constants and rules to form variables and constants, Data Types, Declaration of Variables and initialization, Operators, Expression Types, Operator Precedence and Associativity. Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

Flow of Control:

Selection: if and if-else Statements, if-else if statement and switch case, nested if, examples.

Repetition and Unconditional Control Statements: Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, while Statement, do while statement, for Statement, Nested Loops. Break, continue and go to statements.

UNIT-III

Modular Programming:

Function and Parameter Declarations: Function definition, types of functions, declaration and definition of user defined functions, its prototypes and parameters, calling a function. Function stubs and Functions with and without Parameters. Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes.

Parameter passing Techniques: Pass by Value, recursive functions.

UNIT-IV

Arrays and Strings

Arrays: One-Dimensional Arrays, Declaration, Array Initialization, Input and Output of Array Values, Arrays as Function Arguments, Two-Dimensional Arrays, linear search, and bubble sort.

Strings: String Fundamentals, String Input and Output, String manipulation functions, String Processing, String manipulation operations without Library Functions.

UNIT-V

Pointers, Structures and Unions, Data Files

Pointers: Concept of a Pointer, Initialization of pointer variables, pointers as function arguments, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Pointers and arrays, Pointers and strings, Array of Pointers, Dynamic memory management functions, parameter passing by address, command line arguments.

Structures and Unions: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, type def, bit- fields.
Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access.

Text Books:

- ANSI C Programming, Gary J. Bronson, Cengage Learning.
- Programming in C, Reema Thareja, Oxford.
- Programming in C, Bl Juneja Anita Seth, Cengage Learning.

Reference Books:

- C Programming-A Problem Solving Approach, Forouzan, Gilberg,Cengage.
- Programming with C, Bichkar, Universities Press.
- The C Programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
- C by Example, Noel Kalicharan, Cambridge.

Course Code	ENGINEERING DRAWING	L	T	P	Credits
1000171106		3	1	0	3

Objective: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

- To introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.
- To introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.
- To make the students draw the projections of the lines inclined to both the planes.
- To make the students draw the projections of the plane inclined to both the planes.
- To make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
- To represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO number mapped
CO1	Understand the use of drawing instruments to construct the polygons and curves	Understanding	PO1, PO2, PO3
CO2	Learn the principle of orthographic projections. Draw Orthographic projections of points, lines.	Analyzing	PO1,PO2, PO3,PO12
CO3	Draw the various types of planes and solids its views in different Positions	Analyzing	PO1,PO2, PO3,PO12
CO4	Draw isometric views of simple objects	Analyzing	PO1, PO2, PO3,PO12

UNIT I Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

UNIT II Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

UNIT III Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT IV Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT V Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes. Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Text Books:

1. Engineering Drawing, N. D. Butt, Chariot Publications
2. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Graphics, P.I. Varghese, McGraw Hill Publishers

Reference Books:

1. Engineering Graphics for Degree, K. C. John, PHI Publishers
2. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, NewAge.

Course Code		L	T	P	Credits
1000171107	**APPLIED PHYSICS**	3	1	0	3

Course Objective:

- To enhance the fundamental knowledge in Physics and its applications relevant to various Streams of Engineering and Technology.

Learning Objectives:

- Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
- Teach Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.

	Course outcome	**Cognitive Level as per Bloom's Taxonomy**	**PO**
CO1	Describe the wave phenomena and working principle of optical instruments.	Understanding	PO1,PO2, PO3, PO9, PO12
CO2	Apply the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equation .	Applying	PO1, PO2, PO9, PO12
CO3	Identify the importance of classical and quantum mechanical treatment of materials.	Applying	PO1, PO2, PO9, PO12
CO4	Make use of the basic concepts of energy bands in crystalline solids to understand semiconductor physics.	Analyzing	PO1, PO2, PO9, PO12

UNIT-I

INTERFERENCE: Principle of Superposition – Coherent Sources Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

UNIT-II

DIFFRACTION: Fraunhofer diffraction at single slit cases - Circular Aperture (Qualitative treatment only) - Grating equation - Resolving power of a grating, Telescope and Microscopes.

POLARIZATION: Types of Polarization – Double refraction - Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter).

UNIT-III

ELECTROMAGNETIC FIELDS: Scalar and Vector

Fields – Electric potential- Gradient, Divergence of fields – Gauss and Stokes theorems – Maxwell's equations in differential forms

UNIT-IV

QUANTUM MECHANICS: Introduction – Matter waves – Schrodinger time independent and time dependent wave equations – Particle in a box.

FREE ELECTRON THEORY: Defect of classical free electron theory – density of states – Quantum free electron theory – concept of Fermi energy.

UNIT-V

BAND THEORY OF SOLIDS: Kronig- Penney model – energy bands in crystalline solids – classification of crystalline solids- effective mass of electron and concept of hole.

SEMICONDUCTOR PHYSICS: Conduction – Density of carriers in Intrinsic and Extrinsic-Semiconductors – Fermi energy in intrinsic and extrinsic semiconductors- Drift & Diffusion – Einstein's equation- Hall effect in semiconductors.

Outcome: Construction and working details of instruments, i.e., Interferometer, Diffractometer and Polarimeter are learnt. Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal utility.

Text Books:

1. A Text book of Engineering Physics – by Dr.M.N. Avadhanulu and Dr.P.G.KshiraSagar, S.Chand& Company Ltd.,(2014)
2. Physics by David Halliday and Robert Resnick – Part I and PartII

Reference Books:

1. Applied Physics by P.K.Palanisamy, Scitech publications(2014)
2. Lasers and Non-Linear optics by B.B.Laud, New Age InternationalPub.
3. Engineering Physics by M. Arumugam, Anuradha Publication(2014)
4. Modern Engineering Physics by A.S.Vasudeva
5. University Physics by Young andFreedman
6. Engineering Physics by D.K.Bhattacharya and Poonam Tandon, Oxfordpress
7. Engineering Physics by R.K. Gaur and S.L.Gupta

Course Code	ENGLISH –COMMUNICATION SKILLS LAB -I	L	T	P	Credits
1000171121		0	0	3	2

Objectives: The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

- To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking.
- To improve the fluency in spoken English and neutralize mother tongue influence. To train students to use language appropriately to enhance Oratory Skills.

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Demonstrate the usage of phonemes while referring to the dictionary	Understanding	PO5,PO9, PO10, PO12
CO2	Articulate with others by using proper functions.	Applying	PO5,PO9, PO10, PO12
CO3	Enact the roles with proper body language.	Applying	PO5,PO9, PO10, PO12
CO4	Communicate fluently with proper pronunciation	Analyzing	PO5,PO9, PO10, PO12

Unit -1: Letters and Sounds

Unit-2: Interaction 1

Unit-3: The Sounds of English

Unit-4: Interaction 2

PRESCRIBED LAB MANUAL:

Speak Well - Orient Black Swan Publishers

SUGGESTED BOOKS/ MANUALS AND SOFTWARES:

1. Interact - Orient Black Swan
2. Strengthen your Communication Skills by Maruthi Publishers
3. Personality Development and Soft Skills (Oxford University Press, New Delhi)
4. GRE-Barons-12thEdition
5. Objective English-R.S.Agarwal-S.Chand Publishers
6. The Rossettastone
7. English in Mind

Course Code		L	T	P	Credits
1000171122	**ENGINEERING PHYSICS LABORATORY**	0	0	3	2

Course Objectives:

The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies. To achieve perfectness in experimental skills and the study of practical applications will bring more confidence and ability to develop and fabricate engineering and technical equipments.

Design of circuits using new technology and latest components and to develop practical applications of engineering materials and use of principle in the right way to implement the modern technology.

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Experimentation of laws of vibrations in strenteched string	Understanding	PO1,PO2, PO9, PO12
CO2	Determination of velocity of sound, rigidity modulus of a wire, acceleration due to gravity, radius of gyration and Planck's constant.	Applying	PO1, PO2, PO9, PO12
CO3	Analyze the voltage vs. current characteristics of Zener diode and temperature vs. resistance characteristics of a thermistor	Applying	PO1, PO2, PO9
CO4	Demonstration of formation Newton's rings, diffraction pattern using grating and induced magnetic field in a cirucuclar coil.	Analyzing	PO1, PO2, PO9

List of Experiments

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings –Radius of Curvature of Plano_Convex Lens.
3. Determination of Rigidity modulus of a material- Torsional Pendulum.
4. Determination of Acceleration due to Gravity and Radius of Gyration-Compound Pendulum.

5. Melde's experiment – Transverse and Longitudinalmodes.
6. Verification of laws of stretched string –Sonometer.
7. Determination of velocity of sound – Volumeresonator.
8. L C R Senes ResonanceCircuit.
9. Study of I/V Characteristics of Semi conductor diode.
10. I/V characteristics of Zener diode.
11. Thermistor characteristics – Temperature Coefficient.
12. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
13. Determination of wavelength of laser source using direr action grating.
14. Determination of Planck's constant using

Course Code	COMPUTER PROGRAMMING	L	T	P	Credits
1000171128	LABORATORY	0	0	3	2

Learning Objectives:

- Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concepts of writing a program in C language
- Demonstrate Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Demonstrate Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Demonstrate Role of Functions involving the idea of modularity.

Outcomes:

- Apply and practice logical ability to solve the problems.
- Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
- Understand and apply the in-built functions and customized functions for solving the problems.
- Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

Exercise - 1 Basics

a) What is an OS Command, Familiarization of Editors - vi,Emacs.
b) Using commands like mkdir, ls, cp, mv, cat, pwd, andman.
c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Commandline.

Exercise - 2 Basic Math

a)Write a C Program to Simulate 3 Laws atMotion

b) Write a C Program to convert Celsius to Fahrenheit and viceversa

Exercise - 3 Control Flow - I

a) Write a C Program to Find Whether the Given Year is a Leap Year ornot.

b) Write a C Program to Add Digits & Multiplication of anumber

Exercise – 4 Control Flow - II

a) Write a C Program to Find Whether the Given Numberis

i) PrimeNumber

ii) ArmstrongNumber

b) Write a C program to print FloydTriangle

c) Write a C Program to print PascalTriangle

Exercise – 5 Functions

a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise – 6 Control Flow - III

a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

Exercise – 7 Functions - Continued

Write a C Program to compute the values ofsin x and cos x and e^x values using Series expansion. (Use factorial function)

Exercise – 8 Arrays
Demonstration of arrays

a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.

Exercises - 9 Structures

a) Write a C Program to Store Information of a Movie Using Structure

b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise - 10 Arrays and Pointers

a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 11 Dynamic Memory Allocations

a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc ()function.
b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. Understand the difference between the above two programs

Exercise – 12 Strings

a) Implementation of string manipulation operations **with** library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
b) Implementation of string manipulation operations **without** library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare

Exercise -13 Files

a) Write a C programming code to open a file and to print it contents onscreen.
b) Write a C program to copy files

Exercise - 14 Files (Continued)

a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file

DETAILED SYLLABUS

FOR

I - B.TECH

II SEMESTER

Course Code		L	T	P	Credits
1000171201	**ENGLISH-II**	3	1	0	3

Course Objectives:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To enable the students to study and comprehend the prescribed lessons and subjects more effectively related to their theoretical and practical components.
- To develop the communication skills of the students in both formal and informal situations.
- Practice critical thinking to develop innovative and well-founded perspectives related to the students' emphases. Build and maintain healthy and effective relationships.
- How to convey a credible message and create concise messages using a structured writing process.
- Develop effective interpersonal communication skills.

Course Outcomes:

After completing this Course, the student should be able to:

- Use English language, both written and spoken, competently and correctly.
- Improve comprehension and fluency of speech.
- Gain confidence in using English in verbal situations.
- Display competence in oral, written, and visual communication.

	Course outcome	**Cognitive Level as per Bloom's Taxonomy**	**PO**
CO1	Enhance English Language skills through the concept of Technological advancements.	Understanding	PO6,PO9, PO10, PO12
CO2	Illustrate the life of eminent personalities for developing the skills of vocabulary and grammar	Applying	PO10, PO12
CO3	Emphasize the relevance of cultures and traditions for enhancing writing skills through literature	Applying	PO10, PO12
CO4	Correlate the importance of Environment and sustainability with an emphasis on language skills	Analyzing	PO10, PO12

Detailed Text: English Encounters

1. **A Dilemma**- A Layman looks at Science
2. **Culture Shock**
3. **Lottery**
4. **Health Threats of Climate Change**
5. **A Chief Architect of Microsoft**

Non-Detailed Text: Panorama

1. **A Scarecrow** – SatyajitRay
2. **A Village Lost to the Nation** - Krishna Chandra Pujari

Prescribed Books:

1. **English Encounters** by Maruthi Publications
2. **Panorama** by Oxford University Press

Course Code		L	T	P	Credits
1000171203	**ENGINEERING MATHEMATICS-III**	3	1	0	3

Course Overview:

This course focuses on basic theoretical concepts and advanced Engineering Mathematics. This course helps the students to understand mathematical tools required in the analysis of problems in Engineering and Scientific Professions. The topics included are Solution for linear systems, Eigen values & Eigen vectors, linear transformations, partial differential equations, Vector integral theorems(Green's, Stoke's and Gauss's divergence theorems). Thus mathematical skills derived from this course enable the students to design and solve the problems.

Course Objectives:

1. To explain the concepts of matrix algebra and methods of solving system of linear equations.
2. To compute Eigen values and Eigen vectors of real and complex matrices.
3. To apply properties of partial differential equations to obtain solution for science and engineering problems.
4. Classify and Solve partial differential equations
5. Generalize calculus to vector functions and to compute line, surface and volume integrals.

Course Outcomes:

Up on successful completion of this course, student will be able to:

1. Apply elementary transformations to reduce matrices to echelon form, normal form and hence find their rank.
2. Solve the system of linear equations and compute Eigen values and Eigen vectors of a square matrix.
3. Compute directional derivative and the gradient of functions of several variables.
4. Infer vector integral theorems to evaluate line, surface and volume integrals.

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Solve simultaneous linear equations numerically using rank of a matrix and compute Eigen values and Eigen vectors of a square matrix.	Understanding	PO1,PO2, PO3, PO12
CO2	Identify/classify and solve partial differential equations.	Applying	PO1, PO2, PO3, PO6, PO8
CO3	Calculate gradient of a scalar function, divergence and curl of a vector function.	Applying	PO1, PO2, PO3, PO12
CO4	Determine line, surface and volume integrals using appropriate integral theorems.	Analyzing	PO1, PO2, PO6, PO12

UNIT-I: LINEAR SYSTEMS OF EQUATIONS:

Introduction-Rank-Echelon form-Normal form-Solution of Linear systems - Gauss elimination-Gauss Seidel methods-Applications of matrix methods to finding current in the circuits.

UNIT-II: EIGEN VALUES-EIGEN VECTORS AND QUADRATIC FORMS:

Introduction-Eigen values-Eigen vectors-Properties(without proofs)-Cayley Hamilton theorem (without proof) - Inverse and power of a matrix by using Cayley Hamilton theorem, Diagonalisation of matrix-Quadratic forms-Reduction of Quadratic form to Canonical form-Rank-Index-Signature-Nature-Applications of Eigen value and Eigen vectors to Free Vibrations of two mass system.

UNIT-III: PARTIAL DIFFERENTIAL EQUATIONS:

Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions- Solutions of first order linear (Lagrange's) equation and nonlinear (standard type) equations- Equations reducible to standard forms.

UNIT-IV: VECTOR DIFFERENTIATION:

Differentiation of vectors-Scalar and Vector point functions- Gradient of a scalar field and directional derivatives- Divergence and Curl of a vector field and its physical interpretation-Solenoidal and Irrotational of a vector- Vectoridentities.

UNIT-V: VECTOR INTEGRATION:

Line integral- Circulation, Work done, Surface and Volume integrals-Vector integral theorems: Green's, Stoke's and Gauss's Divergence theorems(without proofs) and related problems.

TEXTBOOKS:

Higher Engineering Mathematics – 43rd Edition by Dr. B. S. Grewal, Khanna Publishers, NewDelhi.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, Erwin Kreszig, 8thEd, Wiley StudentEd.
2. Advanced Engineering Mathematics, Greenburg, 2ndEd, Pearsoneducation.
3. Engineering Mathematics, N.P.Bali, Laxmi Publications (P)Ltd.
4. Engineering Mathematics, B. V. Ramana, TataMcGrawHill PublishingCo.
5. Engineering Mathematics, P.Sivaramakrishna Das, C.Vijayakumari , 2017 Pearson India Education Services Pvt.Ltd

Course Code	APPLIED CHEMISTRY	L	T	P	Credits
1000171211		3	1	0	3

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

Objectives:

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace and automotive industries.
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- To know the mechanism of Corrosion for its control and prevention.
- Water is a basic material in almost all the industries, more so where steam is generated and also where it is supplied for drinking purposes.
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.

Outcomes: The student

- Gains basic knowledge of polymer materials and their engineering applications.
- Understands fuels which are used commonly and their advantages and limitations.
- Extends the principles involved in corrosion to predict and prevent the corrosion in real life system
- The advantages and limitations of semiconducting materials and their use in design would be understood.
- Recalls the principles, working and design of energy storage devises and Acquires knowledge of advanced materials and their applications.

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Identify various polymers like Polythene, PVC, Teflon, Bakelite and their Engineering applications.	Understanding	PO1,PO7, PO8
CO2	Desribe various renwable and non-renwable energy resources.	Applying	PO1, PO2, PO4, PO7, PO8
CO3	Aquire the knoweldge of principles and reaction mechanism Of corrosion.	Applying	PO1, PO7, PO8
CO4	Illustrate green Synthesis ,semiconductors , advanced materials and their applications in industry .	Analyzing	PO1, PO2, PO12

UNIT I: POLYMER TECHNOLOGY

Polymerization: Introduction - Types of polymerization (Addition, Condensation & Co-polymerizstion) – Physical and mechanical properties – advantages and limitations – **Plastics**: Thermoplastics and Thermosetting plastics – Compounding, Moulding techniques (Compression, Injection & Blow film moulding) - Preparation, properties and applications of polyethene, PVC, Bakelite andTeflon.

Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers - Buna S, Buna N and Thiokol – Applications. Composite materials & Fiber reinforced plastics (CFRP & GFRP) – Biodegradable polymers – Conducting polymers.

UNIT II: FUEL TECHNOLOGY

Introduction – Classification – Calorific value - Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis and its Significance – Liquid fuels – Petroleum - Refining – Cracking – knocking - Octane and Cetane numbers - Natural gas - LPG and CNG – Combustion – Flue gas analysis – Orsat apparatus – Numerical problems on combustion. Energy scenario in India – working of thermal power plant – Advantages and disadvantages – Renewable energy – Solar energy – Harnessing of solar energy – solar heaters – photo voltaic cells – Bio energy – Bio diesel.

UNIT III: ELECTROCHEMICAL CELLS & CORROSION

Galvanic cells - Reversible and irreversible cells, Electrode potential – Standard electrodes (Hydrogen and Calomel electrodes). Electro chemical series and its applications,

Batteries-: Dry Cell, lead acid battery and Ni-Cd battery - H_2-O_2 fuel cell & H_3PO_4 fuel cells.

Corrosion: Introduction – Theories of Corrosion (dry and wet) – Types of corrosion –

galvanic, pitting, stress, differential aeration and waterline corrosion – Factorsinfluencingcorrosion–controllingmethods–Designandmaterialselection – Cathodic protection - inhibitors - Protective coatings – Metallic coatings (cathodicand anodic) - Methods of application on metals(Galvanizing, Tinning &Electroplating).

UNIT IV: SOLID STATE CHEMISTRY

Types of solids - close packing of atoms and ions - BCC , FCC, structures of rock salt - cesium chloride- spinel - normal and inverse spinels, Non-elemental

Semi conducting Materials: Stoichiometric, controlled valency &Chalcogen photo/semiconductors, Preparation of Semiconductors - Semiconductor Devices: -p- n junction diode as rectifier – junctiontransistor.

Insulators (electrical and thermal applications)

Magnetic materials: Ferro and ferri magnetism - Hall- Effect and its applications.

UNIT V: CHEMISTRY OF ADVANCED ENGINEERING MATERIALS

Nano materials: Introduction – Preparation, Properties and engineering applications of Carbon nano tubes and fullerenes.

Liquid crystals: Introduction – Types – Applications.

Superconductors: Type-I & Type-2, properties & applications.

Green Chemistry: Principles, any three methods of synthesis – engineering applications.

Sensors & Biosensors: Classification, working principle & applications.

Explosives & Propellants: Introduction, classification & applications.

Prescribed books:

1. Engineering Chemistry (16^{th}edn.) by Jain and Jain; Dhanpat RaiPub.Co.
2. A Text book of Engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition.

Reference Books:

1. Chemistry for Engineers by TehFu Yen, Imperial college press,London.
2. Engineering Chemistry, Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
3. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.
4. Text book of Nano-science and Nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM.

Course Code		L	T	P	Credits
1000171212	**ENVIRONMENTAL STUDIES**	3	1	0	3

Course Overview:

The course gives a broad view on the importance of environment and its conservation. It deals with distribution of biotic and abiotic components on the Earth, their over exploitation and its associated problems. It provides knowledge on different types of environmental pollutions and their control aspects. It develops practical orientation towards environmental concerns.

Course Objectives: The objectives of the course are:

- Classify, describe and explains the concept of Ecosystems and Environmental Engineering.
- Overall understanding of different types of natural resources and its conservation.
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
- An understanding of the environmental impacts of developmental activities and the importance of Environmental Management
- Awareness on the social issues, environmental legislations and global treaties

Course Outcomes

- Give an outline of the natural resources and their importance for the sustenance of life and recognize the need to conserve the natural resources.
- Explain the concepts of the ecosystem and its function in the environment; explains the need for protecting the producers and consumers in various ecosystems and their role in the food web
- Elucidate the biodiversity of India and threats to biodiversity and conservation practices to protect the biodiversity
- Give a broad view on various attributes of pollution and their impacts and measures to reduce or control the pollution along with waste management practices.

	Course outcome	**Cognitive Level as per Bloom's Taxonomy**	**PO**
CO1	Elucidate the natural resource & their importance for the sustenance of life and recognises the need to conserve natural resource	Understanding	PO2,PO5, PO6, PO7, PO12
CO2	Gives the broad view on the various attributes of pollution & and their impact & measure to reduce he pollution along	Applying	PO2,PO3, PO5, PO6, PO7, PO12

	with waste management		
CO3	Debates on social issues both rural and urban environment possible means to combat the challenges and trace the legislation of India towards sustainability	Applying	PO1, PO2,PO5, PO6, PO7, PO12
CO4	Educates about Environmental Impact Assessment, Environmental Impact Statement & Environmental Audit	Analyzing	PO1, PO2, PO4, PO5, PO6, PO7, PO12

UNIT – I

Multidisciplinary nature of Environmental Studies & Natural Resource

Definition, Scope and Importance of Environmental Engineering – Sustainability: Stockholm and Rio Summit–Global

Forest resources– Use and over– exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources– Use and over utilization of surface and ground water– Floods, drought, conflict over water, dams– benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources

Food resources: World food problems, changes caused by non-agriculture activities- effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - II

Environmental Pollution

Definition, Cause, effects and control measures of Air pollution,

Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

Solid Waste Management: Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

UNIT – III

Social Issues and the Environment

Urban problems related to energy -Water conservation, rain water harvesting- Resettlement and rehabilitation of people; its problems and concerns.
Environmental ethics: Issues and possible solutions. Environmental Protection Act - Air(Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT - IV

Ecosystems, Biodiversity & Conservation

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. -Energy flow in the ecosystem -Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

Biodiversity and its conservation

Definition: Levels of Biodiversity, Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega- diversity nation - Hot-spots of biodiversity -Threats to biodiversity: habitat loss, man-wildlife conflicts. -Endangered and endemic species of India – Conservation of biodiversity

UNIT - V

Environmental Management and Field Studies

Impact Assessment and its significance various stages of EIA, Preparation of EMP and EIS, Environmental audit. Eco-tourism, Environmental Economics & Study of a Ecotourism spot in a local area, Visit to some Polluted site. Environmental diary.

Text Books:

1. Environmental Studies by R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
2. A Textbook of Environmental Studies by ShaashiChawla, TMH, NewDelhi
3. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education,Chennai.

References:

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada.
3. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, NewDelhi
4. Environmental Studies by PiyushMalaviya, Pratibha Singh, Anoopsingh: Acme Learning, New Delhi.

Course Code	OBJECT ORIENTED PROGRAMMING	L	T	P	Credits
1000171215	THROUGH C++	3	1	0	3

Course Objectives:

- To write efficient, maintainable and portable code.
- To learn and acquire art of computer programming.
- To know about some popular programming languages and how to choose Programming language for solving a problem.

Course Outcomes:

Students will be able to:

- Understand the basic terminology of C++.
- Write, compile and debug programs in C++ language. Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference.
- Usage of generic programming, over loading of functions and operators, over riding and exception handling in various contexts.

UNIT-I

Introduction to C++

Difference between C and C++- Evolution of C++- The Object Oriented Technology- Disadvantage of Conventional Programming- Key Concepts of Object Oriented Programming- Advantage of OOP- Object Oriented Language

UNIT-II

Classes and Objects &Constructors and Destructor

Classes in C++-Declaring Objects- Access Specifiers and their Scope- Defining Member Function-Overloading Member Function- Nested class, Constructors and Destructors, Introduction-Constructors and Destructor- Characteristics of Constructor and Destructor- Application with Constructor- Constructor with Arguments (parameterized Constructor- Destructors- Anonymous Objects**.**

UNIT-III

Operator Overloading and Type Conversion & Inheritance

The Keyword Operator- Overloading Unary Operator- Operator Return Type- Overloading Assignment Operator (=)- Rules for Overloading Operators, Inheritance, Reusability- Types of Inheritance- Virtual Base Classes- Object as a Class Member- Abstract Classes- Advantages of Inheritance-Disadvantages of Inheritance.

UNIT-IV

Pointers & Binding Polymorphisms and Virtual Functions

Pointer to Object- The this Pointer- Pointer to Derived Classes and Base Class, Binding Polymorphisms and Virtual Functions, Introduction- Binding in C++- Virtual Functions- Rules for Virtual Function- Virtual Destructor.

UNIT-V

Generic Programming with Templates & Exception Handling & Overview of Standard Template Library

Generic Programming with Templates, Need for Templates- Definition of class Templates- Normal Function Templates- Over Loading of Template Function, Difference Between Templates and Macros- Linked Lists with Templates, Exception Handling- Principles of Exception Handling- The Keywords try throw and catch- Multiple Catch Statements – Specifying Exceptions

Overview of Standard Template Library- STL Programming Model- Containers- Sequence Containers- Associative Containers- Algorithms- Iterators- Vectors- Lists- Maps.

Text Books:

1) A First Book of C++, Gary Bronson, Cengage Learing
2) The Complete Reference C++, Herbert Schildt,TMH.
3) Programming in C++, Ashok N Kamathane, Pearson 2nd Edition.

Reference Books:

1) Object Oriented Programming C++, Joyce Farrell,Cengage.
2) C++ Programming: from problem analysis to program design, DS Malik, Cengage Learing.

Course Code		L	T	P	Credits
1000171216	ENGINEERING MECHANICS	3	1	0	3

Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work – energy method.

- The students are to be exposed to the concepts of force and friction, direction and its application.
- The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.
- The students are to be exposed to concepts of centre of gravity
- The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
- The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plan emotion.
- The students are to be exposed to concepts of work, energy and particle motion.

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO number mapped
CO1	Analyze the force systems for equilibrium conditions and able to draw free body diagram.	Analyzing	PO1,PO2,PO3
CO2	Evaluate the frictional forces between contact surfaces.	Applying	PO1,PO2,PO3
CO3	Able to differentiate between centroid and centre of gravity and determine Centroid, centre of gravity and second moment of area for composite sections.	Applying	PO1,PO2,PO3
CO4	Analyse the motion and calculate trajectory characteristics.	Analyzing	PO1,PO2,PO3

UNIT – I: Introduction to Engineering Mechanics – Basic Concepts.
Systems of Forces: Coplanar Concurrent Forces – Components in Space –Resultant

– Moment of Force and its Application – Couples and Resultant of Force Systems. Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

UNIT –II: Friction: Introduction **-** limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

UNIT – III: Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures **Centre of Gravity: Centre** of gravity of simple body (from basic principles), centre of gravity of composite bodies, pappustheorem.

UNIT IV : Area moments of Inertia : Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia: Moment** of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V: Kinematics: Rectilinear and Curve linear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

TEXTBOOKS:

1. Engineering Mechanics - S. Timoshenko & D. H. Young., 4th Ed. ,Mc Graw Hill publications.
2. Engineering Mechanics: Statics and Dynamics 3rd ed., Andrew Pyteland JaanKiusalaas, Cengage Learning publishers.

REFERENCES:

1. Engineering Mechanics statics and dynamics, R.C. Hibbeler, 11th Ed.Pearson
2. Engineering Mechanics, statics, J. L. Meriam, 6th Edn – Wiley India PvtLtd.
3. Engineering Mechanics, dynamics, J. L. Meriam, 6th Edn – WileyIndia.

Course Code		L	T	P	Credits
1000171221	ENGLISH – COMMUNICATION SKILLS LAB -2	0	0	3	2

Objectives

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts. Further, they would be required to communicate their ideas relevantly and coherently in writing.

Course outcomes: The proposed course to enable students to use 'good' English and perform the following: Gather ideas and information, to organize ideas relevantly and coherently.

Engage in debates. Participate in group discussions. Face interviews. Write project/research reports/technical reports. Make oral presentations.

Writing formal letters and to take part in social and professional communication.

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Demonstrate the usage of phonemes while referring to the dictionary	Understanding	PO5,PO9, PO10, PO12
CO2	Articulate with others by using proper functions.	Applying	PO5,PO9, PO10, PO12
CO3	Enact the roles with proper body language.	Applying	PO5,PO9, PO10, PO12
CO4	Communicate fluently with proper pronunciation	Analyzing	PO5,PO9, PO10, PO12

Unit-1: Pronouncing Words

Unit-2: Interaction 3

Unit-3: Stress & Intonation

Unit-4: Interaction 4

LAB MANUAL:

Speak Well - Orient Black Swan Publishers

SUGGESTED BOOKS/ MANUALS AND SOFTWARES:

1. Interact - Orient Black Swan
2. The Rosetta Stone English Library
3. Language in Use
4. English in Mind

Course Code		L	T	P	Credits
1000171227	ENGINEERING CHEMISTRY LABORATORY	0	0	3	2

List of Experiments

1. Determination of hardness of water using standard EDTA solution
2. Determination of Total alkalinity of a water sample.
3. Determination of Ferrous iron using standard $K_2Cr_2O_7$solution.
4. Determination of Copper using standard EDTA solution.
5. Determination of Iron in cement by Colorimetric method
6. Determination of Zinc by ferro cyanide method.
7. Determination of strong acid by Conductometrictitration
8. Determination of Acetic acid by Conductometrictitration
9. Determination of iron by Potentiometric method using $K_2Cr_2O_7$
10. Preparation of Phenol formaldehyde resin
11. Determination of Vitamin –C
12. Determination of flash and fire point of a lubricant oil.
13. Determination of viscosity of a lubricant by Red-wood viscometer.
14. Advanced design experiment - Preparation of Bio diesel.
15. Additional design experiment - Construction of Galvanic cell

*The student should carry out a minimum of 12 experiments. Outcomes**:**
The student is able to acquire principles of various analytical techniques and their applications.

	Course outcome	**Cognitive Level as per Bloom's Taxonomy**	**PO**
CO1	Learn and apply basic techniques used in Chemistry laboratory for small/medium scale water analysis.	Understanding	PO1,PO2, PO9
CO2	Estimate the metal ions present in a domestic/industry sample solutions.	Applying	PO1, PO2, PO7, PO12
CO3	Utilize the fundamental laboratory techniques for titrations and synthetic procedures.	Applying	PO1, PO2, PO9
CO4	Analyze data and gain experimental skills through instrumentation	Analyzing	PO1, PO2, PO5, PO9, PO12

Reference Books:

1. A Textbook of Quantitative Analysis, Arthur J.Vogel.
2. Dr. Jyotsna Cherukuris (2012) Laboratory Manual of engineering chemistry-II, VGS, TechnoSeries
3. Chemistry Practical Manual, Lorven Publications
4. K. Mukkanti (2009) Practical Engineering Chemistry, B.S.Publication

Course Code		L	T	P	Credits
1000171229	OBJECT-ORIENTED PROGRAMMING LAB	0	0	3	2

Learning Objectives:

- To strengthen their problem solving ability by applying the characteristics of object-oriented approach.
- To introduce object oriented concepts in C++ and Java.

Outcomes:

- Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
- Apply an object-oriented approach to developing applications of varying complexities.

Programming

Exercise – 1 (Basics)

Write a Simple Program on printing "Hello World" and "Hello Name" where name is the input from the user.

a) Convert any two programs that are written in C intoC++

b) Write a description of using g++ (150Words)

Exercise – 2 (Expressions Control Flow)

a) Write a Program that computes the simple interest and compound interest payable on principal amount (Rs.) of loan borrowed by the customer from a bank for a given period of time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest.

b) Write a Program to calculate the fare for the passenger starveling in a bus. When a Passenger enters the bus, the conductor asks "What distance will you travel?" On knowing distance from passenger.

(As an approximate integer), the conductor mentions the fare to the passenger according to following criteria.

Exercise – 3 (Variables, Scope, Allocation)

a) Write a program to implement call by value and call by reference using reference variable.

b) Write a program to illustrate scope resolution, new and delete Operators. (Dynamic Memory Allocation)

c) Write a program to illustrate Storage classes

d) Write a program to illustrate Enumerations

Exercises –4 (Functions)

Write a program illustrating Inline Functions

a) Write a program illustrate function overloading. Write 2 overloading functions for power.

b) Write a program illustrate the use of default arguments for simple interest function.

Exercise -5 (Functions–Exercise Continued)

a) Write a program to illustrate function overloading. Write 2 overloading functions for adding two numbers

b) Write a program illustrate function template for power of a number.

c) Write a program to illustrate function template for swapping of two numbers.

Exercise -6 (Classes Objects) Create a Distance class with:

- Feet and inches as data members
- Member function to input distance
- Member function to output distance
- Member function to add two distance objects

a).Write a main function to create objects of DISTANCE class. Input two distances and output the sum.

b). Write a C++ Program to illustrate the use of Constructors and Destructors (use the above program.)

c) Write a program for illustrating function overloading in adding the distance between objects (use the above problem)

d). Write a C++ program demonstrating a Bank Account with necessary methods and variables

Exercise – 7 (Access)

Write a program for illustrating Access Specifiers public, private, protected

a) Write a program implementing Friend Function

b) Write a program to illustrate this pointer

c) Write a Program to illustrate pointer to a class

Exercise -8 (Operator Overloading)

a). Write a program to Overload Unary, and Binary Operators as Member Function, and Non Member Function.

i. Unary operator as member function

ii. Binary operator as non-member function

b). Write a c ++ program to implement the overloading assignment = operator c).Write a case study on Overloading Operators and Overloading Functions (150Words)

Exercise -9 (Inheritance)

a) Write C++ Programs and incorporating various forms of Inheritance
i)Single Inheritance
ii) Hierarchical Inheritance
iii) Multiple Inheritances
iv) Multi-level inheritance
v) Hybrid inheritance
b) Write a program to show Virtual Base Class
c) Write a case study on using virtual classes (150Words)

Exercise-10 (Inheritance –Continued)

a) Write a Program in C++ to illustrate the order of execution of constructors and destructors in inheritance
b) Write a Program to show how constructors are invoked in derived class

Exercise -11 (Polymorphism)

a) Write a program to illustrate run time polymorphism
b) Write a program to illustrate this pointer
c) Write a program illustrates pure virtual function and calculate the area of different shapes by using abstract class.
d) Write a case study on virtual functions (150Words)

Exercise -12(Templates)

a) Write a C++ Program to illustrate template class
b) Write a Program to illustrate class templates with multiple parameters
c) Write a Program to illustrate member function templates

Exercise -13 (Exception Handling)

a).Write a Program for Exception Handling Divide by zero b). Write a Program to rethrow an Exception.

Exercise -14 (STL)

a) Write a Program to implement List and List Operations
b) Write a Program to implement Vector and Vector Operations

Exercise -15 (STL Continued)

a) Write a Program to implement Deque and Deque Operations
b) Write a Program to implement Map and Map Operations

PROGRAM STRUCTURE

FOR

II - B.TECH

I & II SEMESTERS

DEPARTMENT OF INFORMATION TECHNOLOGY
PROGRAM STRUCTURE

II B.Tech I Semester

S.No	Course Code	Course Title	L	T	P	Credits
1	1005172101	Statistics and R Programming	3	1*	0	3
2	1005172102	Mathematical Foundations of Computer Science	3	1*	0	3
3	1005172103	Digital Logic Design	3	1*	0	3
4	1012172104	Software Engineering	3	1*	0	3
5	1005172105	Data Structures through C	3	1*	0	3
6	1012172106	Python Programming	3	1*	0	3
7	1005172121	Data Structures through C Lab	0	0	3	2
8	1012172122	Python Programming Lab	0	0	3	2
Total Credits						**22**

II B.Tech II Semester

S.No	Course Code	Course Title	L	T	P	Credits
1	1012172201	Computer Graphics	3	1*	0	3
2	1012172202	Java Programming	3	1*	0	3
3	1012172203	E- Commerce	3	1*	0	3
4	1012172204	Computer Organization & Architecture	3	1*	0	3
5	1012172205	Object Oriented Analysis and Design using UML	3	1*	0	3
6	1012172206	Language Processors	3	1*	0	3
7	1012172221	Unified Modeling Language Lab	0	0	3	2
8	1012172222	Java Programming Lab	0	0	3	2
9	1012172231	Industrial Visit	0	0	0	2
Total Credits						**24**

DETAILED SYLLABUS

FOR

II - B.TECH

I SEMESTER

Course Code		L	T	P	Credits
1005172101	STATISTICS AND R PROGRAMMING	3	1	0	3

Course Overview:

R is rapidly becoming the leading language in data science and statistics. Today, R is the tool of choice for data science professionals in every industry and field. This Statistics with R programming course will help you master the Programming with R in five Sections. It covers the basic syntax, making you ready to undertake your own first data analysis using R. Starting from variables and basic operations, you will eventually learn how to handle data structures such as vectors, matrices, data frames and lists. In the final section, you will dive deeper into the graphical capabilities of R, and create your own stunning data visualizations and data perform various analysis of Regression models in Linear and Non Linear.

Course Objectives:

Use R for statistical programming, computation, graphics, and modelling,

- Write functions and use R in an efficient way,
- Learn some basic types of statistical models
- Use R in their own research
- Expand the knowledge of R with graphical capabilities in data visualization.
- Understand and use linear, non-linear regression models, and classification techniques for data analysis

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understand the R workspace and Programming with R.	Understanding	PO:1,2,4,5, 12
CO2	Explain the control statements, Loops, Operators and Functions of programming structures using R	Analyzing	PO:1,2,3,4, 12
CO3	Apply math functions and simulation to calculate probability and statistical distributions using R.	Applying	PO:1,2,3,4, 5
CO4	Perform statistical tests using R to create and visualize graphics and Explore data-sets to create testable hypotheses and identify appropriate statistical tests.	Applying	PO:1,2,3,4, 5

Unit-I:

Introduction:

How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes**.**

Outcome:

Understand R environment and run the basic R Sessions, create R objects such as matrices, Data frames, lists etc.

Activity:
Installation of R Studio in Personal systems or Mobile APP and Create an objects using vectors to implement Advanced Data Structure Concepts such as Data Frames, Lists, Arrays, Matrices using R.

Unit-II:

R Programming Structures:

Control Statements, Loops, - Looping Over Non vector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective. No Pointers in R, Recursion, A Quick sort Implementation-Extended Example: A Binary Search Tree.

Outcome: Learn the control statements in R and Implement Functions, Recursion concepts in R.

Activity:

Create a basic control flow constructs of the R Language. Using functions implement Set operations with the help of vectors. Run the R Session implementing Recursion concept in R.

Unit-III:

Doing Math and Simulation in R:

Math Function, Extended Example Calculating Probability-Cumulative Sums and Products-Minima and Maxima- Calculus, Functions For Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writing Files.

Introduction to different Statistics tools, Graphics, Creating Graphs, The Workhorse of R Base graphs, the plot() ,par() Function – Customizing Graphs, Saving Graphs to Files. gplot usage.

Outcome: Learn various Functions for statistical distributions and importance of Linear Algebra on vector data.

Activity:

Compute basic Math functions and calculations of Linear Algebra and operations on vector data.

Unit-IV:
Conditional probability and Bayes theorem, Basic Statistics: Mean median, mode, standard deviation and Covariance, Random variables. Probability distributions: Binomial, Poisson and

Normal, Markov process.

Outcome:

Create and edit visualizations of various graphs with R. Compute basic statistics and probability distributions using R.

Activity:

Generate and customize the graphs using different data sets and understanding particle approach of analysis based on various graphs

Unit-V:

T –Test, ANOVA

Correlation and Regression: Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests.

Outcome:

Understand the regression models of Linear and non Linear, installing and loading the packages required for regression models.

Activity:

Explore data-sets and identify appropriate statistical tests in linear and non linear models.

Text Books:

1. The Art of R Programming, Norman Matloff, Cengage Learning

2. R for Everyone, Lander, Pearson

3. Discrete Mathematical Structures with Applications to Computer Science,

J. P. Tremblay and P. Manohar, Tata McGraw Hill.

4. Probability and Statistics for Engineers: Miller and John E. Freund, Prentice

Hall of India

Reference Books:

1. R Cookbook, PaulTeetor, Oreilly.

2. R in Action,RobKabacoff, Manning

Course Code	MATHEMATICAL FOUNDATIONS OF	L	T	P	Credits
1005172102	COMPUTER SCIENCE	3	1	0	3

Course Overview:

Mathematical foundation of computer science is a systematic way to implement the logic in programs and to construct the algorithm efficiently. Following terms are the foundation terms of a Mathematical foundation of computer science.
The purpose of this course is to provide the students with solid foundations in the basic concepts of mathematical logic, predicates, graph theory concepts, and algorithms. The main objective of the course is to teach the students how to implement the concept and how to design the given data and algorithms that are appropriate for problems that they might encounter. This course is also about showing the correctness of algorithms and studying their computational complexities. This course offers the students a mixture of theoretical knowledge and practical experience. The study of Mathematical foundation of computer science is carried out with Mathematical concepts like Mathematical methods, Engineering mathematics, etc,.

Course Objectives:

1. To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
2. To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	To demonstrate skills in solving counting problem	Applying	PO1, PO2, PO3, PO4
CO2	To develop reasoning skills to implement in programming	Analyzing	PO1, PO2, PO3
CO3	To understand knowledge of mathematical modeling and proficiency in using mathematical software.	Understanding	PO1, PO2
CO4	To solve recurrence relations and able to implement structural models, design concepts using graph theory	Applying	PO1, PO2, PO3, PO12

Unit-I:

Combinatorics, Number Theory:

Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application.

Number Theory:

Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

Outcome:

Student will be able to demonstrate skills in solving counting problems

Activity:

Solve counting problems for real-time applications.

Unit-II :

Mathematical Logic:

Propositional Calculus: Statements and Notations, Connectives, WellFormed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, and Indirect Method of Proof. Predicate Calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus

Outcome:

Student will be able to comprehend mathematical principles and logic

Activity:

Identify applications of mathematical principles in real-time and implement it with in programs.

Unit-III:

Set Theory, And Algebraic Structures:

Introduction, Operations on Sets, Principle of Inclusion and Exclusion, Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, Functions: Bijective Functions, Composition of Functions, Inverse Functions, Permutation, Recursive Functions, Lattice and its Properties.

Algebraic Structures:

Algebraic Structures, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group.

Outcome:

1. Student will be able to demonstrate knowledge of mathematical modeling and proficiency in using mathematical software.

Activity:

Select an appropriate optimized sorting/searching technique for a real-time application and justify.

Unit-IV:

Recurrence Relations:

Generating Functions, Function of Sequences, Partial Fractions,Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

Outcome:

Students will be able to apply induction and other proof techniques towards solving recurrences and other problems in elementary algebra.

Activity:

1. Recurrence relations are used when an exhaustive approach to problem solving is simply too arduous to be practical. Although it is not ideal to compute the terms in a sequence one at a time by using previous terms, this approach can be much more efficient than the alternative of exhaustive casework.

Unit-V:

Graph Theory:

Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs:Adjacency Matrices, Adjacency List, Directed Graph, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

Outcome:

1. Student will be able to manipulate and analyze data numerically and/or graphically using appropriate Software.
2. Demonstrate the use of Trees, Binary Trees in various applications.

Activity:
Construct Graphs for an real time Application.

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.

2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rdEdition, Tata McGraw Hill.

3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

Reference Books:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

Course Code		L	T	P	Credits
1005172103	**DIGITAL LOGIC DESIGN**	3	1	0	3

Course Overview:

This course provides an introduction to logic design and the basic building blocks used in digital systems, in particular digital computers. It starts with a discussion of combinational logic: logic gates, minimization techniques, arithmetic circuits, and modern logic devices such as field programmable logic It also deals with sequential circuits: flip-flops, synthesis of sequential circuits, and case studies, including counters, registers, and random access memories.

Course Objectives:

- To solve typical number base conversions
- To optimize logic gates using various techniques
- To introduce the basic tools for designing combinational and sequential digital logic.

Course Outcomes:

	Course outcome	**Cognitive Level as per Bloom's Taxonomy**	**PO**
CO1	Understand the conversions in number system and Develop the logic circuits using logic gates.	Understand	PO1,PO2
CO2	Minimize the boolean logic circuits using K-maps.	Understand	PO1,PO2, PO3
CO3	Construct and analyze the operation of combinational logic circuits.	Apply	PO1,PO2, PO3,PO4
CO4	Develop the various types of sequential logic circuits like flip flops, registers and counters.	Create	PO1,PO2, PO3,PO5, PO12

Unit-I:

Digital Systems and Binary Numbers:

Digital Systems, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Signed and unsigned Binary Numbers, Arithmetic addition and subtraction, Binary coding.

Outcome:

- Analyze and examine logic circuits by applying the knowledge of number systems, codes.
- To define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation

Activity:

Illustrate how number system is applicable in real time with an example.

Unit-II:

Concept of Boolean algebra:

Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms.

Outcome:

- Demonstrate Gate-Level minimization through Boolean algebra**.**
- Evaluate and simplify logical functions using Boolean algebra.

Activity:

Reduce Boolean expression by applying Boolean algebra postulates and manipulate into SOP/POS form and verify it with Truth table.

Unit-III:

Gate level Minimization & Combinational Logic:

Map Method, Two-Variable K-Map, Three or more -Variable K-Map. Products of Sum Simplification, Sum of Products Simplification, Don't – Care Conditions, Quine-McCluskey method, NAND and NOR Implementation, Exclusive-OR Function. Introduction, Analysis Procedure, Design Procedure, Binary Adder–Subtractor, Decimal Adder, Binary Multiplier, Decoders, Encoders, Multiplexers, HDL Models of Combinational Circuits

Outcome:

- Analyze and design combinatorial circuits
- Simplify combinatorial circuits using Karnaugh maps.
- Implement functions with NAND-NAND and NOR-NOR logic.

Activity: Design digital circuit using HDL.
Unit-IV:

Synchronous Sequential Logic:

Introduction to Sequential Circuits, Storage Elements: Latches, Storage Elements: Flip-Flops, Analysis of Clocked Sequential Circuits, Mealy and Moore Models of Finite State Machines

Outcome:

- Analyze and design Sequential Logic Circuits and summarize the differences between Combinational and Sequential Circuits.

Activity:

Demonstrate the use of sequential circuits and storage elements in real-time applications.

Unit-V:

Registers and Counters:

Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter, Ripple Counter

Outcome:

- Analyze andDesign Registers and counters.

Activity:

Demonstrate the use of registers and counters in real-time applications.

Text Books:

1. Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
2. Fundamentals of Logic Design, 5/e, Roth, Cengage.

Reference Books:

1. Digital Logic and Computer Design, M.Morris Mano, PEA.
2. Digital Logic Design, Leach, Malvino, Saha, TMH.
3. Modern Digital Electronics, R.P. Jain, TMH.

Course Code		L	T	P	Credits
	SOFTWARE ENGINEERING				
1012172104		3	1	0	3

Course Overview:

Software engineering is an engineering branch associated with development of software product using well-defined scientific principles, methods and procedures. The outcome of software engineering is an efficient and reliable software product. Software project management has wider scope than software engineering process as it involves communication, pre and post delivery support etc.

Course Objectives:

- Understand the software life cycle models.
- Understand the software requirements and SRS document.
- Understand the importance of modelling and modelling languages.
- Design and develop correct and robust software products.
- Understand the quality control and how to ensure good quality software.
- Understand the planning and estimation of software projects.
- Understand the implementation issues, validation and verification procedures.
- Understand the maintenance of software

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Apply the appropriate process models for the application development of SDLC	Applying	PO1, PO2, PO3, PO5
CO2	Understand the phases of SDLC from requirement gathering phase to design phase via Analysis Phase	Understanding	PO1,PO2
CO3	Analyzingthe strategies for coding and testing phase in Software product development	Analyzing	PO1,PO2,PO3
CO4	Apply the knowledge about estimation and maintenance of software systems and modeling the software project by using CASE tools	Applying	PO1, PO2, PO3, PO5

Unit-I:

Softare and Software Engineering:

The Nature of Software, The Unique Nature ofWebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models:

A Generic Process Model like Waterfall Models, Agile Model etc. Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

Outcome:

- Define and develop a software project from requirement gathering to implementation.

Activity:

Write in detail about various Process Models

Unit-II:

Requirements Analysis and Specification:

Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.

Software Design:

Overview of the Design Process, How to Characterize of a Design?, Cohesionand Coupling, Layered Arrangement of Modules, Approaches to Software Design

Outcome:

- Define and develop a software project from requirement gathering to implementation.

Activity:

Oral Presentation

Unit-III:

Function-Oriented Software Design:

Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design.

User Interface Design:

Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.

Coding And Testing:

Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing,

White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing

Outcome:

Obtain knowledge about principles and practices of software engineering.

Activity: Case Study

Unit-IV:

Software Reliability And Quality Management:

Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.

Computer Aided Software Engineering:

Case and its Scope, Case Environment, Case Supporting Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment

Outcome:

Focus on the fundamentals of modelling a software project.

Activity:

Think-Pair-Share(TPS)

Unit-V:

Software Maintenance:

Software maintenance, Maintenance Process Models, MaintenanceCost, Software Configuration Management, Devops.

Software Reuse:

What can be reused? Why almost No Reuse So Far? Basic Issues in ReuseApproach, Reuse at Organization Level.

Outcome:

Obtain knowledge about estimation and maintenance of software systems

Activity/Event :

Group Discussion

Text Books:

1. Software engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition
2. Mc GrawHill International Edition.
3. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
4. Software Engineering, Ian Sommerville, Ninth edition, Pearson education

Reference Books:

1. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
4. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.

Course Code	DATA STRUCTURES THROUGH C	L	T	P	Credits
1005172105		3	1	0	3

Course Overview:

Data Structure is a systematic way to organize data in order to use it efficiently.
Following terms are the foundation terms of a data structure.

- Interface − Each data structure has an interface. Interface represents the set of operations that a data structure supports. An interface only provides the list of supported operations, type of parameters they can accept and return type of these operations.
- Implementation − Implementation provides the internal representation of a data structure. Implementation also provides the definition of the algorithms used in the operations of the data structure.

Course Objectives:

- To be familiar with basic concepts of data structures.
- Solve problems using linear data structures such as linear lists, stacks, queues.
- Be familiar with advanced non-linear data structures such as balanced search trees.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understand data structures concepts for solving computing problems.	Understand	PO1,PO2
CO2	Implement standard data structures like stack, queue	Applying	PO1,PO2,PO3, PO5
CO3	Understand sorting and searching algorithms to the small and large data.	Understand	PO1,PO2
CO4	Apply AND Implement basic data structures such as trees for real-time	Applying	PO1,PO2,PO3,PO4,PO5

Unit-I:

Arrays and Linked Lists:

Abstract Data Types ADTs, Dynamic allocation of Arrays, Structures and unions, Polynomials, Spares Matrices Representation of multidimensional Arrays.
Single Linked List, Representing linked list in C, Polynomials and Polynomial Representation- Adding Polynomials- Circular List Representation of Polynomials, Doubly Linked Lists.

Outcome:

1. Understand primitive and non primitive data structures.
2. Outline the need for data structure techniques

3. Implement operations on Arrays, Matrices and Polynomial Expressions

Activity:

1. Construct an Abstract Data Type for real-time applications.
2. Using structural charts represent various operations in different types of linked lists.

Unit-II:

Stacks and Queues: The Stack, Stacks using Dynamic Arrays, Recursion, The Queue, Circular Queues using Dynamic Arrays, Representation of Linked Stacks and Queues.

Application of stacks and queues, Evaluation of Expressions, Expression-Infix, Prefix and Postfix Notation. Conversion of Infix expression to postfix notation. Towers Of Hanoi Problem.

Outcome:

- Implementation of linear data structures using C.
- Implement standard data structures like stack, queue
- Able to implement real time applications on Stacks and Queues.
- Describe how stacks, queues, trees are represented in memory and used by algorithms.

Activity:

- Identify applications of stack and Queue in real-time and implement it with stack

Unit-III:

Searching and Sorting

Searching: Linear Search, Binary Search, Fibonacci search.
Sorting: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort.

Outcome: Able to apply various searching and sorting techniques in the area of Performance.

Activity:

Select an appropriate optimized sorting /searching technique for a real-time application and justify.

Unit-IV:

Trees :

Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal and Tree Iterators, Introduction, In-order Traversal Pre-order Traversal, Post-order Traversal.
Threaded Binary Trees, In-order Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree.

Outcome:

- Summarize basic tree concepts, operations and applications.
- Apply basic data structures such as trees for real-time applications

Activity:

Construct an optimized binary search tree with age of your family members and perform traversals on that tree. Outline the observations.

Unit-V:

Advance concepts of Trees :

Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.
Heaps, Priority Queues, Definition of a Max/Min Heap, Insertion into a Max/Min Heap, Deletion from a Max/Min Heap.

Outcome:

Implement advanced concepts in tress and their Performance and tradeoffs.

Activity:

Illustrate advanced concepts in Trees and Priority Queues.

Text Books:

1. Fundamentals of Data structures in C, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press, Pvt. Ltd.
2. Data structures and Algorithm Analysis in C, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
3. Data structures and Algorithms in C, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

Reference Books:

1. Data Structures and algorithms in C++, 3rd edition, Adam Drozdeck, Thomson
2. Data Structures using C and C++, Langsam, Augenstein and Tenenbaum, PHI
3. Problem Solving with C++, The OOP, Fourth edition, Savitch, W.Pearson Education

Course Code	PYTHON PROGRAMMING	L	T	P	Credit
1012172106		3	1	0	3

Course Overview:

This course introduces computer programming using the Python programming language. T Python Programming course will help you master the Programming with Python by introduci the Object Oriented programming concepts, creation of Data Structures, Implementation Functions, and Visualization libraries using the Python programming language. Lastly you w get into design, code, test, and debug Python programming Language Scripts.

Course Objectives:

- Introduction to Scripting Language.
- Exposure to introduce Data Structures concepts using Python.
- Emphasis to Object Oriented programming concepts.
- Gain knowledge of Python visualization libraries.
- Exposure to various problems solving approaches of computer science and information Technology.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Install Python IDE and run basic Python scripts.	Understand	PO1
CO2	Understand the operators, functions, key Concepts of Object Oriented Programming in python.	Understand	PO1,PO2
CO3	Access Python from various online resources and import packages to the current working environment.	Applying	PO5
CO4	Develop front end GUI using Visualization Libraries and Multithreading techniques.	Analyzing	PO12

Unit-I:

Introduction:

History of Python, Need of Python Programming, Applications Basics of Python Programmin Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input Output, Indentation.

Outcome:

- Understand the Introduction of Python IDE.
- Learn the basics building blocks of python.
- Write the basic programs in python.

Activity:

Install Python on PCs or through Mobile applications run basic Python Scripts for a given data

Unit-II:

Types, Operators and Expressions:

Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membershi Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif else, for, while, break, continue, pass

Data Structures:

Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

Outcome:

- Learn the different types of operators in python
- Understand the syntax of conditional statements in python

Activity:

Identify Operators and types in Python. Implement Data Structure concepts by writing Python Scripts.

Unit-III:

Functions:

Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments,

Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Function (Function Returning Values), Scope of the Variables in a Function - Global and Loca Variables.

Modules:

Creating modules, import statement, from. Import statement, name spacing,

Python packages:

Introduction to PIP, Installing Packages via PIP, Using Python Packages

Outcome:

- Understanding Functions implementation using Python.
- Learn the scope or life time of variables in a function.
- Usage of import statement in modules.
- Create a package, import and install PIP package in python.

Activity:

Using Functions develop simple scripts in Python Programming.

Unit-IV:

Object Oriented Programming OOP in Python:

Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, an Data hiding.

Error and Exceptions:

Difference between an Error and Exception, Handling Exception, try except block, Raisin Exceptions, User Defined Exceptions.

Outcome:

- Implement the OOP concepts using python
- Understand the Exception handling in python.

Activity/Event :

Implement OOP concepts in Writing Python Scripts

Unit-V:

Brief Tour of the Standard Library:

Operating System Interface - String Pattern Matching,

Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI

Programming, Turtle Graphics

Testing: Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing

Test cases, Running Tests.

Outcome:

- Understand standard Libraries and GUI visualization in Python.
- Perform various test cases using Python scripts.

Activity/Event :

Write various test cases and implement specific test for a given case study.

Text Books:

1. Python Programming: A Modern Approach,VamsiKurama, Pearson
2. Learning Python, Mark Lutz, Orielly

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage
4. http://nptel.ac.in/courses/117106113/34 and https://www.python.org/

Course code	DATA STRUCTURES THROUGH LAB	L	T	P	Credits
1012172121		0	0	3	2

Course Objectives:

- Develop skills to design and analyze simple linear and non linear data structures
- Strengthen the ability to identify and apply the suitable data structure for the given real world problem
- Gain knowledge in practical applications of data structures

Outcomes:

- Design and analyze the time and space efficiency of the data structure be capable to identity the appropriate data structure for given problem
- Have practical knowledge on the application of data structures

List of Experiments:

1. Develop C programs to implement the following using an array
   a) Linear search b) binary search
2. Develop a C Program to find number of comparisons and swapping for a given list of numbers. a) Bubble Sort b) Selection Sort
3. Develop a c program to implement Merge Sort
4. Develop a c program to implement Quick Sort
5. Develop C programs to implement the following using an array.
   a) Stack b) Queue
6. Develop C program to Implement Multistack in a Single Array.
7. Develop a C program to do the following
   a) Infix to postfix conversion. b) Evaluation of postfix expression.
8. Implementation of single linked list.
9. Implementation of Doubly linked list.
10. Implement double ended queue using a doubly linked list and an array.
11. Write C programs that use non-recursive functions to traverse the given binary tree in.
    a) Pre-order b) In-order c) Post-order.
12. Implementation of Binary Search trees.
13. Implementation of Heaps.

Course Code	PYTHON PROGRAMMING LAB	L	T	P	Credits
1012172122		0	0	3	2

Course Objectives:

Write, test, and debug simple Basics of Python programming

- Implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Object Oriented Programming using Python.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python
- Learn GUI Programming and Databases operations in Python

Course Outcomes:

- Understand how to write, test, and debug simple Python programs.
- Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python Develop Python programs step-wise by defining functions and calling them..
- Express different Decision Making statements and Functions
- Understand and summarize different File handling operations
- Explain how to design GUI Applications in Python and evaluate different database operations

List of Experiments:

Exercise 1- Basics

a) Running instructions in Interactive interpreter and a Python Script

b) Write a program to purposefully raise Indentation Error and Correct it

Exercise 2- Operations

a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)

b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise 3- Control Flow

a) Write a Program for checking whether the given number is a even number or not.

b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10

c) Write a program using afor loop that loops over a sequence. What is sequence?

d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow – Continued

a) Find the sum of all the primes below two million.

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By

starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise - 5 – DS

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure

b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 6 DS – Continued

a) Write a program combine_lists that combines these lists into a dictionary.

b) Write a program to count frequency of characters in a given file. Can you use character

Frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

a) Write a program to print each line of a file in reverse order.

b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball_collide that takes two balls as parameters and computes if they are

colliding. Your function should return a Boolean representing whether or not the balls are

colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions – Continued

a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

b) Write a function dups to find all duplicates in the list.

c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative product to compute cumulative product of a list of numbers.

b) Write a function reverse to reverse a list. Without using the reverse function.

c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise 11 - Multi-D Lists

a) Write a program that defines a matrix and prints

b) Write a program to perform addition of two square matrices

c) Write a program to perform multiplication of two square matrices

Exercise - 12 – Modules

a) Install packages requests, flask and explore them. using (pip)

b) Write a script that imports requests and fetch content from the page. Eg. (Wiki)

c) Write a simple script that serves a simple HTTPResponse and a simple HTML Page

Exercise - 13 OOP

a) Class variables and instance variable and illustration of the self variable

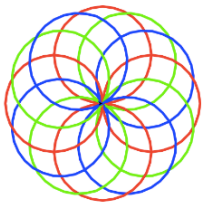
i) Robot

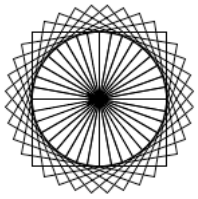
ii) ATM Machine

Exercise - 14 GUI, Graphics

1. Write a GUI for an Expression Calculator using tk

2. Write a program to implement the following figures using turtle





Exercise - 15 – Testing

a) Write a test-case to check the function even numbers which return True on passing a list of

all even numbers

b) Write a test-case to check the function reversestring which returns the reversed strin

Exercise - 16 - Advanced

a) Build any one classical data structure.

b) Write a program to solve knapsack problem.

DETAILED SYLLABUS

FOR

II - B.TECH

II SEMESTER

Course Code	COMPUTER GRAPHICS	L	T	P	Credits
1012172201		3	1	0	3

Course Overview:

Computer graphics are an intrinsic component of many modern software applications and are often essential to the success of these applications. This course is to familiarize the student with fundamental algorithms and data structures that are used in today's interactive graphics systems as well as programming and architecture of high-resolution graphics computers. The principles and practice of computer graphics are described from their mathematical foundations to the modern applications domains of scientific visualization, computer games and film animation.

Course Objectives:

- Develop, design and implement two and three dimensional graphical structures.
- Acquire knowledge on usage of various algorithms used for drawing, filling and Animations.
- Learn to create, manage various Multimedia techniques used in animation.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Describe the general software architecture of programs that use 3D computer graphics.	Understand	PO1
CO2	Discuss hardware system architecture for computer graphics.	Understand	PO1,PO2
CO3	Understand graphics pipeline, frame buffers, and graphic accelerators / co processors.	Understand	PO1,PO2
CO4	Select among models for lighting/shading Color, ambient light, distant and light with sources, Phong reflection model and shading	Applying	PO2,PO3, PO4, PO5

Unit-I:

Basic Of Computer Graphics: Pixel, Buffer frame, raster scan and random scan, resolution, aspect ratio, rasterization and scan conversion

2D primitives: Output primitives – Line, Circle and Ellipse drawing algorithms

Outcome:

- Able to describe the architecture used in computer graphics programming
- Able to understand different types of hardware and software used in computer graphics

Activity:

- Implement a line drawing algorithm to draw a snowman.

Unit-II:

Polygon Filling Algorithms: Scan line polygon, boundary filling flood filling

Clipping Algorithms: Cohen Sutherland , Sutherland-Hodgemen and Cyrus-Beck

Outcome:

- Able to understand different types of filling algorithms used in graphics.

Activity:

- Add to your drawing algorithm implementing any one of the filling algorithms.

Unit-III:

2-D Geometrical Transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transformations between coordinate systems

3-D Geometric Transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3D Viewing pipeline, clipping, projections (Parallel and Perspective).

Outcome:

- Able to understand key transformation algorithms used in real time scenario

Activity:

- Create a simple polygon that rotates in 3D on its y-axis.

Unit-IV:

Rendering: Introduction to Shading models – Flat and Smooth shading – Adding texture to faces–Adding shadows of objects – Building a camera in a program – Creating shaded objects– Rendering texture – Drawing Shadows.
Fractals: Fractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals

Outcome:

- Know and able to understand graphics pipeline, frame buffers, and graphic accelerators / co-processors.
- Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phone reflection model; and shading (flat, smooth, Goraud,Phong).

Activity:

- Add a floor to your scene and add a shadow of your object on the floor. You should see the shadow change as the object spins

Unit-V:

Visible Surface Detection Methods: Classification, back-face detection, depth-buffer, ray tracing method, depth sorting, BSP tree methods.

Graphics Programming: Colour Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Key frame - Graphics programming using OPENGL – Basic graphics primitives –Drawing three dimensional objects - Drawing three dimensional scenes

Outcome:

- Know and understand various colour models applied in real world.
- Know and able to select graphics accelerators / co-processors

Activity:

- Create a simple Screen saver program using basic OPENGL commands

Text Books:

1. Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition Pearson Education, 2004.
2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

Reference Books:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics-Principles and practice, Second Edition in C, Pearson Education, 2007.

Course Code		L	T	P	Credits
1012172202	JAVA PROGRAMMING	3	1	0	3

Course Overview:

Java has emerged as the object-oriented programming language of choice.

- Some of the important concepts of Java include are:
  a. A Java virtual machine (JVM), which provides the fundamental basis for platform independence.
  b. Automated storage management techniques, such as garbage collection, collection frameworks
  c. Language syntax that is similar to that of the C language.

Course Objectives:

- To Understanding the object oriented programming concepts like Data Abstraction, Encapsulation, Inheritance and Polymorphism.
- Gain the knowledge about the relationship between the classes and objects.
- Understand the principles of Inheritance, Packages, Multithreading and Interfaces.
- To understand and apply the concepts of Applets and AWT.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Identify the concepts and features of object oriented programming in Java.	Understanding	PO1, PO2
CO2	Describe and implement the programs with command line arguments and Scanner Class.	Analyzing	PO1, PO2, PO3,PO5
CO3	Analyze and implement the concepts of Inheritances and Multithreading with real world scenario.	Applying	PO1, PO2, PO3,PO5
CO4	Develop GUI programs using Applets and Event Handling.	Applying	PO1, PO2, PO3,PO5

Unit-I:

Introduction to OOP:

Introduction, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

Outcome:
Be familiar with Object oriented programming techniques.

- Explain the structure of the program
- Demonstrate various control structures in JAVA.

Activity:

Simulate various control structures for real time applications.

Unit-II:

Classes and Objects :

Abstract Data Type, Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

Outcome:

- Outline the relation between class and object.
- Illustrate the difference between method and constructor overloading.
- Make use of static keyword and this keyword.
- Analyze the Command Line arguments.

Activity:

Develop real time applications using OOPs concepts through various ADT's.

Inheritance:

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java. Lang Package. Exception handling, importance of try, catch, throw, throws and finally block, user defined exceptions, Assertions, Collection inbuilt classes.

Multithreading: Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

Outcome:

- Classify various types of Inheritance.
- Illustrate the difference between method overloading and overriding.
- Demonstrate to usage of Packages.
- Make use of Exception Handling.
- Develop and make use of synchronization through multithreading.

Activity:

Develop enhanced applications from existing versions to new versions.

Unit-IV:

Applets: Applet class, Applet structure, Applet life cycle, sample Applet programs.

Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

Outcome:

- Explain the structure of Applet Program.
- Construct an approach for event delegation model.
- Build the frame based applications using event handling mechanism.

Activity:

Develop client browser applications with Graphics

Unit-V:

AWT: Introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

Outcome:

- Extend the importance of AWT.
- Develop the components and containers in AWT.
- Develop the GUI application using checkboxes, radio buttons, List Boxes etc.
- Construct different types of Layouts

Activity:

Develop a client side module which contains checkboxes, text fields, text area, radio buttons etc.

Text Books:

1. The complete Reference Java, 8thedition, Herbert Schildt, TMH.

2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.

3. Introduction to java programming, 7thedition by Y Daniel Liang, Pearson.

Reference Books:

1. Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in

2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

Course Code		L	T	P	Credits
1012172203	E - COMMERCE	3	1	0	3

Course Overview:

This course introduces the learner to various topologies used within e-commerce, the infrastructure required and security needed to make e-commerce possible. Various topologies and security plans allow producers and consumers to sell and purchase with ease. Major advances in technology have seen e-commerce becoming extremely viable for business and also very convenient for consumers. This course will be of great interest to business professionals, as well as any learner wanting to expand their knowledge and understanding of e-commerce.

Course Objectives:

- Identify the major categories and trends of e-commerce applications.
- Identify the essential processes of an e-commerce system.
- Identify several factors and web store requirements needed to succeed in e-commerce.
- Discuss the benefits and trade-offs of various e-commerce clicks and bricks alternatives.
- Understand the main technologies behind e-commerce systems and how these technologies interact.
- Discuss the various marketing strategies for an online business.
- Define various electronic payment types and associated security risks and the ways to protect against them.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Identify, interpret and analyze stakeholder needs	Understand, Analyze	PO1, PO2, PO3, PO4, PO5
CO2	Identify and apply relevant problem solving methodologies	Understand, Applying	PO1, PO2, PO3, PO4, PO5
CO3	Design components, systems and/or processes to meet required specifications	Understand	PO1, PO2, PO3, PO4
CO4	Demonstrate research skills	Understand	PO1, PO2

Unit-I:

Electronic Commerce:

Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications. Consumer Oriented Electronic Commerce - Mercantile Process models.

Outcome: Demonstrate an understanding of the foundations and importance of E-commerce

Activity:

How a fresh juice company grew sales from $8,000 per month to $96,000 per month.

Unit-II:

Electronic payment systems:

Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems.

Outcome:

Understand the different forms of electronic money

Activity:

Navigate to the site(s) of your choice and then try to find out how the organization uses digital cryptography to help make your transactions secure.

Unit-III:

Inter Organizational Commerce:

EDI, EDI Implementation, Value added networks.

Intra Organizational Commerce:

Work Flow, Automation Customization and internal Commerce, Supply chain Management

Outcome:

Describe Internet trading relationships including Business to Consumer, Business-to-Business, Intra-organizational.

Activity: A comparison of inter- and intra-organizational relationships.

Unit-IV:

Corporate Digital Library:

Document Library, digital Document types, corporate Data Ware houses. Advertising and Marketing - Information based marketing, Advertising on Internet, On-line marketing process, market research.

Outcome:

Discuss legal issues and privacy in E-Commerce Recognize and discuss global E-commerce issues

Activity:

Compare and Contrast the marketing strategies of Ecommerce sites.

Unit-V:

Consumer Search and Resource Discovery: Information search and Retrieval, Commerce Catalogues, Information Filtering.

Multimedia: key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing, Desktop video conferencing

Outcome:

Give an outline of searching and retrieval of information.
Explain the information filtering.
Describe the basic concepts of multimedia

Activity:

Discuss the effects of multimedia in your daily life

Text Books:

1. Frontiers of electronic commerce – Kalakata, Whinston, Pearson.

Reference Books:

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, TharamDillon, Ellizabeth Chang, John Wiley.
2. E-Commerce, S.Jaiswal – Galgotia.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
4. Electronic Commerce – Gary P.Schneider – Thomson.
5. E-Commerce – Business, Technology, Society, Kenneth C.Taudon, Carol GuyericoTraver.

Course Code	COMPUTER ORGANIZATION & ARCHITECTURE	L	T	P	Credits
1012172204		3	1	0	3

Course Overview:

This course is intended to give you a basic understanding of how computers execute programs. Understanding computers means understanding the hardware/software process of how you and the computer work together to have the computer carry out a task. In this course, building will not mean connecting chips and gates. Rather, you will describe the hardware in diagrams, finite-state machines, and hardware simulators.

Course Objectives:

- To study the basic organization and architecture of digital computers (CPU, memory, I/O, software). Also the Performance measurement of the computer system.
- To understand various data transfer techniques in digital computer.
- Be familiar with functional units of processor such as register file and arithmetic logic unit.
- To understand the stages in instruction set life cycle.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	To conceptualize the basics of organizational and architectural issues of a digital computer and to perform computer arithmetic operations.	Understanding	PO1,PO2
CO2	To analyze performance issues in processor and can calculate the effective address of an operand by addressing modes.	Analyzing	PO1,PO2,PO3,PPO4
CO3	Ability to design memory organization that uses banks for different word size operations to understand the concept of cache memory techniques	Applying	PO1, PO2, PO3, PO4,PO5
CO4	Understand the concept of Input / Output organization.	Understanding	PO1,PO2

Unit-I:

Introduction to Computers:

Basic of Computer, internal organization of CPU, Functional Units, Software, Basic Operational Concepts, Von Neumann Architecture, Data Representation, Fixed-Point Representation, Floating-Point Representation.

Outcome:

To conceptualize the basics of organizational and architectural issues of a digital computer and to perform computer arithmetic operations.

Activity:

Describe the importance of components of computer and impact of computers on society.

Unit-II:

Register Transfer and Micro operations:

Register Transfer Language, Bus and Memory Transfers, Arithmetic, Logic and Shift Micro operations, Arithmetic Logic Unit.
Basic Computer Organization: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt.

Outcome:

To understand the concept of Input / Output organization.

Activity:

Design of ALU (Arithmetic Logical Unit) in a digital circuit to perform operations like addition, subtraction, division, multiplication and logical operations and, or, xor .

Unit-III:

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes with numerical examples, Data Transfer and Manipulation, Program Control, Program Interrupt, Types of interrupts, CISC Characteristics, RISC Characteristics. Introduction to Parallel Processing, Pipelining – General Considerations.

Control Design: Hardwired & Micro Programmed (Control Unit), Control Memory, Address Sequencing, Conditional and Unconditional Branching, Micro program Example.

Outcome:

To analyze performance issues in processor and can calculate the effective address of an operand by addressing modes.

Activity:

Describe the external behaviour of data and control signals that is their exchanges with components with respective to your system.

Unit-IV:

Memory Organization:

Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Outcome:

Ability to design memory organization that uses banks for different word size operations to understand the concept of cache memory techniques

Activity:

Design a 4 X 4 Random Access Memory (RAM)

Unit-V:
Input-Output Organization:

Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access. Multi Processors: Introduction, Characteristics or Multiprocessors, Interconnection Structures, Inter Processor Arbitration.

Outcome:

To analyze performance issues in processor and can calculate the effective address of an operand by addressing modes.

Activity:

Discuss about DMA (Direct Memory Access) in various PC Platforms

Text Books:

1. Computer System Architecture, M.Moris Mano, 3rd Edition, Pearson/PHI
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.

Reference Books:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - SivaRaamaDandamudi Springer Int. Edition.
4. “Computer Organization and Design: The Hardware/Software Interface” by David A. Patterson and John L. Hennessy

Course Code		L	T	P	Credits
1012172205	OBJECT ORIENTED ANALYSIS AND DESIGN USING UML	3	1	0	3

Course Overview:

The course discusses object-oriented analysis and design using Unified Modelling Language (UML) by understanding the insight knowledge into analyzing and designing Complex software system using Object – Oriented approach and Provide the notations of Unified Modelling Language like Basic Behavioral, Advanced Behavioral and Architectural Modelling.

Course Objectives:

- Explore and analyze different analysis and design models, such OO Models, Structured Analysis and Design Models, etc.
- Understanding the insight and knowledge into analyzing and designing software using different object-oriented modeling techniques
- Understanding the fundamental principles through advanced concepts of analysis and design using UML notations.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Build solutions to the complex problems using object oriented approach	Creating	PO1,PO3
CO2	Identify classes and responsibilities of the problem domain	Understand	PO1,PO2
CO3	Apply UML tools for various case studies	Apply	PO4,PO5,PO12
CO4	Represent classes, objects, responsibilities and states using UML notations.	Remember and Understand	PO1,PO2

Unit-I:

Introduction:

The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems, Evolution of Object Model, Foundation of Object Model, Elements of Object Model, Applying the Object Model.

Outcome:

- To design a solution using Object-Oriented method for a Complex Software System.

Activity: Illustrate a solution to a complex software system.

Unit-II:

Classes and Objects: Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms.

Outcome:

- Understand the basic relationship among Classes and Objects
- Identification of Class and Object in Object-oriented approach.

Activity:

To identify the difference between a Class and Object diagram using sample scenarios.

Unit-III:

Introduction to UML: Why we model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams.

Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams.

Outcome:

- Understand conceptual model of UML using different notations.
- To design Basic Behaviour a modelling diagram using Use Case, Interaction and Activity scenarios.

Activity:

- Design a Use case diagram for sample case study.
- Develop Interaction and Activity Diagrams using sample case studies.

Unit-IV:

Advanced Behavioral Modeling:

Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

Outcome:

Learn about events and signals to be handle in developing a state chart diagram.

Activity:

Create a State Chart diagram using a sample scenario in real time application.

Unit-V:

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

Case Study: The Unified Library application.

Outcome:

- To design and understand the component diagram.
- To identify the difference between component and deployment diagram.

Activity:

Perform a real time activity to identify component and deployment diagrams in UML.

Text Books:

1. "Object- Oriented Analysis And Design with Applications", Grady BOOCH,Robert Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3rd edition, 2013,PEARSON.
2. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, 12th Impression, 2012,PEARSON.

Reference Books:

1. "Object-oriented analysis and design using UML", Mahesh P. Matha,PHI
2. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West,O"Reilly
3. "Object-orientedanalysisanddesignwiththe Unifiedprocess",JohnW Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning
4. "The Unified modeling language Reference manual", James Rumbaugh, IvarJacobson, Grady Booch, Addison-Wesley

Course Code	LANGUAGE PROCESSORS	L	T	P	Credits
1012172206		3	1	0	3

Course Overview:

This course covers the main design practices and principles for the development of programming languages. This course covers the basic of finite automata and regular expressions. It also covers the analysis and synthesis phases of a language processor: lexical analysis, syntax analysis (top-down and bottom-up techniques), semantic analysis, runtime environments, error handling, intermediate code, code optimization, and final code generation.

Course Objectives:

- Describes how a programming language works
- How input is converted into output from the machine hardware level and various phases of compiler
- Understanding the Language Semantics
- Understanding the relation between the source code and generated machine code.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Construct LL, SLR, CLR and LALR parse table.	Applying	PO3, PO4
CO2	Understand Parser and its types i.e. Top-down and Bottom-up parsers.	Understanding	PO1, PO2
CO3	Classify machines by their power to recognize languages	Understanding	PO1, PO2
CO4	Syntax directed translation, synthesized and inherited attributes and analyze techniques for code optimization	Analyzing	PO1,PO2, PO3, PO4

Unit-I:

Formal Language and Regular Expressions:

Languages, operations on languages, regular expressions (re), Languages associated with (re), operations on (re), identity rules for (re), Finite Automata: DFA, NFA, Conversion of regular expression to NFA, NFA to DFA, Applications of Finite Automata to lexical analysis.

Outcome:

- Learn the basic terminology and operations of languages; identify the difference between DFA and NFA.
- Understand the power and the limitations of regular languages and Lexical Analysis.

Activity:

Construct the equivalent DFA for the NFA chosen from any source.

Unit-II:

Context Free grammars and parsing:

Context free Grammars, Leftmost Derivations, Rightmost Derivations, Parse Trees, Ambiguity Grammars, Top-Down Parsing, Recursive Descent Parsers: LL(1) Parsers. Rightmost Parsers: Shift Reduce Parser, LR (0) Parser, SLR (1) Parser, LR (1) & LALR (1) Parsers, Ambiguous Grammars.

Outcome:

- Learn the basics of context free grammars and various Parsing techniques
- Identify various parsing techniques for a given grammars.

Activity:

- Obtain the leftmost and rightmost derivations for a given grammar.
- Construct SLR, LR and LALR parsing tables for a given grammars using Bottom Up Parsing technique.

Unit-III:

Syntax Directed Translation: Definitions, construction of Syntax Trees, S-attributed and L-attributed grammars, Intermediate code generation, abstract syntax tree, translation of simple statements and control flow statements.

Semantic Analysis: Semantic Errors, Chomsky hierarchy of languages and recognizers, Type checking, type conversions.

Outcome:

- Explain semantic analysis in the context of the compilation process.
- Describe scope checking and type checking.
- Specify the functions of semantic analysis.

Activity:

- Distinguish between S-attributed grammars and L-attribute grammars and illustrate with an example.

- Construct syntax for the expression and identify the typical semantic errors.

Unit-IV:

Storage Organization:

Storage Organization Issues, Storage Allocation Strategies, Scope, Access to Nonlocal Names, Parameter Passing, Dynamics Storage Allocation Techniques.

Code Optimization:

Issues in the design of code optimization, Principal sources of optimization, optimization of basic blocks, Loop optimization, and peephole optimization.

Outcome:

- Describe the role of intermediate representation and runtime environments in the compilation process.
- Explain the encoding of data structures in runtime memory.
- Understand various code Optimization techniques.

Activity:

Describe about various storage allocation strategies and illustrate deep access and shallow access with an example.

Unit-V:

Code Generation:

Issues in the design of code Generation, Machine Dependent Code Generation, object code forms, Register allocation and assignment, DAG representation of basic Blocks, Generating code from DAGs.

Outcome:

- Explain the importance of Code Generation.
- Identify the difficult aspects of code generation.
- Construct DAG based representation of basic blocks.

Activity:

Explain how a basic block is represented using a DAG and construct DAG based local optimization for a given basic block.

Text Books:

1. A Text Book on Automata Theory, Nasir S.F.B, P.K. Srimani, Cambridge university Press.
2. Introduction to Automata Theory, Formal languages and computation, Shamalendukandar,
3. Compilers Principles, Techniques and Tools, Aho, Ullman, Ravi Sethi, PEA

4. Introduction to theory of computation, 2nd ed, Michel sipser, CENGAGE
5. Principles of Compiler Design, A.V. Aho .J.D.Ullman; PEA

Reference Books:

1. Theory of Computer Science, Automata languages and computation , 2/e, Mishra, Chandra Shekaran, PHI
2. Theory of Computation ,aproblem solving approach, kavi Mahesh, Wiley

Course Code		L	T	P	Credits
	UNIFIED MODELING LANGUAGE LAB				
1012172221		**0**	**0**	**3**	**2**

Course Objectives:

- Learn basic concepts of UML. Master the vocabulary, rules, and idioms of the UML and learn how to model it effectively.
- Understand how to apply the UML to solve a number of common modeling problems
- Model the systems, from concept to executable artifact, using object oriented techniques.
- Apply the knowledge of Software engineering and project management.
- Create a requirements model using UML class notations and use-cases based on statements of user requirements, and to analyze requirements models given to them for correctness and quality.

Course Outcomes:

- Sketch a Modeling with UML by Deploying Structural Modeling, Behavioural Modeling, Architectural Modeling.
- Recognize the difference between various object relationships: inheritance, association, whole-part, and dependency relationships
- Show the role and function of each UML model in developing object oriented software.

List of Experiments:

Week 1:
Familiarization with Rational Rose or Umbrello

Week 2, 3 & 4:

For each case study:

a) Identify and analyze events

b) Identify Use cases

c) Develop event table

d) Identify &analyze domain classes

e) Represent use cases and a domain class diagram using Rational Rose

f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

Week 5 & 6:
For each case study:

a) Develop Use case diagrams

b) Develop elaborate Use case descriptions & scenarios

c) Develop prototypes (without functionality)

d) Develop system sequence diagrams

Week 7, 8, 9 & 10:

For each case study:

a) Develop high-level sequence diagrams for each use case

b) Identify MVC classes / objects for each use case

c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects

d) Develop detailed design class model (use GRASP patterns for responsibility assignment)

e) Develop three-layer package diagrams for each case study

Week 11 & 12:

For each case study:

a) Develop Use case Packages

b) Develop component diagrams

c) Identify relationships between use cases and represent them

d) Refine domain class model by showing all the associations among classes

Week 13:

For each case study:

a) Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

Course Code		L	T	P	Credits
	JAVA PROGRAMMING LAB				
1012172222		0	0	3	2

Course Objectives:

- To understand object oriented programming concepts, and apply them in problem solving.
- To learn the basics of java Console, GUI based programming and networking programming.

Course Outcomes:

- Understanding the basics of Java programming, Inheritance, Multithreading and Exception Handling.
- The skills to apply OOP and Java programming in problem solving.
- Use of GUI based concepts like Applets and AWT.
- Should have the ability to extend his/her knowledge in Java programming with his/her own business logic

List of Experiments:

Exercise - 1 (Basics)

a) Write a JAVA program to display default value of all primitive data type of JAVA

b) Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

c) Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

d)Write a case study on public static void main(250 words)

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b) Write a JAVA program to sort for an element in a given list of elements using bubble sort

c) Write a JAVA program to sort for an element in a given list of elements using merge sort.

d) Write a JAVA program using String Bufferto delete, remove character.

Exercise - 3 (Class, Objects)

a) Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.

b) Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

a)Write a JAVA program to implement constructor overloading.

b)Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)

a)Write a JAVA program to implement Single Inheritance

b)Write a JAVA program to implement multi level Inheritance

c)Write a java program for abstract class to find areas of different shapes

Exercise - 6 (Inheritance - Continued)

a)Write a JAVA program give example for "super" keyword.

b)Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

a)Write a JAVA program that describes exception handling mechanism

b)Write a JAVA program Illustrating Multiple catch clauses

Exercise – 8 (Runtime Polymorphism)

a)Write a JAVA program that implements Runtime polymorphism

b)Write a Case study on run time polymorphism, inheritance that implements in above problem

Exercise – 9 (User defined Exception)

a)Write a JAVA program for creation of Illustrating throw

b)Write a JAVA program for creation of Illustrating finally

c)Write a JAVA program for creation of Java Built-in Exceptions

d)Write a JAVA program for creation of User Defined Exception

Exercise – 10 (Threads)

Write a JAVA program that creates threads by extending Thread class. First thread displays "Good Morning" every 1 sec, the second thread displays "Hello" every 2 seconds and the third thread displays "Welcome" every 3 seconds (Repeat the same by implementing Runnable)

Exercise - 11 (Threads continuity)

a) Write a JAVA program Producer Consumer Problem

b) Write a case study on thread Synchronization after solving the above producer consumer problem

Exercise – 12 (Packages)

a) Write a JAVA program illustrate class path

b) Write a case study on including in class path in your os environment of your package.

c) Write a JAVA program that import and use the defined your package in the previous Problem

Exercise - 13 (Applet)

A) Write a JAVA program to paint like paint brush in applet.
b) Write a JAVA program to display analog clock using Applet.
c) Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 14 (Event Handling)

a) Write a JAVA program that display the x and y position of the cursor movement using Mouse.
b) Write a JAVA program that identifies key-up key-down event user entering text in a Applet

PROGRAM STRUCTURE

FOR

III - B.TECH

I & II SEMESTERS

DEPARTMENT OF INFORMATION TECHNOLOGY
PROGRAM STRUCTURE

III B.Tech I Semester

S.No	Course Code	Course Title	L	T	P	Credits
1	1012173101	Human Computer Interaction	3	1*	0	3
2	1012173102	Advanced Java Programming	3	1*	0	3
3	1012173103	Database Management Systems	3	1*	0	3
4	1012173104	Unix Programming	3	1*	0	3
5	1005172206	Operating Systems	3	1*	0	3
6	1012173121	Advanced Java Programming Lab	0	0	3	2
7	1012173122	Unix and Operating Systems Lab	0	0	3	2
8	1012173123	Database Management System Lab	0	0	3	2
9	1099172103	Professional Ethics & Human Values	0	3	0	0
		Total Credits				**21**

III B.Tech II Semester

S.No	Course Code	Course Title	L	T	P	Credits
1	1005173201	Computer Networks	3	1*	0	3
2	1005173202	Web Technologies	3	1*	0	3
3	1012173201	Software Testing Methodologies	3	1*	0	3
4	1012173202	Data Ware housing & Data Mining	3	1*	0	3
5	**Elective – I:**					
	1012173203	e) Social Networks and Semantic Web	3	1*	0	3
	1012173204	f) Biometric Systems				
	1012173205	g) Neural Networks				
	1012173206	h) Operation Research				
6	**Open Elective :**					
	1005173204	e) Artificial Intelligence	3	1*	0	3
	1012173207	f) Introduction to Digital Signal Processing				
	1005173205	g) Embedded Systems				
	1003173203	h) Robotics				
7	1012173221	Data Mining Lab using WEKA	0	0	3	2

8	1005173223	Web Technologies Lab	0	0	3	2
9	1012173222	Software Testing Lab	0	0	3	2
10	1099173101	IPR & Patents	0	2*	0	0
Total Credits						**24**

S.No	Course Code	Name of the Course	L	T	P	Credits
1	1012173241	Industry Oriented Mini Project	0	0	0	2

DETAILED SYLLABUS

FOR

III - B.TECH

I SEMESTER

Course Code	HUMAN COMPUTER INTERACTION	L	T	P	Credits
1012173101		3	1	0	3

Course Overview:

This course covers the principles of human-computer interaction and the design and evaluation of user interfaces. Topics include an overview of human information processing subsystems (perception, memory, attention, and problem solving); how the properties of these systems affect the design of user interfaces; the principles, guidelines, and specification languages for designing good user interfaces.

Course Objectives:

- Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
- Recognize how a computer system may be modified to include human diversity
- Design mock ups and carry out user and expert evaluation of interface
- Design mock ups and carry out user and expert evaluation of interfaces
- Carry out the steps of experimental design, usability and experimental testing, and evaluation of human computer interaction systems
- Use the information sources available, and be aware of the methodologies and technologies supporting advances in HCI.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understand the basics of human and computational abilities and limitations	Understand	PO1, PO2, PO4
CO2	Understand the fundamental aspects of designing and evaluating interfaces.	Understand	PO1,PO2,PO4,
CO3	Apply new theories, tools and techniques in HCI.	Applying	PO1,PO2, PO4,PO5
CO4	To analyze and design software systems, components to meet desired needs.	Applying	PO1, PO2, PO4,PO5

Unit-I:

Introduction to HCI & The graphical user interface:

Introduction:

Importance of user Interface, definition, importance of good design. Benefits of good design. A brief history of Screen design

The graphical user interface:

Popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user –interface popularity, characteristics- Principles of user interface.

Outcome:

1. Understand the basics of human and computational abilities and limitations
2. Understand basic theories, tools and techniques in HCI.

Activity/Event : Seminar and Class Test

Unit-II:

Design process:

Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, Understanding business junctions

Outcome:

Have a capacity to analyze and design software systems, components to meet desired needs.

Activity/Event : Seminar and Class Test

Unit-III:

Screen Designing :

Design goals, Screen planning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

Outcome:

- Understand the fundamental aspects of designing and evaluating interfaces.

Activity/Event : Seminar and Class Test

Unit-IV:

Windows:

Windows new and Navigation schemes selection of window, selection of devices based and screen based controls.

Components:

Components text and messages, Icons and increases, Multimedia, colors, uses problems, choosing colors.

Outcome:

- Practice a variety of simple methods for evaluating the quality of a user interface

Activity/Event : Seminar and Class Test

Unit-V:

Software tools: Specification methods, interface, Building Tools.

Interaction Devices:

Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.

Outcome:

1. Apply appropriate HCI techniques to design systems that are usable by people

Activity/Event : Seminar and Class Test

Text Books:

1. Wilbert O. Galitz, "The Essential Guide to User Interface Design", Wiley India Edition
2. Prece, Rogers, "Sharps Interaction Design", Wiley India.
3. Ben Shneidermann,"Designing the user interfaces". 3rd Edition, Pearson Education Asia.

Reference Books:

1. Soren Lauesen, "User Interface Design" , Pearson Education
2. Alan Cooper, Robert Riemann, David Cronin, "Essentials of Interaction Design", Wiley
3. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell, Bealg,"HumanComputer Interaction", Pearson Education

Course Code		L	T	P	Credits
1012173102	ADVANCED JAVA PROGRAMMING	3	1	0	3

Course Overview:

This course mainly used to develop web applications. Web application is an application running inside the server to provide some services to the client. It is a world wide web (WWW) distributed application. The main use of java is enterprise vision.

Course Objectives:

Getting the student to be well trained in Advanced Java Programming skills for an easy entry in the IT Industry

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Develop advanced HTML pages with the help of tags and scripting language.	Understand	PO1, PO2, PO4
CO2	Understand scope, life cycles, request and response headers.	Understand	PO1,PO2, PO4
CO3	Construct a Web Application using Servlets	Applying	PO1,PO2, PO4,PO5
CO4	Construct a Web application using Java Server Pages	Applying	PO1, PO2, PO4,PO5

Unit-I:

Recapitulation of HTML, HTML5, Java Swing package – use of System class – Applet Context – signed applet – object serialization- shallow and deep copying – Java collections – Iterators – Array Lists – sets –hashset-hash table- queue- priority queue class-vector class-comparable interface.

Outcome:

- Develop advanced HTML pages with the help of tags and scriptinglanguage.
- Able to use graphical user interface and Event Handling injava.

Activity/Event :

Develop static web pages for real time applications.

Unit-II:

Java Beans Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizers, Java Beans API

Outcome:

- Configure BDK for running Java Beansprograms

Activity/Event :

Develop GUI applications using BDK.

Unit-III:

Introduction to Servelets: Lifecycle of a Serverlet, JSDK The Servelet API, The javax. servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, servlet chaining-Security Issues

Outcome:

- Develop java servlets to handle HTTP requests.
- Understand how data is passed to servlets and how to retrieve information from htmlfiles.

Activity/Event :

Develop web applications using servlets..

Unit-IV:

Introduction to JSP The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

JSP Application Development:

Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations

Outcome:

- Understands the fundamentals and reasons for MVC architecture
- Implement an interactive Web application using JSP.

Activity/Event :

Develop web applications using JSP.

Unit-V:

Database Access Database Programming using JDBC Studying Javax.sql. package. Accessing

MySql database- Accessing MS Access database- Accessing a Database from a JSP Page Application – Specific Database Actions Deploying JAVA Beans in a JSP Page. Introduction to struts framework.

Outcome:

- To write a server side java application called Servlet tocatch form data sent from client, process it and store it ondatabase.
- To write a server side java application called JSP to catchform data sent from client and store it ondatabase.

Activity/Event :

Develop dynamic web pages using various databases.

Text Books:

1. Internet and World wide web- How to program,Dietel and Nieto, Pearson. (Chapters: 3, 4, 8, 9, 10, 11, 12 to 18)
2. The Complete Reference, Java 2 , 3ed, Patrik Naughton, Herbert Schildt, TMH. (Chapters: 19, 20, 21, 22, 25, 27)
3. Java Server Pages , Hans Bergstan, Oreilly (Chapters: 1-9)

Reference Books:

1. Jakarta Struts cook book, Bill Siggelkow, SPD, Oreilly(Chapter 8)
2. Murach's, Beginning Java JDK5, Murach, SPD.
3. An introduction to Web Design and Programming, Wang Thomson
4. Web application technologies concepts, Knuckles, John Wiley.
5. Programming world wide web, Sebesta, Pearson
6. Building Web Applications, NIIT, PHI
7. Web Warrior Guide to Web Programing, Bai, Ekedaw, Thomas, Wiley
8. Beginning Web Programming, Jon Duckett ,Wrox, WileyJava server pages, Pekowsky, Pearson

Course Code	DATA BASE MANAGEMENT SYSTEMS	L	T	P	Credits
1012173103		3	1	0	3

Course Overview:

This course introduces database design and creation using a DBMS product. Emphasis is on data dictionaries, normalization, data integrity, data modelling, and creation of simple tables, queries, reports, and forms. Upon completion, students should be able to design and implement normalized database structures by creating simple database tables, queries, reports, and forms.

Course Objectives:

- Provide students with theoretical knowledge and practical skills in the use of database and database management systems in information technology applications.
- The logical design, physical design and implementation of relational databases are covered.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Describe ER model and normalization for database design.	Analyzing	PO1, PO2, PO4
CO2	Create, maintain and manipulate a relational database using SQL	Applying	PO1,PO2,PO4,PO5
CO3	Design and build database system for a given real world problem.	Applying	PO1,PO2,PO4,PO5
CO4	Examine issues in data storage and query processing and can formulate appropriate solutions.	Understand	PO1, PO2

Unit-I:

Introduction to Database Systems:

File System Vs DBMS, Advantages of DBMS, Structure of DBMS, Levels of Data Abstraction (Data Independence), Database Users and Administrators, Database Architecture, Different Data Models.

Entity Relationship Model:
Introduction, Representation ofentities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER

Diagrams.

Outcome:

After Completion of the Unit, Student will Be able to:

- Describe the Architecture of Database Management Systems
- Design different ER Models
- Understand the applications of dbms, difference between file systems vs. dbms, identify the data models ,understand dbms structure

Activity: Draw ER Diagram for Various Real Time Systems.

Unit-II:

Relational Model:

Introduction to relational model, concepts of domain, attribute, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance.

Basic SQL :

Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion).

Outcome:

After Completion of the Unit, Student will Be able to**:**

- To differentiate the knowledge in TRC & DRC
- Compare relational model with the structured query language (SQL)
- Understands the relational algebra concepts, selection ,projection ,relational calculus which helps in understanding queries

Activity: Tabulate Various Relational Models for Real Time Application.

Unit-III:

SQL:

Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, views, relational set operations.

Schema Refinement (Normalization) :

Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

Outcome:

After Completion of the Unit, Student will Be able to:

- Design the new database.
- Master the basic concepts and appreciate the applications of database systems.
- Master the basics of SQL and construct queries using SQL.

Activity: Design a new Database and normalize the data

Unit-IV:

Transaction Management And Concurrency Control:

Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and save point. Concurrency control for lost updates, uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods : lock granularity, lock types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering : Wait/Die and Wound/Wait Schemes, Database Recovery management : Transaction recovery
SQL constructs that grant access or revoke access from user or user groups. Basic PL/SQL procedures, functions and triggers.

Outcome:

After Completion of the Unit, Student will Be able to**:**

- Make us of transactions for new concepts.
- Understands the properties of transaction management.
- Master the basics of query evaluation techniques and query optimization.
- Be familiar with the basic issues of transaction processing and concurrency control

Activity: Perform Transaction on Various Real Time Concepts.
Unit-V:

Overview of Storage and Indexing:

Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree based Indexing.

Outcome:

After Completion of the Unit, Student will Be able to:

- Differentiate different indexing techniques in real time.
- An ability to use and apply current technical concepts and practices in the
- Coreinformation technologies.
- Be familiar with a commercial relational database system (Oracle) by
- Writing SQLusing the system.
- Be familiar with the relational database theory, and be able to
- Write relational algebraexpressions for queries

Activity:

Create your own data base and connect the front-End and back-End

Text Books:

1. Database Management Systems, 3/e Raghuram Krishnan, Johannes Gehrke, TMH

2. Database Management System, 6/e RamezElmasri, Shamkant B. Navathe, PEA
3. Database System Concepts. 6/e Silberschatz, Korth, TMH

Reference Books:

1. Introduction to Database Systems, 8/e C J Date, PEA
2. The Database book principles & practice using Oracle/MySqlNarainGehani, University Press.
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

Course Code		L	T	P	Credits
1012173104	UNIX PROGRAMMING	3	1	0	3

Course Overview:

This course provides training on standard UNIX/Linux commands and utilities used for day to day tasks including file manipulation, program execution and control, and effective use of the shell and desktop environments. The course presents the concepts necessary to understand the way UNIX works as well as the system's most commonly used commands. Data manipulation utilities and shell syntax for synthesizing command pipelines are emphasized. Bourne shell, Bash shell and Korn shell programming techniques are introduced so students will be able to read and modify existing shell scripts as well as create their own.

Course Objectives:

- Written technical communication and effective use of concepts and terminology.
- Facility with UNIX command syntax and semantics.
- Ability to read and understand specifications, scripts and programs.
- Individual capability in problem solving using the tools presented within the class.
- Students will demonstrate a mastery of the course materials and concepts within in class discussions.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Explain the architecture and features of UNIX Operating System and differentiate it from other Operating Systems	Understand/Remember	PO1
CO2	Demonstrate UNIX commands for file handling and process control	Understand	PO1,PO10
CO3	Build Regular expressions for pattern matching and apply them to various filters for a specific task	Apply	PO1,PO2,PO3,PO5
CO4	Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem	Analyze	PO1,PO2,PO4,PO12

Unit-I:

Introduction to Unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands. File Handling Utilities, Text Processing Utilities, Process Utilities, Disk Utilities

Outcome:

- Demonstrate basic commands, command substitution, command chaining in UNIX.

Activity/Event: Illustrate how UNIX commands are applicable in real time with ar example.

Unit-II:

The File system –The Basics of Files-What's in a File-Directories and File Names· Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

Outcome:

- Explain basics of files, directory hierarchy, permissions, and inodes in UNIX.
- Analyze file command to know the file type and chmod command to change file permissions

Activity/Event :

Demonstrate the use of chmod, chown, chgrp commands in real time applications.

Unit-III:

Using the Shell-Command Line Structure-Meta characters-Creating New Commands· Command Arguments and Parameters-Program Output as Arguments-Shell Variables- · More on I/O Redirection-Looping in Shell Programs.

Filters-

The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

Outcome:

- Demonstrate command arguments, shell variables, looping in shell programs.
- Illustrate filters, the stream editor, the awk pattern scanning and processing language.

Activity/Event :

Demonstrate the use of command arguments, shell variables, filters in real time applications.

Unit-IV:

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command.

Outcome:

- Demonstrate the export, read, set, exit, expr commands.
- Analyze The here Document(<<)-The Sleep Command-The Script Command-The Eval Command-The Exec Command

Activity/Event :

Demonstrate the use of export, exit, expr, sleep, script, eval, exec command in real time applications.

Unit-V:

The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control

Outcome:

- Design parent and child processes, foreground and background processes.
- Demonstrate internal and external commands, trap, stty, and kill commands.

Activity/Event :

Demonstrate the use of types of processes in real-time applications.

Text Books:

1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.

2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

Reference Books:

1. Unix and shell programming by B.M. Harwani, OXFORD university press

Course Code		L	T	P	Credits
1005172206	OPERATING SYSTEMS	3	1	0	3

Course Overview:

This course will introduce the core concepts of operating systems, such as processes and threads, scheduling, synchronization, memory management, file systems, input and output device management and security.

Course Objectives:

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Summarize various concepts of Operating Systems.	Understanding	PO1, PO2
CO2	Implement and Apply Process Scheduling Algorithms.	Applying	PO1, PO2, PO4,PO5
CO3	Illustrate concepts of Paging, Segmentation and Apply Concurrency, Deadlock Mechanisms in real world.	Applying	PO1, PO2, PO3
CO4	Analyze the concepts of file systems in operating systems.	Analyzing	PO1, PO3, PO12

Unit-I:

Introduction to Operating System Concept:

Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

Outcome:

Define Operating System and describe types of Operating Systems.

Activity/Event: Brainstorming method

Unit-II:

Process Management:

Process concept, The process, Process State Diagram , Process control block, Process Scheduling-Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms. Case Studies: UNIX, Linux, Windows

Outcome:

Define the concept of process and apply process scheduling algorithms

Activity/Event : Problem solving related to CPU Scheduling algorithms

Unit-III:

Memory Management:

Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation Case Studies: UNIX, Linux, Windows

Virtual Memory Management:

Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

Outcome:

Illustrate the concept of Paging and Segmentation

Activity/Event : Visualization of concepts using model charts

Unit-IV:

Concurrency:

Process Synchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples Case Studies: UNIX, Linux, Windows

Principles of deadlock :

System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

Outcome: Apply the concept of Concurrency to real world problems.

Activity/Event: Role play related to classic problems of synchronization

Unit-V:

File system Interface:

The concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection. File System implementation- File system structure, allocation methods, free-space management Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers, Case Studies: UNIX, Linux, Windows

Outcome: Design and Implement a prototype file systems.

Activity/Event: Seminar method

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.
3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016 .

Reference Books:

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001
2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education", 1996.
3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, Tata Mc Graw-Hill Education, 200

Course Code	ADVANCED JAVA PROGRAMING LAB	L	T	P	Credits
1012173121		0	0	3	2

Course Objectives:

To develop skills in students in developing applications using advanced concepts of advanced Java programming concepts like JDBC, Servlets, JSP, Java Beans, etc.

Course Outcomes:

After successful completion of course, students will be able appreciate and apply the advanced concepts of Java including JDBC, Servlets, JSP, Java Beans, etc.

Programs List:

1. Write a program to prompt the user for a hostname and then looks up the IP address for the hostname and displays the results.
2. Design the following static web pages
    a. Login page
    b. Registration page
3. Write programs for TCP server and Client interaction as per given below.
    i). A program to create TCP server to send a message to client.
    ii). A program to create TCP client to receive the message sent by the server.
4. Write programs for Datagram server and Client interaction as per given below.
    i). A program to create Datagram server to send a message to client.
    ii). A program to create Datagram client to receive the message sent by the server
5. Write a program in Java Beans to add a Button to the Bean and display the number of times the button has been clicked.
6. Create a simple visual bean with a area filled with a color. The shape of the area depends c property shape. If it is set to true then the shape of the area is Square and it is Circle, i false. The color of the area should be changed dynamically for every mouse click.
    The color should also be changed if we change the color in the “property window “.
7. Write a program to display a greeting message in the browser by using Http Servlet.
8. Write a program to receive two numbers from a HTML form and display their sum in the browser by using Http Servlet.
9. Write a program to store the user information into Cookies. Write another program to display the above stored information by retrieving from Cookies.
10. Program to demonstrate dynamic html using java Servlet.

11. Write a JSP program to print even and odd numbers.
12. Program to verify the particular user and redirect to welcome page if credentials are valid else print proper message.
13. Write a program by using JDBC to execute a SQL query for a database and display the results.
14. Write a program by using JDBC to execute an update query without using Prepared Statement and display the results.
15. Write a program by using JDBC to execute an update query by using Prepared Statement and display the results.
16. Write a program to execute a stored procedure in the database by using Callable Statement and display the results.

Course Code		L	T	P	Credits
1012173122	UNIX AND OPERATING SYSTEMS LAB	0	0	3	2

Course Objectives:

- To understand the design aspects of operating system.
- To study the process management concepts & Techniques.
- To study the storage management concepts.
- To familiarize students with the Linux environment
- To learn the fundamentals of shell scripting/programming
- To familiarize students with basic Unix administration

Course Outcomes:

- To use Unix utilities and perform basic shell control of the utilities
- To use the Unix file system and file access control.
- To use of an operating system to develop software
- Work confidently in Unix/Linux environment
- Write shell scripts to automate various tasks
- Master the basics of Linux administration

Programs List:

Operating Systems

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF c) FCFS d) Priority
2. Multiprogramming-Memory management- Implementation of fork (), wait (), exec() and exit (), System calls
3. Simulate the following
   a) Multi programming with a fixed number of tasks (MFT)
   b) Multiprogramming with a variable number of tasks (MVT)
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate Bankers Algorithm for Dead Lock Prevention.
6. Simulate the following page replacement algorithms.
   a) FIFO b) LRU c) LFU
7. Simulate the following File allocation strategies
   a) Sequenced b) Indexed c) Linked

UNIX Programming

1. Unix Basic commands
2. Session 1
    a. Login to the system
    b. Use VI editor to create a file called myfile.txt which contains some text
    c. Correct typing errors during creation
    d. Save file
    e. Logout of the system

    Session-2: Inserting or Adding Text
    Session-3: Changing Text
    Session-4: Deleting Text

3. Write a shell script to display the reverse numbers from given argument list
4. Write a shell script to which will display Armstrong numbers from given arguments
5. Write a shell script to display the factorial value from given argument list
6. Write a shell script to computes the gross salary of a employee according to the following rules:
    a. i)If basic salary is < 1500 then HRA = 10% of the basic and DA=90% of the basic
    b. ii)If basic salary is>=1500 then HRA =Rs500 and DA=98% of the basic.
    The Basic salary is entered interactively through the key board.
7. Write a shell script that accepts two integers as its arguments and computes the value of first number raised to the power of the second number.
8. Write a shell script that takes a command-line argument and reports on whether it is directory, file or something else.
9. Write a shell script to generate mathematical table
10. Write a script which will display Fibonacci series up to a given no. of arguments

Course Code		L	T	P	Credits
1012173123	DATA BASE MANAGEMENT SYSTEM LAB	0	0	3	2

Course Objectives:

- To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.
- To familiarize the participant with the nuances of database environments towards an information-oriented data-processing oriented framework
- To give a good formal foundation on the relational model of data
- To present SQL and procedural interfaces to SQL comprehensively
- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

Course Outcomes:

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application using a 4GL

Programs list:

1) Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2) Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
Example:- Select the roll number and name of the student who secured fourth rank in the class.

3) Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

4) Queries using Conversion functions (to char, to number and to date), string functions(Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, sub strand instr), datefunctions (Sysdate, nextday, addmonths, lastday, monthsbetween, least, greatest, trunc,round, tochar, todate)

5) Creation of simple PL/SQL program which includes declaration section, executable sectionand exception –Handling section (Ex. Student marks can be selected from the table andprinted for those who secured first class and an exception can be raised if no records were found).

6) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT inPL/SQL

block.

7) Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

8) Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE-APPLICATIONERROR.

9) Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

10) Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.

11) Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

12) Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

Course Code		L	T	P	Credits
1099172103	PROFESSIONAL ETHICS & HUMAN VALUES	0	3	0	0

Course Objectives:

- To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.
- Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

Course Outcomes:

	Course Outcome	Cognitive level as per Bloom's Taxonomy	PO
CO1	Recognize importance of human values, harmony and ethical behavior in real life situations	Understanding	PO-8
CO2	Describe the core values that shape the ethical behaviour of an engineer	Understanding	PO-8
CO3	Recall basics of professional ethics and human values.	Remembering	PO-8
CO4	Listing sustained happiness through identifying the essentials of human values and skills.	Remembering	PO-8
CO5	Describe the practical importance of trust, mutually satisfying human behaviour and enriching interaction with nature	Understanding	PO-8

Unit-I:

Human Values :

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully -Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality-Character.

Unit-II:
Engineering Ethics:

The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy – Professional and Professionalism –Professional Roles to be played by an Engineer – Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics-Types of Inquiry – Engineering and Ethics- Kohlberg's Theory – Gilligan's Argument –Heinz's Dilemma.

Unit-III:

Engineering as Social Experimentation:

Comparison with Standard Experiments – Knowledge gained –Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature ofEngineering

Unit-IV:

Engineers' Responsibility for Safety and Risk:

Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences- Expected Probability- Reversible Effects- Threshold Levels for Risk-Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

Unit-V:

Engineers' Responsibilities and Rights:
Collegiality-Loyalty-Professionalism and Loyalty- Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-Ethical egoism-Collective bargaining-Confidentiality-Acceptance of Bribes/Gifts- when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies- Occupational Crimes-industrial espionage-price fixing-endangering lives- Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing. Cross-culture Issues.

Text Books:

Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi

Reference Books:

1. Ethics in Engineering by Mike W. Martin and Roland Schinzinger - Tata McGraw-Hill – 2003.
2. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana - Maruthi Publications.
3. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
4. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
5. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.
6. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M. Jayakumaran – University Science Press.
7. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill - 2013
8. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

DETAILED SYLLABUS

FOR

III - B.TECH

II SEMESTER

Course Code	COMPUTER NETWORKS	L	T	P	Credits
1005173201		3	1	0	3

Course Overview:

This course aims at hardware configuration of network and focusing on layer approach and their functionalities, connection establishment, data transfer, protocols, architectures and connection termination process. The detailed study helps the student to settle their future in Hardware engineering.

Course Objectives:

- Building a firm foundation for understanding fundamentals of Data Communications and Computer Networks.
- Familiarize with the basic terminologies of Computer Networking area.
- Understand the state of art in Network protocols, Architecture and Applications.
- Acquire the knowledge of the basic protocols involved in Wired/Wireless communication process.
- Understand Process of Networking Research, Approach and Analysis

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Identify the different types of network topologies and protocols.	Applying	PO1
CO2	Enumerate the layers of the OSI model and TCP/IP models	Understanding	PO1, PO4
CO3	Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation and understand routing and congestion control algorithms	Understanding	PO1, PO3, PO4
CO4	Analyze MAC layer protocols and LAN technologies	Analyzing	PO1, PO2, PO4

Unit-I:

Introduction: Network Topologies, **Types of Networks**: WAN, LAN, MAN.

Reference models: The OSI Reference Model, the TCP/IP Reference Model, A Comparison of the OSI and TCP/IP Reference Models.

Physical Layer: Guided Transmission medium.

Multiplexing: Frequency Division multiplexing, Time Division Multiplexing, Code Division Multiplexing.

Outcome: Understand OSI and TCP/IP models.

Activity: Identify Network Topology of your laboratory and sketch it

UNIT-II

The Data Link Layer – **Design issues**: Services Provided to the Network Layer, Framing, Error Control, Flow Control,

Error Detection: Parity check, Checksum, CRC,

Error Correction: Hamming Code, Linear block codes, FEC.

Elementary Data Link Protocols: A Utopian Simplex Protocol, A Simplex Stop and Wait Protocol for an Error free channel, A Simplex Stop and Wait Protocol for a Noisy Channel,

Sliding Window Protocols: One Bit Sliding Window Protocol, A Protocol Using Go-Back-N, Selective Repeat.

Outcome: Analyze Data Link Layer protocols and design issues.

Activity: Draw a time-line diagram for the sliding window algorithm.

UNIT-III

The Medium Access Control Sub layer -The Channel Allocation Problem: Static Channel Allocation, Dynamic Channel Allocation,

Multiple Access Protocols: Aloha, pure ALOHA, Slotted ALOHA,**CSMA:**CSMA/CD,CSMA/CA, Collision Free Protocols, Limited Contention Protocols, Wireless LAN Protocols,

Ethernet: Classic Ethernet Physical Layer, Classic ,MAC Sub-layer,

Wireless LAN'S: The 802.11 Architecture and Protocol Stack, The 802.11 Physical Layer, The802.11 MAC Sub-layer Protocol.

Outcome: Analyze MAC layer protocols and LAN technologies.

Activity: With the help of flowchart differentiate between the Ethernet and IP address.

UNIT-IV

The Network Layer- Design Issues – Store and Forward Packet Switching, Services Provided to the Transport layer, Implementation of Connectionless Service, Implementation of Connection Oriented Service, Comparison of Virtual Circuit and Datagram Networks,

Routing Algorithms: The Optimality principle, Shortest path Algorithm, **Congestion**

Control Algorithms: Approaches to Congestion Control, Traffic Throttling-Load Shedding.

Outcome: 1. Design applications using internet protocols, routing and congestion control algorithms.

Activity: Sketch routing tables in the case of direct and indirect routing.

UNIT-V

Transport Layer: Transport Services, Connection management, TCP and UDP protocols; ATM AAL Layer Protocol.

Application Layer –The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services.

Outcome: Understand how internet works.

Activity: Design resource allocation in TCP using any model.

TEXT BOOKS

1. **Computer Networks** (5th Edition) – Andrew S. Tanenbaum. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010.

2. **Computer Networks**: A Top Down Approach, Behrouz A. Forouzan, Firouz Mosharraf, McGraw Hill Education.

REFERENCE BOOKS

1. Computer Networking: A Top-Down Approach (6th Edition) – Kurose and Ross

2. Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4th Edition) – Douglas E. Comer.

Course Code	WEB TECHNOLOGIES	L	T	P	Credits
1005173202		3	1	0	3

Course Overview:

This course is designed to start a path toward future studies in web development and design. By the end of this course student can able to describe the structure and functionality of the world wide web, create dynamic web pages using a combination of HTML, CSS, and JavaScript, apply essential programming language concepts

Course Objectives:

- Design and develop the web application with client server architecture using latest technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understand HTML tags to design static web pages	Understand/Remember	PO1
CO2	Describe the basic concepts of Java Scripts to design dynamic web pages	Understand	PO1,PO10
CO3	Familiarize the concepts of PHP and AJAX	Apply	PO1,PO2,PO3 ,PO5
CO4	Analyze a given problem and apply requisite appropriate tools for designing dynamicand interactive web applications	Analyze	PO1,PO2,PO4 ,PO12

Unit-I:

Introduction to HTML :

Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5
CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution

Outcome: Understand HTML tags to design static web pages

Activity: Design Static website using basic tags and Lists, Tables, Forms.

Unit-II:

Java Script:

The Basic of Java script: Objects, Primitives Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions DHTML: Positioning Moving and Changing Elements

Outcome:

- Describe the basic concepts of Java Scripts to design dynamic web pages

Activity:

Validate the login and registration pages.

Unit-III:

Introduction to XML, Document Type Definition, XML namespaces, XML SCHEMA Document object model, XML parsers, XSLT , DOM VS SAX, sample XML Documents

Introduction to AJAX:

Integrating PHP and AJAX, Consuming web Services in AJAX,SOAP WSDL, UDDI, Sample Programs

Outcome: Familiarize the concepts of XML and AJAX

Activity: Validate the XML and DOM Files.
Unit-IV:

PHP Programming: Introducing PHP: Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as MySQL

Outcome:

- Familiarize the concepts of PHP
- Design the server side dynamic web application

Activity: Design web database application using PHP

Unit-V:

Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

Outcome:

- Analyze a given problem and apply requisite appropriate tools for designing dynamic and interactive web applications
- Familiarize the concepts of PERL

Activity: Demonstrate the use of PERL in real-time applications.

Text Books:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage

Reference Books:

1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly(2006)
2. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book,
3. Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning

Course Code	SOFTWARE TESTING METHODOLOGIES	L	T	P	Credits
1012173201		3	1	0	3

Course Overview:

This course explains the fundamentals of software testing. It will provide a theoretical framework and also demonstrate how to practically implement software testing techniques. This course will explain how the testing process works and how it should be implemented. Candidates will gain an understanding of the different terminology involved in software testing and how each fits into the development of software.

Course Objectives:

- Fundamentals for various testing methodologies.
- Describe the principles and procedures for designing test cases.
- Provide supports to debugging methods.
- Acts as the reference for software testing techniques and strategies.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understanding the purpose of Software Testing.	Understand	PO1
CO2	Understand the Transaction Flow Testing and Dataflow testing	Understand	PO1,PO2
CO3	Test the software using domain testing and Logic Based Testing	Applying	PO1,PO2,PO3,PO4
CO4	Apply the software testing tools for real world applications	Applying, Create	PO1,PO2,PO3, PO4, PO5

Unit-I:

Introduction:

Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs.

Flow graphs and Path testing:

Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

Outcome:

- Understanding the purpose of Software Testing.
- Develop Model for Testing.

- Able to use flow graphs and path testing.

Activity/Event :

Write in detail about flow graphs and path testing.

Unit-II:

Transaction Flow Testing:

Transaction Flows, Transaction Flow Testing Techniques.

Dataflow testing:

Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

Domain Testing:

Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.

Outcome:

- Obtain knowledge about Transaction Flow Testing and Dataflow testing

Activity/Event :

Develop an application and test that application using different testing techniques.
Unit-III:

Paths, Path products and Regular expressions:

Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection

Syntax Testing:

Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips.

Outcome:

- Knowledge of various testing techniques.
- Understanding path products and regular Expressions.

Activity/Event :

Test the software using domain testing and Logic Based Testing

Unit-IV:

Logic Based Testing:

Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

State, State Graphs and Transition Testing:

State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.

Outcome:

- Understanding the use of state Graphs and Transition Testing.
- Knowledge of graph matrices and Application.

Activity/Event : Discuss about Graph matrices and its applications.

Unit-V:

Graph Matrices and Application:

Motivational overview, matrix of graph, relations, power ofa matrix, node reduction algorithm.

Software Testing Tools:

Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

Outcome:

- The need for automation and categorization of testing tools.
- Selection of testing tools and costs incurred.
- Guidelines for automated testing and an overview of some commercial testing tools.

Activity/Event : Discuss the usage of various testing tools.

Text Books:

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing- Yogesh Singh, Camebridge

Reference Books:

1. The Craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
3. Software Testing, N.Chauhan, Oxford University Press.
4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.
5. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.
6. Software Testing Concepts and Tools, P.NageswaraRao, dreamtech Press
7. Win Runner in simple steps by Hakeem Shittu, 2007 Genixpress.
8. Foundations of Software Testing, D.Graham& Others, Cengage Learning

Course Code		L	T	P	Credits
1012173202	DATA WARE HOUSING & DATA MINING	3	1	0	3

Course Overview:

This course includes the design of a Data warehouse system; perform business analysis with OLAP tools. By applying suitable pre-processing and visualization techniques for data analysis. Classification and regression techniques are also included.

Course Objectives:

- Approach business problems data-analytically by identifying opportunities to derive business value from data.
- Know the basics of data mining techniques and how they can be applied to extract relevant Business.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understand why there is a need for data warehouse in addition to traditional operational database systems	Understand	PO1, PO2
CO2	Identify components in typical data warehouse architectures	Analyze	PO1, PO2, PO3
CO3	Design a data warehouse and understand the process required to construct one	Apply	PO1, PO2, PO3, PO4
CO4	Solve real data mining problems by using the right tools to find interesting patterns	Create	PO1, PO2, PO3, PO5, PO12

Unit-I:

Introduction to Data Mining:
Motivation for Data Mining, Data Mining-Definition &Functionalities, Classification of DM systems, DM task primitives, Integration of a Data Mining system with a Database or a Data Warehouse, Major issues in Data Mining.

Data Warehousing(Overview Only): Overview of concepts like star schema, fact and dimension tables, OLAP operations, From OLAP to Data Mining.

Outcome:

Communicate and foster realistic expectations of the role of OLAP technology and business

intelligence systems in management and decision support and design multidimensional data models and implement those using star schemas and relational databases.

Activity/Event:

For a sales database find out retail patterns of the customers and forecast retail trends.

Unit-II:

Data Preprocessing: Why? Descriptive Data Summarization, Data Cleaning: Missing Values, Noisy Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Data Discretization and Concept hierarchy generation for numerical and categorical data.

Outcome:

Design systems for sourcing and structuring data to provide an integrated, non-volatile collection of data for decision support

Activity/Event:

Finding state-of-the-art techniques for traffic and mobility data collection for real-time applications in reference to following article https://dspace.mit.edu/handle/1721.1/77592

Unit-III:

Mining Frequent Patterns, Associations, and Correlations: Market Basket Analysis, Frequent Item sets, Closed Item sets, and Association Rules, Frequent Pattern Mining, Efficient and Scalable Frequent Item set Mining Methods, The Apriority Algorithm for finding Frequent Item sets Using Candidate Generation, Generating Association Rules from Frequent Item sets, Improving the Efficiency of Apriority, Frequent Item sets without Candidate Generation using FP Tree, Mining Multilevel Association Rules, Mining Multidimensional Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining

Outcome:

Apply theories and principles of data visualization to encourage high quality analysis of business information to inform decision making

Activity/Event:

Compare association rule algorithms using three real-world datasets and an artificial dataset.“Real world performance of association rule algorithms”.

Unit-IV:

Classification & Prediction: What is it? Issues regarding Classification and prediction

Classification methods:

Decision tree, Bayesian Classification, Rule based Prediction: Linear and non linear regression, Accuracy and Error measures, Evaluating the accuracy of a Classifier or Predictor.

Cluster Analysis:

What is it? Types of Data in cluster analysis, Categories of clustering methods, Partitioning methods iñ K-Means, K-Mediods. Hierarchical Clustering- Agglomerative and Divisive Clustering, BIRCH and ROCK methods, DBSCAN, Outlier Analysis.

Outcome:

Able to gather and analyze large sets of data to gain useful business understanding and produce a quantitative analysis report/memo with the necessary information to make decisions.

Activity/Event :

Implement the Decision Tree Induction algorithm and find the best splitting attribute.

Unit-V:

Data Mining for Business Intelligence Applications:

Data mining for business Applications like Balanced Scorecard, Fraud Detection, Click stream Mining, Market Segmentation, retail industry, telecommunications industry, banking & finance and CRM etc.

Outcome:

Describing and demonstrating basic data mining algorithms, methods, and tools and identify business applications of data mining.

Activity/Event:

Implement the Business Intelligence applications.

Text Books:

1. Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann 2 nd Edition
2. P. N. Tan, M. Steinbach, Vipin Kumar, introduction to Data Miming, Pearson Education

Reference Books:

1. MacLennan Jamie, Tang ZhaoHui and Crivat Bogdan, Data Mining with Microsoft
2. SQL Server 2008î, Wiley India Edition.
3. G. Shmueli, N.R. Patel, P.C. Bruce, ìData Mining for Business Intelligence: Concepts,
4. Techniques and Applications in Microsoft Office Excel with XLMinerî, Wiley India.
5. Michael Berry and Gordon LinoffìData Mining Techniquesî, 2nd Edition Wiley
6. Publications.
7. Alex Berson and Smith, ìData Mining and Data Warehousing and OLAPî, McGraw
8. Hill Publication.

9. E. G. Mallach, ìDecision Support and Data Warehouse Systems", Tata McGraw Hill.
10. Michael Berry and Gordon LinoffìMastering Data Mining- Art & science of CRMî,
11. Wiley Student Edition
12. Arijay Chaudhry & P. S. Deshpande, ìMultidimensional Data Analysis and Data
13. Mining Dreamtech Press
14. Vikram Pudi& Radha Krishna, ìDataMiningî, Oxford Higher Education.
15. Chakrabarti, S., ìMining the Web: Discovering knowledge from hypertext dataî,
16. M. Jarke, M. Lenzerini, Y. Vassiliou, P. Vassiliadis (ed.), ìFundamentals of Data
17. Warehousesî, Springer-Verlag, 1999.telligence.ng Data Mining & OLAP, Alex Berson, Stephen Smith, TMH

Course Code		L	T	P	Credits
1012173203	SOCIAL NETWORKS AND SEMANTIC WEB (Elective - I)	3	1	0	3

Course Overview:

The Semantic Web and social networks is an extension of the current Web that will allow you to find, share, and combine information more easily. The World Wide Web, or simply the Web, is an example of an application of computing on a global scale, thereby creating a Distributed Information Space. The main purpose of the Semantic Web is driving the evolution of the current Web by enabling users to find, share, and combine information more easily.

Course Objectives:

- To learn Knowledge Representation for the Semantic Web
- To learn Ontology Engineering
- To learn Semantic Web Applications, Services and Technology
- To learn Social Network Analysis and semantic web

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understand semantic web basics, architecture and technologies.	Understand	PO1
CO2	Understand the semantic relationships among these data elements using Resource Description Framework (RDF).	Understand	PO1,PO2, PO4
CO3	Design and implement a web services application that "discovers" the Data and/or other web services via the semantic web.	Applying	PO1,PO2, PO3,PO4
CO4	Discover the capabilities and limitations of semantic web technology for social networks.	Applying, Create	PO1, PO2, PO4,PO5

Unit-I:

Web Intelligence Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

Outcome:

Understand semantic web basics, architecture and technologies

Activity/Event : To develop several real time web based applications

Unit-II:

Knowledge Representation for the Semantic Web Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema

Outcome:

To represent data from a chosen problem in XML with appropriate semantic

Activity/Event : Giving seminars on semantic web ontologism

Unit-III:

Ontology Engineering Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

Semantic Web Applications, Services and Technology Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods

Outcome:

Tags obtained or derived from the ontology Able to understand the semantic relationships among these data elements.

Activity/Event: Giving a seminar on Semantic Web Applications, Services and Technology.

Unit-IV:

Social Network Analysis and semantic web What is social Networks analysis, development of the social networks analysis

Outcome: To know Social Network Analysis and semantic web.

Activity/Event: Giving a seminar on Social Network Analysis and semantic web.

Unit-V:

Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features

Outcome:

To discover the capabilities and limitations of semantic web technology for social networks.

Activity/Event :

Giving a seminar on Electronic Sources for Network Analysis

Text Books:

1. Thinking on the Web - Berners Lee, Gödel and Turing, Wiley inter science, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

Reference Books:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, R.Studer, P.Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications. 4. Programming the Semantic Web, T.Segaran, C.Evans, J.Taylor, O'Reilly, SPD.

Course Code		L	T	P	Credits
1012173204	BIOMETRIC SYSTEMS (Elective - I)	3	1	0	3

Course Overview:

The Introduction to Biometrics course introduces students to biometric technology. Each module covers a component of biometrics, from an introduction to a discussion on each of the main biometric modalities including: fingerprint recognition, iris recognition, and face recognition.

Course Objectives:

- To understand the basics of Biometrics and its functionalities
- To learn the role of biometric in the organization
- To expose the concept of IRIS and sensors
- To expose the context of Biometric Applications
- To learn to develop applications with biometric security

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Identify the various Biometric technologies.	Understand	PO1,PO2
CO2	Understand the need of biometric in the society	Understand	PO1,PO2
CO3	Design of biometric recognition for the organization.	Applying	PO1,PO2,PO3, PO4
CO4	Develop simple applications for privacy.	Create	PO3,PO4,PO5

Unit-I:

Introduction:

Person Recognition – Biometric systems –Biometric functionalities: verification, identification Biometric systems errors - The design cycle of biometric systems – Applications of Biometric systems – Security and privacy issues

Outcome:

Understand the overview of Biometric systems, applications and its basic functionalities.

Activity/Event: Identify the applications of Biometric systems in reality.

Unit-II:

Finger Print And Facial Recognition

Fingerprint:

Introduction – Friction ridge pattern- finger print acquisition: sensing techniques,image quality –Feature Extraction –matching –indexing.

Face Recognition: Introduction –Image acquisition: 2D sensors ,3D sensors- Face detection- Feature extraction -matching

Outcome:
Classify the Fingerprint and Face Recognition Sensing Techniques

Activity/Event :

Develop small module of Fingerprint and Facial Recognition related application as mini project

Unit-III:

IRIS And Other Traits

Design of an IRIS recognition system-IRIS segmentation- normalization – encoding and matching- IRIS quality –performance evaluation –other traits- ear detection –ear recognition – gait feature extraction and matching –challenges- hand geometry –soft biometrics

Outcome:

Illustrate the design of IRIS recognition system and other traits such as ear detection and soft biometrics.

Activity/Event: Design the IRIS and ear recognition systems flow chart.

Unit-IV:

Behavioral Biometrics:

Introduction –Features- classification of behavioral biometrics –properties of behavioral biometrics –signature –keystroke dynamics –voice- merits –demerits –applications- error sources-types –open issues –future trends

Outcome: Know the features of behavioral biometrics, applications and its future trends.

Activity/Event:

Identify the applications where behavioral biometrics was most frequently required.

Unit-V:

Applications And Trends:

Application areas: surveillance applications- personal applications –design and deployment – user system interaction-operational processes – architecture –application development – design validation-disaster recovery plan-maintenance-privacy concerns

Outcome:

Understand the future trends and needs related to surveillance and disaster management Applications.

Activity/Event: Design the flow chart to develop an application for user system interaction.

Text Books:

James wayman, Anilk.Jain ,Arun A.Ross ,Karthik Nandakumar, ―"Introduction to Biometrics", Springer, 2011

Reference Books:

1. John Vacca "Biometrics Technologies and Verification Systems" Elsevier 2007
2. James Wayman,AnilJain,DavidMAltoni,DasioMaio(Eds) "Biometrics Systems Technology", Design and Performance Evalution.Springer 2005
3. Khalid saeed with Marcin Adamski, TapalinaBhattasali, Mohammed K. Nammous, Piotr panasiuk, mariusz Rybnik and soharabH.Sgaikh, "New Directions in Behavioral Biometrics", CRC Press 2017
4. Paul Reid "Biometrics For Network Security "Person Education 2004
5. Shimon K.Modi , ―Biometrics in Identity Management :concepts to applications‖, Artech House 2011

Course Code	NEURAL NETWORKS (Elective - I)	L	T	P	Credits
1012173205		3	1	0	3

Course Overview:

This course explores the organization of synaptic connectivity as the basis of neural computation and learning. Perceptrons and dynamical theories of recurrent networks including amplifiers, attractors, and hybrid computation are covered.

Course Objectives:

- Identify the various neural network models and their characteristics.
- Differentiate feed forward and feedback neural networks and their functionalities.
- Understand ANN for pattern recognition and applications of ANN.
- Understand the concept of synaptic dynamics.
- Understand the competitive learning neural networks

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understanding of the technical potential of the learning and self organizing systems of today.	Understand	PO1,PO2
CO2	Describe the assumptions behind, and the derivations of the ANN algorithms	Understand	PO1
CO3	Learn Analysis of linear auto associative FF Networks	Analyze	PO1,PO2,PO3,PO4
CO4	Apply applications of Artificial Neural Networks to real world applications	Create	PO3,PO4,PO5

Unit-I:

Basics of artificial neural networks:

Characteristics of neural networks, Historical development of neural network, artificial neural networks: terminology, models of neurons, topology, basic learning laws

Activation and synaptic dynamics:

Activation Dynamics models, Synaptic Dynamics models, learning methods, stability and convergence, recall in neural networks.

Outcome:

Achieve an understanding of the technical potential and the advantages and limitations of the learning and self organizing systems of today.

Activity/Event :

To build and train a neural network that identify whether a new 2*2 image has the stairs pattern.

Unit-II:

Functional units of ANN for pattern recognition tasks: Pattern Recognition Problems, basic functional units, Pattern Recognition tasks by the functional units

Outcome:

Describe the assumptions behind, and the derivations of the ANN algorithms dealt with in the course, it gives example of design and implementation for small problems.

Activity/Event: Apply the methods and produce applications in their working life.

Unit-III:

Feed forward neural networks:

Analysis of pattern association networks, Analysis of pattern classification networks, Analysis of pattern mapping networks.

Feedback neural networks:

Analysis of linear auto associative FF Networks, Analysis of pattern storage networks, Stochastic Networks and Simulated Annealing, Boltzmann Machine

Outcome: Learn Analysis of linear auto associative FF Networks.

Activity/Event:

4 clusters of data (A,B,C,D) are defined in a 2-dimensional input space. (A,C) and (B,D) clusters represent XOR classification problem. The task is to define a neural network for solving the XOR problem.

Unit-IV:

Competitive learning neural networks:

Components of competitive learning networks, analysis of feedback layer for different output functions, analysis of pattern clustering networks, analysis of feature mapping networks.

Outcome: Understand the analysis of different functions in neural networks.

Activity/Event :

Design a neural network for the recursive prediction of chaotic Mackay-Glass time series, try various network architectures and experiment with various delays.

Unit-V:

Architectures for complex pattern recognition tasks:

Associative memory, pattern mapping, stability-plasticity dilemma: ART, Temporal patterns, Pattern Variability: Neocognition

Applications of ANN: Direct Applications, Application Area.

Outcome:

Learn applications of Artificial Neural Networks

Activity/Event :

Calculate the output of a simple neuron

Text Books:

1. B. Yegnanarayana, Artificial Neural Networks, 1stEdition, Prentice Hall, 2009

Reference Books:

1. Satish Kumar, Neural Networks –A Classroom Approach, 2ndEdition, Tata McGraw-Hill, 2004.
2. 2.C.M.Bishop, Pattern Recognition and Machine Learning, 1stEdition, Springer, 2006.

Web reference:

www.nd.com/nnreference.html

Course code		L	T	P	Credits
1012173206	OPERATION RESEARCH (Elective- I)	3	1	0	3

Course Overview:

Operations research helps in solving problems in different environments that needs dicisions. The topics that include: linear programming, Transportation, Assignment, and CPM/ MSPT techniques. Analytic techniques and computer packages will be used to solve problems facing business managers in decision environments.

Course Objectives:

- Identify and develop operational research models from the verbal description of the real system.
- Understand the mathematical tools that are needed to solve optimization problems.
- Use mathematical software to solve the proposed models.
- Develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision-making processes in Management Engineering

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understand the methodology of Operations Research.	Understand	PO1
CO2	Understand the Linear programming methods, duality, and sensitivity analysis.	Understand	PO1,PO2
CO3	Apply Multi-criteria decision techniques.	Applying	PO1,PO2,PO3,PO5
CO4	Create decision making under uncertainty and risk.	Applying, Create	PO2,PO3,PO4,PO5

Unit-I:

Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem – Formulation of LPP, Graphical solution of LPP. Simple Method, Artificial variables, big-M method, two-phase method, degeneracy and unbound solutions**.**

Outcome: To do Methodology of Operations Research.

Activity/Event: Giving more number of sample problems to each individual students.

Unit-II:

Transportation Problem. Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method

Outcome: To minimize the total transportation cost.

Activity/Event: Giving more number of problems on Vogel's and MODI methods.

Unit-III:

Assignment model. Formulation. Hungarian method for optimal solution. Solving unbalanced problem. Traveling salesman problem and assignment problem Sequencing models. Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines – Processing n Jobs through m Machines

Dynamic programming. Characteristics of dynamic programming. Dynamic programming approach for Priority Management employment smoothening, capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problems Games Theory. Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games

Outcome: To know several strategies of a games and maximize the profits for sales man

Activity/Event : Giving a gaming problem to find the strategies for the players

Unit-IV:

Replacement Models. Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value. Replacement of items that fail suddenly: individual replacement policy, group replacement policy

Outcome:

To know several techniques for replacement in several sectors

Activity/Event :

Giving more number of different machine replacement problems.

Unit-V:

Inventory models. Inventory costs. Models with deterministic demand – model (a) demand rate uniform and production rate infinite, model (b) demand rate non-uniform and production rate infinite, model (c) demand rate uniform and production rate finite.

Outcome: To know demand rate and uniform rate and price breaks.

Activity/Event: Giving more number of real time problems.

Text Books:

1. P. SankaraIyer,"Operations Research", Tata McGraw-Hill, 2008.
2. A.M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2005**.**

Reference Books:

1. J K Sharma. "Operations Research Theory & Applications, 3e", Macmillan India Ltd, 2007.
2. P. K. Gupta and D. S. Hira, "Operations Research", S. Chand & co., 2007.
3. J K Sharma., "Operations Research, Problems and Solutions, 3e", Macmillan India Ltd N.V.S. Raju, "Operations Research", HI-TECH, 200

Course Code	ARTIFICIAL INTELLIGENCE (Open Elective)	L	T	P	Credits
1005173204		3	1	0	3

Course Overview:

Artificial intelligence (AI) is a research field that studies how to realize the intelligent human behaviors on a computer. The ultimate goal of AI is to make a computer that can learn, plan, and solve problems autonomously. Although AI has been studied for more than half a century, we still cannot make a computer that is as intelligent as a human in all aspects.

Course Objectives:

- Having a basic Knowledge about intelligent systems and Problem solving methods
- Applying different search techniques for solving different problems
- Understanding the knowledge representation techniques and uncertainty in data
- Developing a Rule Based Expert Systems.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Identify Methods in AI that may be suited to solving a given problem and Game Playing	Understanding	PO1,PO2
CO2	Analyze the basic issues of different types of knowledge representation techniques to build intelligent system	Analyze	PO2,PO3
CO3	Build Expert systems for real time applications	Create	PO2,PO3, PO5,PO7
CO4	Determination of uncertainty of data using different probability approaches for real time applications	Analyze	PO1,PO2,PO4

Unit-I:

Introduction to artificial intelligence:

Introduction, history, intelligent systems, foundations of AI, Applications of AI, current trends in AI

Problem solving:

Definition, characteristics of problem, types of Problem solving techniques, General Problem Solver (GPS), Water Jug Problem, Missionaries and Cannibals Problem.

Outcome: Understand need of AI and its applications.

Activity/Event: Write a Report on the use of artificial intelligence in every day.

Unit-II:

Search Techniques:

State Space Search**,** Definition, Examples, Exhaustive search techniques: BFS, DFS, IDDFS, Heuristic search techniques: Uniform Cost Search, Best First Search, A* algorithm & Constraint satisfaction Problem

Game playing:

Introduction about game playing, Mini-Max Algorithm, Alpha-Beta pruning algorithm.

Outcome:

Identify Methods in AI that may be suited to solving a given problem and Game Playing.

Activity/Event: Identify Methods in AI used to solve the tricky puzzles.

Unit-III:

Logic concepts:

Introduction, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic,

Predicate logic:

Introduction, PNX Normal form, Resolution in Predicate Logic

Outcome: Able to understand the uses of logic concepts and predicate logic

Activity/Event : Convert Natural Language Sentences To Predicate Logic

Unit-IV:

Knowledge representation:

Introduction, approaches to knowledge representation, knowledge representation using semantic network, knowledge representation using frames.

Uncertainty measure:

Introduction to probability theory, Bayesian belief networks, Certainty factor theory, Dempster-Shafer theory

Outcome:

- Analyze the basic issues of different types of knowledge representation techniques to build intelligent system
- Determination of uncertainty of data using different probability approaches for real time applications

Activity/Event : Consider any data set and Classify the test instances using BBN

Unit-V:

Expert system and applications:

Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems, application of expert systems, Black board Systems, TMS.

Fuzzy stand fuzzy logic:

Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges

Outcome: Build Expert systems for real time applications.

Activity/Event: Explain the use of fuzzy logic in the real time scenario.

Text Books:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

Reference Books:

1. Artificial intelligence, structures and Strategies for Complex problem solving, - George F.Lugar,5thed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

Course Code	INTRODUCTION TO DIGITAL SIGNAL PROCESSING	L	T	P	Credits
1012173207	(Open Elective)	3	1	0	3

Course Overview:

Signal processing is a technology that spans an vast spectrum of disciplines including entertainment, communication, robotics, space exploration, medicine, seismology, just to name a few. Sophisticated signal processing algorithms and hardware are prevalent in a wide range of systems, from highly specialized military systems through industrial applications to consumer electronics.

Course Objectives:

- To study DFT and its computation
- To study the design techniques for digital filters
- To study the finite word length effects in signal processing
- To study the non-parametric methods of power spectrum estimations
- To study the fundamentals of digital signal processors

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Design, simulate and realize different digital filters.	Applying, Analyze	PO1,PO2,PO3, PO4, PO5
CO2	Estimate the spectra of signals that are to be processed by discrete time system and to verify the performance of various spectrum estimation techniques.	Understand , Applying	PO1,PO2, PO5
CO3	Design multi rate digital signal processing system.	Applying	PO1,PO2,PO3, PO4, PO5
CO4	Understand the architecture of DSP processor.	Understand	PO1

Unit-I:

Discrete Fourier Transform:
DFT and its properties, Relation between DTFT and DFT, FFT computations using Decimation in time and Decimation in frequency algorithms, Overlap-add and save methods

Outcome: Understand the Fourier series

Activity/Event : Problem and solution on Fourier Transform

Unit-II:

Infinite Impulse Response Digital Filters:

Review of design of analogue Butterworth and Chebyshev Filters, Frequency transformation in analogue domain - Design of IIR digital filters using impulse invariance technique - Design of digital filters using bilinear transform - pre warping – Realization using direct, cascade and parallel forms.

Outcome: Understand the Filter and impulse response

Activity/Event : Problem and solution on impulse response and filters

Unit-III:

Finite Impulse Response Digital Filters:

Symmetric and Ant symmetric FIR filters - Linear phase FIR filters - Design using Hamming, Henning and Blackman Windows - Frequency sampling method - Realization of FIR filters - Transversal, Linear phase and Polyphase structures.

Finite Word Length Effects:

Fixed point and floating point number representations - Comparison - Truncation and Rounding errors - Quantization noise - derivation for quantization noise power - coefficient quantization error - Product quantization error

Outcome: Understand the types of filters

Activity/Event : Problems and solutions on impulse response

Unit-IV:

Overflow error - Round off noise power - limit cycle oscillations due to product round off and overflow errors - signal scaling

Outcome: Understand the noise power limits, errors and scaling.

Activity/Event : Problems and solutions of power limits

Unit-V:

Multirate Signal Processing

Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase implementation of FIR filters for interpolator and decimator -Multistage implementation of sampling rate conversion- Design of narrow band filters - Applications of Multirate signal processing.

Outcome: Analyze the interpolation techniques

Activity/Event : Real time applications of interpolation techniques

Text Books:

1. John G Proakis and Manolakis, “Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007.
2. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, TMH/McGraw HillInternational, 2007

Reference Books:

1. E.C. Ifeachor and B.W. Jervis, " Digital signal processing - A practical approach", Second edition, Pearson, 2002.
2. S.K. Mitra, Digital Signal Processing, A Computer Based approach, Tata Mc GrawHill, 1998.
3. P.P.Vaidyanathan, Multirate Systems & Filter Banks, Prentice Hall, Englewood cliffs, NJ, 1993.
4. Johny R. Johnson, Introduction to Digital Signal Processing, PHI, 2006.

Course Code	EMBEDDED SYSTEMS (Open Elective)	L	T	P	Credits
1005173205		3	1	0	3

Course Overview:
The objective of this course is to equip the students with the basic concepts of embedded system. It is intended for Designing, Implementation and Test of embedded applications. It provides RTOS concepts for coding the embedded system software routines. It tells what makes a system a real-time system and describes characteristics of it.

Course Objectives:

- To have knowledge about the basic working of a microcontroller system and its programming in assembly language.
- To provide experience to integrate hardware and software for microcontroller applications systems.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Categorize embedded systems and Summarize 8051 microcontroller architecture	Understand/Remember	PO1
CO2	Identify the unique characteristics of real-time systems	Understand	PO1,PO2
CO3	Apply synchronization tools in various real time scenarios	Apply	PO4,PO5,PO12
CO4	Define the unique design problems and challenges of real-time systems	Apply	PO2,PO3,PO4,PO5,PO12

Unit-I:

Introduction to Embedded systems:

What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

Outcome: Understand the basics of an embedded system.

Activity/Event: List out various embedded system relevant components.

Unit-II:

8 bit microcontrollers architecture:

Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture

Outcome: Understand the INTEL 8051 architecture and instruction set.

Activity/Event :8051 interrupts

Unit-III:

RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

Outcome:

- Identify the unique characteristics of real-time systems
- Explain the general structure of a real-time system

Activity/Event : Identify the unique characteristics of real-time systems

Unit-IV:

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

Outcome: Able to describe synchronization techniques

Activity/Event : Explain about process synchronization for any operating system

Unit-V:

Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

Outcome: Understand Embedded Product Development life cycle (EDLC),

Activity/Event : Explain any practical application of embedded system

Text Books:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

Reference Books:

1. Ayala &Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
2. Embedded Systems, Rajkamal, TMH, 2009.
3. Embedded Software Primer, David Simon, Pearson.
4. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson,.

Course Code		L	T	P	Credits
1003173203	ROBOTICS (Open Elective)	3	1	0	3

Course Overview:

The course is focused on robots in industrial automation with kinematic and dynamic analysis of manipulators. It also explains the need for automation in industry by discussing the concepts of robot actuators and feedback mechanisms with applications.

Course Objectives:

- To give students practice in applying their knowledge of mathematics, science, and engineering and to expand this knowledge into the vast area of robotics.
- The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectory planning.
- Mathematical approach to explain how the robotic arm motion can be described.
- The students will understand the functioning of sensors and actuators.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Identify various robot configuration and components.	Understanding	PO1,PO5,PO6,PO7, PO8
CO2	Select appropriate actuators and sensors for a robot based on specific application.	Applying	PO2,PO3,PO4,PO6, PO11
CO3	Carry out kinematic and dynamic analysis for simple serial kinematic chains.	Analyzing	PO2, PO3, PO4, PO7, PO12
CO4	Perform trajectory planning for a manipulator by avoiding obstacles.	Evaluating	PO1, PO2, PO3, PO4, PO5, PO8, PO9, PO10, PO11, PO12

Unit-I:

Introduction:

Automation and Robotics, – An over view of Robotics –Classification by coordinate system and control system.

Components of The industrial Robot:
Common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors.

Outcome:

- Types of robots and arms.
- Various classification of robots

Activity/Event: Demo on Mechatronics system in Mechatronics lab.

Unit-II:

Motion Analysis:

Homogeneous transformations as applicable to rotation and translation – problems.

Manipulator Kinematics:

Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems

Outcome:

- Transformations of robot arms.
- Kinematics of manipulators

Activity/Event: Demo on transformations using simulation mode in cad/cam lab.

Unit-III:

Differential transformation and manipulators, Jacobians – problems Dynamics:Lagrange – Euler and Newton – Euler formulations – Problems.

Outcome: Manipulator dynamics using jacobians.

Activity/Event: Video representing of kinematic and dynamic analysis with simulation.
Unit-IV:

General Considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language.

Outcome:

- Trajectory planning with via points.
- Determination of displacement, velocity and acceleration for a curve.

Activity/Event: Demo of linear and circular interpolation with algorithms.

Unit-V:

Robot Actuators And Feed Back Components:

Actuators: Pneumatic, Hydraulic Electrical actuators–comparison. Electric & stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

Robot Applications: In Manufacturing:

Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

Outcome:

- Difference between various actuating systems.
- Planning for various manufacturing methods.

Activity/Event :

Demo of Electric, pneumatic and hydraulic system.

Text Books:

1. Industrial Robotics /Grover M P, M Weiss,R N Nagel, N G Odrey, Ashish Dutta/ Pearson Edu.
2. Robotics and Control / Mittal R K &Nagrath I J / TMH.

Reference Books:

1. Robotics / Fu K S/ McGraw Hill.
2. Robotic Engineering / Richard D. Klafter, Prentice Hall.
3. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter Science.
4. 4. Introduction to Robotics / John J Craig / Pearson Edu.

Course Code		L	T	P	Credits
1012173221	DATA MINING LAB USING WEKA	0	0	3	2

Course Objectives:

- Practical exposure on implementation of well known data mining tasks.
- Exposure to real life data sets for analysis and prediction.
- Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
- Handling a small data mining project for a given practical domain.

Course Outcomes:

- The data mining process and important issues around data cleaning, pre-processing and integration
- The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.

Programs list:

1. Demonstration of preprocessing on dataset student. arff
2. Demonstration of preprocessing on dataset labor. arff
3. Demonstration of Association rule process on dataset contactlenses. arff using a priori algorithm
4. Demonstration of Association rule process on dataset test. arff using apriori algorithm
5. Demonstration of classification rule process on dataset student. arff using j48 algorithm
6. Demonstration of classification rule process on dataset employee. arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee. arff using id3 algorithm
8. Demonstration of classification rule process on dataset employee. arff using naïve bayes algorithm
9. Demonstration of clustering rule process on dataset iris. arff using simple k-means
10. Demonstration of clustering rule process on dataset student. arff using simple k- means.

Course Code	WEB TECHNOLOGIES LAB	L	T	P	Credits
1005173223		0	0	3	2

Course Objectives:

- To acquire knowledge of XHTML, Java Script and XML to develop web applications
- Ability to develop dynamic web content using PHP, MySql
- To understand Database connections and Mail API through PHP
- To understand the design and development process of a complete web application

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Create a static web pages using HTML and CSS and Develop JavaScript code for data validation	Understand	PO1
CO2	Demonstrate how *XML* provides a standard method to access information	Applying	PO1, PO2
CO3	Demonstrate database connectivity for developing web applications	Applying	PO5
CO4	Summarize object oriented programming concepts	Analyzing	PO12

List of Experiments:

1. Design the following static web pages required for a Training and placement cell web site.

   1) Home Page 2) Login Page 3) Registration page 4) Company Details Page 5) Alumni Details Page 6) Placement Staff Details Page7) Student personal Info Page 8) Student Academic Info page 9) Semester Wise Percentage & their Aggregate page
2. Validate login page and registration page using regular expressions.
3. Apply different font styles, font families, font colors and other formatting styles

to the above static web pages.

4. Write an XML file which will display the Student personal information which includes the Book Information Fields
5. Install wamp server to access above developed static web pages using this server.
6. Write a PHP to connect to the database, Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration.
7. Write a PHP to connect to the database, Insert the details of the student academic information with student academic info page
8. Write perl program takes set names along the command line and prints whether they are regular files or special files
9. Write a perl program to implement UNIX `passed' program
10. An example perl program to connect to a MySQl database table and executing simple commands.

Text Books:

1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly(2006)
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage.

Course Code	SOFTWARE TESTING LAB	L	T	P	Credits
1012173222		0	0	3	2

Course Objectives:

- Demonstrate the UML diagrams with ATM system descriptions.
- Demonstrate the working of software testing tools with c language.
- Study of testing tools- win runner, selenium etc.
- Writing test cases for various applications

Course Outcomes:

- Find practical solutions to the problems
- Solve specific problems alone or in teams
- Manage a project from beginning to end
- Work independently as well as in teams
- Define, formulate and analyze a problem

Programs list:

1 Write programs in 'C' Language to demonstrate the working ofthe following constructs:

i) do...while
ii) while….do
iii) if…else
iv) switch
v) for

2 "A program written in 'C' language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.

3 Take any system (e.g. ATM system) and study its system specifications and report the various bugs.

4 Write the test cases for any known application (e.g. Banking application)

5 Create a test plan document for any application (e.g. Library Management System)

6 Study of Win Runner Testing Tool and its implementation

a) Win runner Testing Process and Win runner User Interface.
b) How Win Runner identifies GUI(Graphical User Interface) objects in an application and describes the two modes for

organizing GUI map files.

c) How to record a test script and explains the basics of Test Script Language (TSL).

d) How to synchronize a test when the application responds slowly.

e) How to create a test that checks GUI objects and compare the behaviour of GUI objects in different versions of the sample application.

f) How to create and run a test that checks bitmaps in your application and run the test on different versions of the sample application and examine any differences, pixel by pixel.

g) How to Create Data-Driven Tests which supports to run a single test on several sets of data from a data table.

h) How to read and check text found in GUI objects and bitmaps.

i) How to create a batch test that automatically runs the tests.

j) How to update the GUI object descriptions which in turn supports test scripts as the application changes.

7. Apply Win Runner testing tool implementation in any real time applications.

Course Code		L	T	P	Credits
1099173101	IPR AND PATENTS	0	2	0	0

Course Objectives:

- To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.
- Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.

Course Outcomes:

IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.

Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements

Unit-I:

Introduction to Intellectual Property Rights (IPR):

Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

Unit-II:

Copyrights and Neighboring Rights:

Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers **–** Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act

Unit-IV:

Trade Secrets:

Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State La

Unit-V:

Cyber Law and Cyber Crime:

Introduction to Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions - E-commerce - Data Security – Authentication and Confidentiality - Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and

Punishment – Liability of Network Providers.
Relevant Cases Shall be dealt where ever necessary.

Reference Books:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
3. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
5. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
6. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
7. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
8. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

PROGRAM STRUCTURE

FOR

IV - B.TECH

I & II SEMESTERS

DEAPARTMENT OF INFORMATION TECHNOLOGY
PROGRAM STRUCTURE

IV B.Tech I-Semester

S. No	Course Code	Course Title	L	T	P	Credits
1	1005174101	Cryptography and Network Security	3	1*	0	3
2	1012174101	Mobile Computing	3	0	0	3
3	1005174103	Big Data Analytics	3	0	0	3
4	1099172106	Managerial Economics and Financial Analysis	3	0	0	3
5	**Elective – II**		3	0	0	3
	1012174102	A) Advanced Operating Systems				
	1012174103	B) Information Retrieval Systems				
	1004174105	C) IoT & its Applications				
	1012174104	D) Multimedia Programming				
6	**Elective – III**		3	0	0	3
	1012174105	A) Management Information Systems				
	1005174105	B) Software Project Management				
	1005174102	C) Machine Learning				
	1012174106	D) Decision Support System				
7	1005174121	Cryptography and Network Security Lab	0	0	3	2
8	1005174122	Big Data Analytics Lab	0	0	3	2
Total Credits :						**22**

IV B.Tech II- Semester

S. No	Course Code	Course Title	L	T	P	Credits
1	1005174203	Distributed Systems	3	0	0	3
2	1005174106	Cloud Computing	3	0	0	3
3	1099172203	Management Science	3	0	0	3
4	**Elective – IV**		3	0	0	3
	1005174205	A) Concurrent and Parallel Programming				
	1012174201	B) Cyber Security				
	1005174201	C) Fundamentals of Block Chain Technology				
	1012174202	D) Software Quality Assurance				
(OR)						
	1012174281	Internship	0	0	0	12
5	1012174251	Technical Seminar	0	3	0	2
6	1012174261	Comprehensive Viva	0	0	0	2
7	1012174231	Main Project	0	0	0	10
Total Credits :						**26**

DETAILED SYLLABUS

FOR

IV - B.TECH

I & II SEMESTERS

Course Code	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	Credits
1005174101		3	1	0	3

Course Overview: The objective of this course is to equip the students with principles and practice of cryptography and network security, Classical systems, symmetric block ciphers (DES, AES, other contemporary symmetric ciphers), Public-key cryptography (RSA, Discrete logarithms), Algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes, Email and web security.

Course Objectives:

- Understanding the requirement of security in modern communication and information systems.
- Mastering the concept of security attack, services and mechanisms.
- Mastering concepts of confidentiality using cryptography with mathematical background.
- Mastering concept of authentication using hash algorithms and digital signature
- To be familiar with network security designs using available secure solutions (PGP, SS L, IPSec).

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understand the principles and practices involved in cryptography and network security	Understand/Remember	PO1
CO2	Understand the various symmetric and Asymmetric encryption algorithms.	Understand	PO1,PO2
CO3	Identifying cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes	Apply	PO2,PO3,PO4,PO12
CO4	Design of network security solutions for E-mail Security like PGP,S/MIME and web security like SSL,TLS .	Evaluate/Create	PO1,PO2,PO3,PO4, PO6,PO12

UNIT-I

Security attacks, services & mechanisms, fundamental security principles, A Model for Network Security, Symmetric Cipher Model, Substitution Techniques Transportation Techniques, Rotor Machines, steganography.

Outcome: Demonstrate a systematic and critical understanding of the theories, principles and practices of Cryptography and network security.

Activity: Implement a simple cryptographic function

UNIT-II

Secret Key Cryptography: Traditional Block Cipher Structure**,** Data Encryption Standard (DES), Block Cipher Design Principles, Triple DES, Blowfish, AES, Steam ciphers, RC4, Modes of Operation.

Outcome: Understand fundamentals of symmetric cryptographic algorithms like DES, AES,

BLOWFISH etc.

Activity: Implement a AES algorithm in Python Language

UNIT-III

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, the Chinese Remainder Theorem, Discrete Logarithms.

Public Key Cryptography: Principles of Public Key Cryptosystems, RSA Algorithm, Diffie-Hellman Key Exchange, Introduction to Elliptic Curve Cryptography.

Outcome: Understand the asymmetric cryptography algorithms like RSA, Elliptical Cryptography etc

Activity: Bit coin and time stamp server

UNIT-IV:

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Secure Hash Algorithm (SHA), Message Authentication Codes - Message Authentication Requirements and Functions, HMAC, Digital signatures, RSA Digital Signature Scheme, NIST Digital Signature Schemes(DSA approach)

Outcome: Understand the Authentication functions the manner in which Message Authentication Codes and Hash Functions works.

Activity: Generate digital signature for a given message

Unit-V:

Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS, Security at the Network Layer: IPSec, System Security

Outcome: Understand existing system security protocols like Kerberos, PGP, SSL and IPSEC

Activity: Develop a web page using a protocol HTTPS

TEXT BOOKS

1. Cryptography and Network Security, Behrouz A Forouzan, Debdeep Mukhopadhyay, (3e) Mc Graw Hill.
2. Cryptography and Network Security, William Stallings, (7e) Pearson.

Reference Books:

1. Everyday Cryptography, Keith M.Martin, Oxford.
2. Network Security and Cryptography, Bernard Meneges, Cengage Learning.
3. Cryptography and Network Security: AtulKahate, Mc Graw Hill, 2nd Edition.
4. Information Security, Principles and Practice: Mark Stamp, Wiley India.
5. Principles of Computer Sceurity: WM.Arthur Conklin, Greg White, TMH
6. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
7. Principles of Information security by Michael E Whitman and Herbert J.Mattord.
8. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.

Course Code	MOBILE COMPUTING	L	T	P	Credits
1012174101		3	0	0	3

Course Overview: This course explores various challenges and opportunities of mobile computing, including topics such as wireless network protocols and standards, location awareness, sensing, user interfaces, application development, and security/privacy concerns. The course will offer significant hands-on experience, i.e., students will have the opportunity to explore various features of mobile devices such as geotracking, sensing, social networking, and multimedia as part of a semester-long development project.

Course Objectives: The course should enable the student:

- To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
- To understand the typical mobile networking infrastructure through a popular GSM protocol
- To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
- To understand the platforms and protocols used in mobile environment.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Able to think and develop new mobile application.	Understanding	PO1,PO2,PO3
CO2	Apply to take any new technical issue related to this new paradigm and come up with a solution(s).	Applying	PO1,PO3
CO3	Create a new ad hoc network applications and/or algorithms/protocols.	Creating	PO1,PO3,PO5
CO4	Able to understand & develop any existing or new protocol related to mobile environment	Understanding	PO1,PO3,PO5

UNIT-I:

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS

Outcome: Students will able to understand the architecture of communication layer to define new protocols and applications
Activity/Event: Examine the protocols that runs on mobile telephone that uses GSM channels

UNIT-II:
(Wireless) Medium Access Control (MAC) : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

Outcome: Students will be able to determine and analyse various access methods for specific applications.
Activity/Event/:analyze a simple, elegant medium access control (MAC) protocol for use in transmitting real-time data in point to point *ad hoc* wireless local area networks

UNIT-III:

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunnelling and Encapsulation, Route Optimization, DHCP.

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.
Outcome: Students will be able to build up new protocols related to mobile network, transport and data related issues
Activity/Event : Discuss various recent advancements and issues in mobile communications

UNIT-IV:

Data Dissemination and Synchronization : Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

Outcome: Students will be able to disseminate and synchronise the software application and protocols
Activity/Event : Identification of network measurements, statistical analysis & modelling

UNIT-V:

Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices, Android.

Outcome: The students will be Able to extend new ad hoc network applications and/or algorithms/protocols
Activity/Event: Modelling and analysis of wireless access markets

Text Books:

1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, “Mobile Computing”, Oxford University Press, 2007, ISBN: 0195686772

Reference Books:

1.ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, “Mobile Computing, Technology Applications and Service Creation” Second Edition, McGraw Hill.

2. UWEHansmann, LotherMerk, Martin S. Nocklous, Thomas Stober, “Principles of Mobile Computing,”SecondEdition,Springer

Course Code	BIG DATA ANALYTICS	L	T	P	Credits
1005174103		3	0	0	3

Course Overview: This course provides practical foundation level training that enables immediate and effective participation in big data projects. The course provides grounding in basic and advanced methods to big data technology and tools, including Map Reduce and Hadoop and its ecosystem

Course Objectives:

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Preparing for data summarization, query, and analysis.	Understanding	PO1, PO2
CO2	Applying data modeling techniques to large data sets	Applying	PO1, PO2,PO4
CO3	Creating applications for Big Data analytics	Applying	PO1, PO2,PO4
CO4	Building a complete business data analytic solution	Applying	PO1, PO2, PO4, PO5

UNIT-I:

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

Outcome:

- Analyze the distinction between GFS and HDFS
- Demonstrate understanding of different mode of Hadoop Installations.

Activity:

- Installation of Hadoop and configuring various XML files

Unit 2:

Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for Map Reduce Framework (Old and New), Basic programs of Hadoop Map Reduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

Outcome:

- Analyze the distinction MapReduce execution of old and new versions
- Demonstrate understanding of different code blocks

Activity:

- Running of Map Reduce program to forecast weather.

Unit 3:

Effort estimation & activity Planning

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

Outcome:

- Understanding the I/O classes used for Hadoop Map Reduce concept
- Able to write wrapper classes and Generic class programs

Activity:

- Implementation of I/O operations using writable wrappers

Unit 4:

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Outcome:

- Understand the PIG Architecture and Modes of operations.
- Able to write the PIG scripts

Activity :

- Installation of PIG and running pig scripts on different modes

UNIT – 5:

Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

Outcome:

- Understand the HIVE Architecture and Modes of operations.
- Able to create database on HIVE environment

Activity:

- Installation of HIVE and running running the queries on database

Text Books:

- Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
- Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
- Hadoop in Action by Chuck Lam, MANNING Publ.
- Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

Reference Books:

- Hadoop in Practice by Alex Holmes, MANNING Publ.
- Hadoop MapReduce Cookbook, SrinathPerera, ThilinaGunarathne

Course Code	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	L	T	P	Credits
1099172106		3	0	0	3

Course Overview: The present course is designed in such a way that it gives an overview of concepts of Economics. Managerial Economics enables students to understand micro environment in which markets operate how price determination is done under different kinds of competitions. Financial Analysis gives clear idea about concepts, conventions and accounting procedures along with introducing students to fundamentals of ratio analysis and interpretation of financial statements. Break Even Analysis is very helpful to the Business Concern for Decision Making, controlling and forward Strategic Planning. Ratio analysis gives an idea about financial forecasting, financial planning, controlling the business and decision making.

Course Objectives:

At the end of the course, the students will be able to:

- Understand the concepts of managerial economics and the market dynamics namely Demand, Elasticity of demand and pricing in different market structures.
- Acquire the knowledge about production theories and cost analysis besides dealing with the production and factors of production.
- Analyze the different market structures and understand various pricing methods which are adopted in attracting the customers under different markets.
- To provide the basic knowledge on financial accounting
- To understanding Capital budgeting decisions.

Course Outcomes:

1. Describe the economic activities performed by the businessmen in the business for profit earning. Understand the significance of demand, its analysis, measurement of demand and its Forecasting
2. Evaluate the production theories and pricing policies of various enterprises
3. Design and implement different structures of market covering how price is determined under different market structures. Also can able to take decisions using business cycles. Analyze different forms of business organizations existing in the modern business and able to choose suitable form of business
4. Able to prepare financial statements
5. Evaluate investment proposals using capital budgeting tools and techniques.

Unit-I:

Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law ofDemand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting

Outcome: Describe the economic activities performed by the businessmen in the business for profit earning. Understand the significance of demand, its analysis, measurement of demand and its Forecasting

Activity: Presentations and object oriented tests

Unit-II:

Production and Cost Analyses: Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of breakeven point.

Outcome: Evaluate the production theories and pricing policies of various enterprises

Activity: Presentations and object oriented tests

Unit-III:

Part:I: Introduction to Markets, Theories of the Firm & Pricing Policies: Managerial Theories of firm: Marris and Williamson's models – Significance of Pricing and various methods of pricing with contemporary examples. Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination.

Part: II: Types of Business Organization and Business Cycles: Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle.

Outcome: Design and implement different structures of market covering how price is determined under different market structures. Also can able to take decisions using business cycles

Activity: Presentations and object oriented tests

Unit-IV: Introduction to Accounting and Capital Budgeting Decisions: Part I: Introduction to Accounting, Double Entry Systems Journal, Ledger, Trail Balance, preparation of Financial Statements (Problems).

Outcome: Analyze different forms of business organizations existing in the modern business and able to choose suitable form of business

Activity: Presentations and object oriented tests

Unit-V:

Capital Budgeting Decisions: Classification of Capital- Methods of appraising Project profitability: Traditional Methods (Payback period, Accounting rate of return) and Time value of money- Modern methods (Net Present Value method, Internal Rate of Return

Method and Profitability Index Method) – Problems

Outcome: Able to prepare financial statements and understand and implement the capital budgeting tools and techniques.

Activity: Presentations and object oriented tests

Text Books:

1. M.Kasi Reddy & Saraswathi, "Managerial Economics and Financial Analysis", PHI Publications, New Delhi, 10th Revised Edition, 2012.
2. Varshney& Maheswari, "Managerial Economics", Sulthan Chand Publishers, 1st Revised Edition, 2009.
3. S.N. Maheshwari & S.K.Maheshwari, "Financial Accounting", Vikas Publication House Pvt.Ltd, 4th Edition, 2012.

Reference Books:

1. D.N. Dwivedi, "Managerial Economics", Vikas Publication House Pvt.Ltd, 2nd Edition, 2012.
2. R.NarayanaSwamy, "Financial Accounting- A managerial Perspective", Pearson publications, 1st Indian Reprint Edition, 2012.
3. J.V.Prabhakar Rao &P.V.Rao, "Managerial Economics & Financial Analysis", Maruthi Publishers, 1st Revised Editon, 2011

Course Code	ADVANCED OPERATING SYSTEMS ELECTIVE – II	L	T	P	Credits
1012174102		3	0	0	3

Course Overview: This course exposes students to the operating systems as a research field and study operating systems, and more broadly computer systems in general, from a design point of view. We will examine different systems in both important historical context and recent research developments.

Course Objectives: The aim of this module is to study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems); Hardware and software features that support these systems.

Course Outcomes:
Upon completion of the course, student will able to achieve the following outcomes

	Course outcome	Skill	PO
CO1	Understand concepts architecture for communication in distributed systems	Understand	PO1
CO2	Understand the range of techniques available for increasing system security	Understand	PO1,PO2
CO3	Outline the potential benefits of distributed systems	Analyzing	PO2
CO4	Summarize the major security issues associated with distributed systems along with the range of techniques available for increasing system security	Applying	PO1,PO2, PO3,PO4

UNIT-I:
Introduction to Distributed systems: Goals of distributed system, hardware and software concepts, design issues. **Communication in Distributed systems**: Layered protocols, ATM networks, the Client - Server model, remote procedure call and group communication.

Outcome: Understand concepts architecture for communication in distributed systems. Outline the potential benefits of distributed systems

Activity/Event: Establish client – Server communication using distributed system

Unit 2:
Synchronization in Distributed systems: Clock synchronization, Mutual exclusion, E-tech algorithms, the Bully algorithm, a ring algorithm, atomic transactions,

Outcome:
Understand the range of techniques available for increasing system security
Activity/Event/:
Write a program to implement synchronization in group communication

Unit 3: Deadlocks: dead lock in distributed systems, Distributed deadlock prevention, and distributed dead lock detection.

Processes: Processes and Processors in distributed systems: Threads, system models, Processor allocation, Scheduling in distributed system, Fault tolerance and real time distributed systems.

Outcome: Summarize the major security issues associated with distributed systems along with the range of techniques available for increasing system security. Outline the potential benefits of distributed systems

Activity/Event :
Write a program to implement threads in distributed system for identifying deadlock.

Unit 4:

Distributed file systems: Distributed file systems design, distributed file system implementation, trends in distributed file systems**.**

Distributed shared memory: What is shared memory, consistency models, page based distributed shared memory, shared variable distributed shared memory, object based DSM.

Outcome: Understand concepts architecture for communication in distributed systems

Activity/Event :
Investigate different existed distributed file system along with their advantages

UNIT – 5:

Case study MACH: Introduction to MACH, process management in MACH, memory management in MACH, communication in MACH, UNIX emulation in MACH.

Case study DCE: Introduction to DCE threads, RPC's, Time service, Directory service, security service, Distributed file system.

Outcome: Applying key concepts of distributed Systems for real-world problem

Activity/Event :
Write a report on case studies with implementation methods.

Text Books:

1. Distributed Operating System - Andrew. S. Tanenbaum, PHI
2. Operating Systems' – Internal and Design Principles Stallings, Fifth Edition–2005, Pearson education/PHI

Reference Books:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.

2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI

Course Code	INFORMATION RETRIEVAL SYSTEMS	L	T	P	Credits

1012174103 **3 0 0 3**

Course Overview:

This course will cover algorithms, design, and implementation of modern information retrieval systems. Topics include: retrieval system design and implementation, text analysis techniques, retrieval models (e.g., Boolean, vector space, probabilistic, and learning-based methods), search evaluation, retrieval feedback, search log mining, and applications in web information management.

Course Objectives:

1. To provide the foundation knowledge in information retrieval.
2. To equip students with sound skills to solve computational search problems.
3. To appreciate how to evaluate search engines.
4. To appreciate the different applications of information retrieval techniques in the Internet or Web environment.
5. To provide hands-on experience in building search engines and/or hands-on experience in evaluating search engines.

Course Outcomes:

	Course outcome	**Cognitive Level as per Bloom's Taxonomy**	**PO**
CO1	Identify basic theories in information retrieval systems Identify the analysis tools as they apply to information retrieval systemS	Remembering, Understanding, Analyzing	PO1 PO6 PO3
CO2	Understands the problems solved in current IR systems Describes the advantages of current IR systems	Applying	PO2,PO4
CO3	Understand the difficulty of representing and retrieving documents.	Evaluation, Analyzing	PO1,PO3,PO6
CO4	Understand the latest technologies for linking, describing and searching the web.	Remembering, Analyzing	PO2,PO3,PO4, PO12

Unit-I: Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

Unit-I Outcome: Identify basic theories in information retrieval systems

Activity/Event on Unit-1: Investigate different existed information retrieval systems along with pros and cons.

Unit-II: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques

Unit-II Outcome: Identify the analysis tools as they apply to information retrieval systems. Understands the problems solved in current IR systems Describes the advantages of current IR systems

Activity/Event on Unit-2: Write a program to build inverted file using arrays

Unit-III: Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning

New Indices for Text: PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

Unit-III Outcome:
Understand the difficulty of representing and retrieving documents.

Activity/Event on Unit-3: Compare and contrast vertical partitioning and horizontal partitioning and investigate methods that deployed these partitioning techniques

Unit-IV: Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files

Unit-IV Outcome: Understand the difficulty of representing and retrieving documents

Activity/Event on Unit-4: Implement the concept of stemming on ant inverted file.

Unit-V: Thesaurus Construction: Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri

Ranking Algorithms: Introduction, How Ranking is done, Ranking models and experiments with these models

Unit-V Outcome: Understand the latest technologies for linking, describing and searching the web.

Activity/Event on Unit-5: Write a program to construct a small Thesaurus and implement the merging of Thesauri.

Text Books:

- Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992
- Modern Information Retrieval by Yates Pearson Education.
- Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons

Reference Books:

- Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
- Information retrieval Algorithms and Heuristics, 2ed, Springer

Course Code		L	T	P	Credits
1004174105	**IoT & ITS APPLICATIONS**	3	0	0	3

Course Overview: The purpose of this course is to impart knowledge on IoT Technology and Architecture, Internal communication protocols, corrections with other technologies, real time applications ad study practical design and implementation issues

Course Objectives:
The main objective of course make student to understand the IoT basic concepts, standards, communication protocols, technological relation and real time applications and their design, implementation and deployment issues.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	To Understand the Architecture, protocols and applications of IoT.	Understand	PO1
CO2	To Analyse the communication protocols and standards used in IoT	Analyse	PO2
CO3	To analyse and design the simple IoT applications to monitor or control IoT devices using simulation or hardware.	Design and Creative thinking	PO3,PO6,PO7
CO4	To implement the real time IoT applications.	Design and Deployment	PO4,PO5,PO11, PO12

Unit-I: Introduction to IoT, Need of Internet of Things, Internet of Things ERA, Characteristics of Internet of Things, architectural view of Internet of Things, Technologies behind Internet of Things – Server- End Technology – Major Components of IoT system – Development Tools – API and device interfacing components, Sources of IoT, Examples of IoT – Smart Watch – Smart Home – Smart Phone.

Unit-I Outcome: Understand the characteristics, physical and logical of IoT and their application.

Activity/Event on Unit-1: Identify physical and logical components involved in IoT applications

Unit-II Outcome: Analyze and design hardware and software components of IoT application

Activity/Event on Unit-2: Identification day to day embedded devices along with hardware and software components

Unit-III:M2M communication – M2M to IoT – M2M architecture – software development tools, Communication Technologies – Wireless communication technologies – Wired Communication, Physical Design of IoT – Things in IoT – IoT Protocols, Logical design of IoT – IoT functional blocks – IoT communication models.

Unit-III Outcome: Analyze and design the communication protocols of IoT applications

Activity/Event on Unit-3: Identification of communication styles of various IoT Protocols

Unit-IV: Basic building blocks of an IoT devices, Introduction about the Raspberry Pi Board, Operating systems for Raspberry Pi, Interfaces for IoT – Serial Interface – SPI – I2C, IoT Design Methodology – Requirements – Process – Domain Model – Information model – service – Functional View – Operational View – Device & components Integration – Application development.

Unit-IV Outcome: Construction of IoT systems with raspberry pi and simulation tools

Activity/Event on Unit-4: Hands-on setup of IoT Systems using Raspberry pi

Unit-V: Case Studies: Home Automation – Smart lighting – Home intrusion detection, Cities – smart parking, Environment – Weather monitoring system – Air Pollution Monitoring – Forest Fire Detection, Agriculture – smart irrigation system.
Unit-V Outcome: Understand physical and logical aspects of real time IoT applications.

Activity/Event on Unit-5: Mini project on IoT applications for monitoring/control devices

Text Books:

- Internet of Things: A hands-On Approach, ArshdeepBahga, Vijay Madisetti, 2014 edition, University Press.
- The Internet of Things: Enabling technologies, Platforms and Use cases, Pethuru Raj and Anupama C. Raman, 2017 edition, CRC Press, Taylor and Francis Group.
- Introduction to Embedded Systems, Shibu K V, 2nd Edition, Tata Mc-Graw hill Edition.

Reference Books:

1. Internet of Things: Architecture and design Principles, Raj Kamal, Tata Mc-Graw hill Edition.
2. Embedded Systems: Architecture and applications, Raj Kamal, Tata Mc-Graw hill Edition.

Course Code		L	T	P	Credits
1012174104	MULTIMEDIA PROGRAMMING	3	0	0	3

Course Overview:

Multimedia is the combined use of text, graphics, sound, animation, and video. A primary objective is to teach participants how to develop multimedia programs. Another objective is to demonstrate how still images, sound, and video can be digitized on the computer.

Course Objectives:

1. Able to understand the different multimedia formats and compression techniques**.**
2. Able to know the different types of image formats and audio formats.
3. Describe and understand the different video formats and compression.
4. Gain the knowledge of real world multimedia applications

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Able to understand the different multimedia formats and compression techniques	Remembering, Understanding	PO1,PO7,PO3
CO2	Able to know the different types of image formats and audio formats	Understanding, Applying, Analyzing	PO1,PO3,PO5
CO3	Describe and understand the different video formats and compression	Understanding, Applying, Analyzing	PO1,PO2,PO3
CO4	Gain the knowledge of real world multimedia applications	Applying, Analyzing, Evaluation	PO3,PO12

Unit-I: Multimedia Information Representation:

Introduction, Digitization Principles – Analog Signals, Encoder Design, Decoder Design. Text – Unformatted Text, Formatted Text, Hyper Text. Images- Graphics, Digitized Documents, Digitized Pictures. Audio – PCM Speech, CD – Quality Audio, Synthesized Audio. Video – Broadcast Television, Digital Video, PC Video, Video Content.

Unit-I Outcome: Able to understand the different multimedia formats and compression techniques

Activity/Event on Unit-1: Analyze the different multimedia formats

Unit-II: Text Compression:

Compression Principles – Source Encoder and Destination, Decoder, Lossless and Lossy Compression, Entropy Encoding, Source Encoding. Text Compression – Static and Dynamic

Huffman Coding, Arithmetic Coding.

Unit-II Outcome: Able to understand the different multimedia formats and compression techniques

Activity/Event on Unit-2: Create a text and apply different compression techniques

Unit-III:

Image Compression: Graphics Interchange Format (GIF), Tagged Image File Format (TIFF), Digitised Documents, JPEG.

Audio Compression: Differential Pulse Coded Modulation (DPCM), Adaptive Differential PCM (ADPCM), Adaptive Predictive Coding and Linear Predictive Coding MPEG Audio Coding. Dolby Audio Coding

Unit-III Outcome: Able to know the different types of image formats and audio formats

Activity/Event on Unit-3: Design a image in different formats . Create a audio and apply compression

Unit-IV:

Video Compression: Principles, H.261 Video Compression, H.263 Video Compression, MPEG 1, MPEG 2 and MPEG 4.

Unit-IV Outcome: Describe and understand the different video formats and compression

Activity/Event on Unit-4: Create a video in different formats and apply compression

Unit-V:

Multimedia Applications: Inter- personnel Communication, Interactive Applications over the Internet, Entertainment Applications and Multimedia Conferencing.

Unit-V Outcome: Gain the knowledge of real world multimedia applications

Activity/Event on Unit-5: Design different types of real world multimedia applications

TEXT BOOKS: Halshall, Fred. “Multimedia Communications – Applications, Networks, Protocols and Standards”. 2001. Pearson Education.

Reference Books: Chapman, Nigel and Chapman, Jenny. “Digital Multimedia”. 2000. John Wily &Sons. Steinmaetz, Ralf and Nahrstedt, Klara. Multimedia: “Communications and Applications”. 2003. Pearson Education.

Course Code	MANAGEMENT INFORMATION SYSTEMS ELECTIVE III	L	T	P	Credits
1012174105		3	0	0	3

Course Overview:

Information Systems provides learners with an overview of business topics, such as finance, human resources, and marketing, while emphasizing proven management theories and a variety of leadership styles. Students focusing on the specific field of management information systems (MIS) gain advanced skills with software and hardware, network administration, and database systems.

Course Objectives:

- MIS is very useful for efficient and effective planning and control functions of the management. Management is the art of getting things done through others.
- MIS will be instrumental in getting the things done by providing quick and timely information to the management.
- Able to helpful in controlling costs by giving information about idle time, labour turnover, wastages and losses and surplus capacity.
- By making comparison of actual performance with the standard and budgeted performance, variances are brought to the notice of the management by MIS which can be corrected by taking remedial steps.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	MIS brings to the notice of the management strength (i.e., strong points) of the organization, to take advantage of the opportunities available.	Remembering, Understanding, Analyzing	PO1PO2PO3
CO2	MIS reports on production statistics regarding rejection, defective and spoilage and their effect on costs and quality of the products	Understanding, Applying	PO2,PO4

Unit-I:

Introduction: Introduction, Levels of Management.

Information System And Organization: Matching the Information System Plan to the Organizational Strategic Plan – Identifying Key Organizational Objective and Processes and Developing an Information System Development – User role in Systems Development Process – Maintainability and Recoverability in System Design.

Unit-I Outcome: MIS brings to the notice of the management strength (i.e., strong points) of the

organization, to take advantage of the opportunities available.

Activity/Event on Unit-1: Map the any key organizational objective with the information system

Unit-II: Representation And Analysis Of System Structure: Models for Representing Systems: Mathematical, Graphical and Hierarchical organization Chart, Tree Diagram) – Information Flow – Process Flow – Methods and Heuristics – Decomposition and Aggregation – Information Architecture – Application of System Representation to Case Studies.

Unit-II Outcome: MIS analyses the System structure

Activity/Event on Unit-2: Take an example system and represent in hierarchical chart.

Unit-III: Systems, Information and Decision Theory: Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty. Identifying Information needed to Support Decision Making – Human Factors – Problem characteristics and Information System Capabilities in Decision Making.

Unit-III Outcome: MIS brings to the notice of the management strength (i.e., strong points) of the organization, to take advantage of the opportunities available.

Activity/Event on Unit-3: State different existed methods of classification, compression, summarization and filtering.

Unit-IV: Information System Application: Transaction Processing Applications – Basic Accounting Application – Applications for Budgeting and Planning – Other use of Information Technology: Automation – Word Processing– Electronic Mail – Evaluation Remote Conferencing and Graphics – System and Selection – Cost Benefit – Centralized versus Decentralized Allocation Mechanism

Unit-IV Outcome: MIS reports on production statistics regarding rejection, defective and spoilage and their effect on costs and quality of the products

Activity/Event on Unit-4: State the applications of Information system with their importance.

Unit-V:Development And Maintenance Of Information Systems: Systems analysis and design – System development life cycle – Limitation – End user Development – Managing End Users – off– the shelf software packages – Outsourcing –Comparison of different methodologies.
Unit-V Outcome: Analyzing methodologies for designing Information System.

Activity/Event on Unit-5: Explain different system development life cycle. Mention different methods of managing end users.

Text Books:
1. Laudon K.C, Laudon J.P, Brabston M.E, "Management Information Systems - Managing the digital firm", Pearson Education, 2004.

Reference Books:
1. Turban E.F, Potter R.E, "Introduction to Information Technology"; Wiley, 2 004.
2. Jeffrey A.Hoffer, Joey F.George, Joseph S. Valachich, "Modern Systems Analys and Design", Third Edition, Prentice Hall, 2002.

Course Code	SOFTWARE PROJECT MANAGEMENT	L	T	P	Credits
1005174105		3	0	0	3

Course Overview: To study how to plan and manage projects at each stage of the software development lifecycle (SDLC). To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process. To understand successful software projects that support organization's strategic goals

Course Objectives:

- To study how to plan and manage projects at each stage of the software development lifecycle (SDLC)
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization's strategic goals

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	To understand the basic concepts and issues of software project management	understand	PO1
CO2	To conduct activities necessary to successfully complete and close the Software projects	Understanding	PO1,PO2
CO3	To implement the project plans through managing people, communications and change	Applying	PO2,PO3,PO4,PO12
CO4	To develop the skills for tracking and controlling software deliverables	Analyzing	PO1,PO2,PO3,PO4,PO6,PO12

UNIT-I:

Introduction

Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals

Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

Outcome: Develop basic knowledge of Project Management and Project Planning

Activity: Design a plan for the given project

Unit 2:

Project Approach

Lifecycle models, Agile model, Choosing Technology, Prototyping Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows.

Outcome: Obtain knowledge about various project Approaches and Process Framework

Activity: Choose a suitable Project Approach and define a Process Framework for a project

Unit 3: Effort estimation & activity Planning

Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation, Activity Identification Approaches, Network planning models, Critical path analysis
Outcome: Obtain knowledge about various estimation techniques and Network planning models

Activity: Estimate Effort using various estimation techniques for the project

Unit 4:

Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach
Outcome: Define various risk categories and assess it by Identifying the risk.

Activity: Identify and asses Risks in the project

UNIT – 5:

Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling
Outcome: Obtain knowledge about monitoring & controlling process, cost etc., and Resource scheduling
Activity: Monitor and control the progress of the project

Text Books:

1. Rajib Mall, Fundamentals of Software Engineering, PHI Publication, 3rd Edition.
2. Pankaj Jalote, Software Engineering, Narosa Publication, 3rd Edition
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers, 3rd Edition. Cryptography and Network Security, William Stallings, (6e) Pearson.

Reference Books:

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill, 6th Edition.
2. Ian Sommerville, Software Engineering, Addison Wesley, 8th Edition.
3. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication

Course code	MACHINE LEARNING	L	T	P	Credits
1005174102		3	0	0	3

Course Overview: This course provides how to recognize the characteristics and applications of machine learning. The course provides brief information about supervised, unsupervised, clustering algorithms and Artificial neural networks.

Course Objectives:

- Familiarity with a set of well-known supervised, unsupervised and semi-supervised learning
- The ability to implement basic machine learning algorithms
- Understanding of how machine learning algorithms are evaluated
- Applying new concepts in machine learning

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Recognize the characteristics of machine learning that make it useful to real-world Problems	Understand/Remember	PO1,PO3,PO4
CO2	Characterize machine learning algorithms as supervised, semi-supervised, and Unsupervised	Understand/analyze	PO1,PO5,PO9,
CO3	Be able to use support vector machine, regularized regression algorithms	Create	PO3,PO5,PO9, PO2
CO4	Understand the concept behind neural networks for learning non-linear functions	Evaluate/Apply	PO2,PO3,PO5, PO12

Unit-I:

INTRODUCTION TO MACHINE LEARNING:

Introduction to machine learning, Definition, traditional programming vs machine learning algorithms, learning a system, supervised learning, unsupervised learning and reinforcement learning, application areas

Outcome:

- Familiarize with a set of well known problem and feature of machine learning

Activity: Apply characteristics with real world problems

UNIT- II:

Classification and Regression Models

Linear separability and decision regions, linear discriminants, linear regression, logistic regression, decision trees-ID3 and C4.5, KNN

Outcome:

- Able to understand the difference between classification and regression problems

Activity: Regression analysis and hypothesis space

UNIT -III:

Dimensionality reduction and Support vector machines

Dimensionality reduction and Feature selection, Dimensionality reduction algorithms: LDA and PCA, Margin of a classifier, Support Vector Machine, Learning nonlinear hypothesis using kernel functions.

Outcome:

- Ability to implement basic machine learning algorithms

Activity: Implement tree models,rule models and linear models on simple dataset

Unit-IV: Clustering and Ensemble Methods

Introduction to clustering: K-means clustering, Gaussian mixture model, Ensemble Methods: bagging and boosting, Random forest and AdaBoost algorithms and Bayesian learning algorithm.

Outcome:

- Able to understand how to evaluate machine learning algorithms

Activity: Implement classification algorithms on a datset

Unit-V:

ARTIFICIAL NEURAL NETWORKS

Introduction, The perceptron, the perceptron learning algorithm, Multilayer neural networks, activation functions, Back Propagation algorithm and introduction to Deep learning models: CNN

Outcome:

- Able to understand the ensemble methods and ANN algorithms

Activity: Understand the concept of neural networks for learning non linear functions

Text Books:

1. Tom Mitchell, *"Machine Learning"*, Mc GrawHill publications, 1997
2. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
3. Introduction to Machine Learning with Python By Andreas C. Müller, Sarah Guido O'Reilly Media
4. Deep Learning by Josh Patterson, Adam Gibson ,O'Reilly Media

Reference Books:

1. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben- David, Cambridge.
2. Machine Learning in Action, Peter Harington, 2012, Cengage.

Course Code	DECISION SUPPORT SYSTEM	L	T	P	Credits
1012174106		3	0	0	3

Course Overview: The course gives an **overview of how business intelligence technologies can support decision making across any number of business sectors.** These technologies have had a profound impact on corporate strategy, performance, and competitiveness and broadly encompass decision support systems, business intelligence systems, and visual analytics. Modules are organized around the business intelligence concepts, tools, and applications, and the use of data warehouse for business reporting.

Course Objectives:

- Increase the effectiveness of the manager's decision-making process.
- Supports the manager in the decision-making process but does not replace it.
- Ability to select appropriate modelling techniques for supporting semi-structured business decision making
- Ability to identify and select appropriate decision support systems for generating innovative business solutions

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understand the relationship between business information needs and decision making	Understanding	PO1,PO3
CO2	.Apply the general nature and range of decision support systems	Applying	PO2,PO4
CO3	Appraise issues related to the development of DSS	Understanding	PO1,PO6
CO4	Create appropriate modelling techniques	Creating	PO2,PO4

Unit-I: Introduction to Decision Support Systems, How Decision Support Systems Evolved- What is a DSS? Why decision Support Systems Matter – DSS Benefits – Why Study DSS?- The plan of This book.

Unit-I Outcome: Understand the relationship between business information needs and decision making.

Activity/Event on Unit-1: Design and analyze the DSS.

Unit-II: Human Decision –Making Processes what is a Decision? –The Decision Process, Types of Decision, How Business People make Decision, The Impact of Psychological Type on Decision Making, The Impact of culture on Decision Making

Unit-II Outcome: : Understand the relationship between business information needs and decision making.

Activity/Event on Unit-2: Create the impact culture on decision making

Unit-III: Systems, Information Quality. And Models- About Systems- Information Systems Data Flow Diagrams – DSS as Information Systems- Information and Information Quality- Models

Types of Decision Support Systems – the DSS Hierarchy – Generalizing the DSS Categories – Matching DSS to the Decision Type, Individual and Group DSS

Unit-III Outcome: Apply the general nature and range of decision support systems

Activity/Event on Unit-3: Analyze the system quality and DSS categories

Unit-IV:DSS Architecture, Hardware and Operating Systems platform – Defining the DSS Architecture-The Major Options- DSS on the Central Corporate System- DSS and Clint/Server Computing, Choosing a DSS Hardware Environment.

Unit-IV Outcome: Appraise issues related to the development of DSS

Activity/Event on Unit-4: Design DSS and Client/Server computing

Unit-V:DSS Software Tools – DSS Software Categories - Standard Packages – Programming Languages DSS, Models in Decision Support Systems- Types of Models- Discrete – Event Simulation Models – Random Numbers, Pseudo-Random Numbers, and Statistical Distribution – Static Simulation Model

Unit-V Outcome: Create appropriate modelling techniques

Activity/Event on Unit-5: Apply different software tools on DSS

Text Books:

1. Decision Support and Data Warehouse Systems, Efrem G. Mallach Mc Graw Hill.
2. Decision Support Systems for Business Intelligence,Vicki L. Sauter,Wiley

Reference Books:

1. Decision Support Systems (2nd Edition) George M. Marakas,Prentice Hall

Course code	CRYPTOGRAPHY AND NETWORK SECURITY LAB	L	T	P	Credits
1005174121		0	0	3	2

Course Overview: To give practical exposure on basic security attacks, encryption algorithms, authentication techniques. Apart from security algorithms, firewall configuration is also introduced.

Course Objectives:

1. To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
2. To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
3. To familiarize symmetric and asymmetric cryptography

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Identify basic security attacks and services	understanding	PO1, PO2
CO2	To understand the implementation of Symmetric cryptographic algorithms	applying	PO1, PO2,PO4
CO3	To understand the implementation of Asymmetric cryptographic algorithms	applying	PO1, PO2,PO4
CO4	To understand the implementation of Various Cryptographic Hash algorithms	applying	PO1, PO2,PO4, PO5

1. Working with sniffers for monitoring network communication using Wireshark

2. Implementation of Caesar Cipher technique

3. Decode the Given message which is encrypted using Caesar Cipher. Also Identify the key. M = "AOPZPZJYFWAVNYHWOFULADVYRZLJBYPAFSHI"
4. Implement implement Simple Substitution Cipher

5. Decode the Given message which is encrypted using Simple Substitution cipher. Also identify the key.M=

"ceiraoxnirvhrcacvcadfqaxeikar p qaxeikcepceprhiifafvriudkopfwevfgkigr du wipkr pf izqinnifcearcdkwarmasifafraodfrafmerceiqdgihddl ac hpraqpnnwqdfrarcr du rvhrcacvcafmisikwxnpafcizcqepkpqcikudk p gauuikifcqaxeikcizcqepkpqcik ac gauuikrukdoceiqpirpkqaxeikafcepcceiqaxeikpnxephicarfdcraoxnwceipnxephicreaucig ac arqdoxnicinwyvohnigceiraoxnirvhrcacvcadfqaxeikduuikrsikwnaccniqdoovfaqpcadfriqvkacw pfg actann hi redtfcepc ac qpf hi ipranwhkdlifisifhwepfgirxiqapnnwprceioirrpmirhiqdoindfmikodkicepfrisikpnevfgkigqaxeikci zcqepkpqcikr"

6. Implement the Play fair Cipher

7. Implement the Pure Transposition Cipher

8. Implement DES Encryption and Decryption

9. Implement the BLOWFISH Encryption and decryption
10. Implement the AES Encryption and decryption
11. Implement RSA Encryption and Decryption
12. Implementation of CRC Hash Functions
13. Implement SHA – 128 Hash Functions

Text Books:

1. Cryptography and Network Security, Behrouz A Forouzan, DebdeepMukhopadhyay, (3e) Mc Graw Hill.
2. Cryptography and Network Security, William Stallings, (7e) Pearson.

Course code	**BIGDATA ANALYTICS LAB**	**L**	**T**	**P**	**Credits**

1005174122 **0 0 3 2**

Course Overview: This course provides practical foundation level training that enables immediate and effective participation in big data projects. The course provides grounding in basic and advanced methods to big data technology and tools, including Map Reduce and Hadoop and its ecosystem

Course Objectives:

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm

To introduce programming tools PIG & HIVE in Hadoop echo system

Course Outcomes:

	Course outcome	**Cognitive Level as per Bloom's Taxonomy**	**PO**
CO1	Preparing for data summarization, query, and analysis.	Understanding	PO1, PO2
CO2	Applying data modeling techniques to large data sets	Applying	PO1, PO2,PO4
CO3	Creating applications for Big Data analytics	Applying	PO1, PO2,PO4
CO4	Building a complete business data analytic solution	Applying	PO1, PO2,PO4, PO5

Week 1:

1. (i)Perform setting up and Installing Hadoop in its three operating modes:
- Standalone,
- Pseudo distributed,
- Fully distributed.

(ii)Use web based tools to monitor your Hadoop setup.

Week 2:

2. Implement the following file management tasks in Hadoop:
- Adding files and directories
- Retrieving files
- Deleting files

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

Week 3:

3. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Week 4:

4. Write a Map Reduce program that mines weather data.

Weather sensors collecting data every hour at many locations across the globe gather a

large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record oriented.

Week 5:

5. Implement Matrix Multiplication with Hadoop Map Reduce

Week 6:

6. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

Week 7:

7. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

Text Books:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melny k,Bruce Brown, Rafael Coss

Reference Books:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2.Hadoop Map Reduce Cookbook, SrinathPerera, Thilina Gunarathne

Course Code	DISTRIBUTED SYSTEMS	L	T	P	Credits
1005174203		3	0	0	3

Course Overview: This course provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls and expose students to current technology used to build architectures to enhance distributed Computing infrastructures with various computing principles

Course Objectives:

- Explain difference between failure model and security model
- Give outline of resource sharing concept
- Explain client server communication.
- Extract the features of Internet protocols
- Describe important characteristics of distributed systems and the salient architectural
- Features of such systems

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Develop distributed file system	Understand	PO1
CO2	Outline importance characteristics of distributed systems and the salient architectural features of such systems	Understand	PO1,PO4
CO3	Explain the features and applications of important standard protocols which are used in the distributed system	Applying	PO5
CO4	Interpret inter-process communication in a distributed system	Applying	PO2,PO12

Unit-I:

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.
System Models: Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

Outcome:

- List out the different examples of distributed system
- Explain difference between failure model and security model
- Give outline of resource sharing concept

Activity: Distributed systems usage in real time examples and resource sharing usage.

Unit-II:

Inter process Communication: Introduction, The API for the Internet Protocols- The Characteristics of Inter process communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast Comprehensions.

Outcome:
Differentiate between TCP and UDP.
Explain client server communication.
Extract the features of Internet protocols

Activity: Practice Example of TCP and UDP communication

Unit-III:

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

Outcome:
- Able to Explain the process of RPC
- List the mechanisms for RMI
- Explain the processes and thread.
- List out the thread states

Activity: JAVA RMI with JVM example study, examples of thread execution

Unit-IV:

Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

Outcome:
- Develop a familiarity with distributed file systems.
- Describe important characteristics of distributed systems and the salient architectural features of such systems.

Activity: Different shortest path applications using graph based approach

Unit-V:

Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

Outcome:

- Describe important characteristics of Distributed Deadlocks along with passive and active replication.

Activity: ATM application, Railway Reservation examples

Text Books:

1. Ajay D Kshemkalyani, MukeshSighal, "Distributed Computing, Principles, Algorithms and Systems", Cambridge
2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems- Concepts and Design", Fourth Edition, Pearson Publication

Reference Books:

1. Distributed-Systems-Principles-Paradigms-Tanenbaum PHI
2. https://nptel.ac.in/courses/106/106/106106168/

Course Code		L	T	P	Credits
1005174106	CLOUD COMPUTING	3	0	0	3

Course Overview: This course provides the comprehensive study of key concepts of Cloud & its environment. Building software systems and components that scale to millions of users in modern internet. Cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas. Developing cloud based software applications on top of cloud platforms. Storage systems and backup strategies for cloud based data.

Course Objectives:

After taking the course, students will be able:

- To learn the basics of Cloud computing
- To know the key concepts of Virtualization
- To gain knowledge on cloud computing service models
- To develop cloud implementation, programming and mobile cloud computing
- To learn key components of Amazon web services
- To maintain the Cloud backup and solutions

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Define cloud computing and memorize the different cloud computing service and deployment models	Understand/ Remember	PO1
CO2	Describe the importance of virtualization along with their technologies for data center automation	Understand	PO1,PO5
CO3	Identify emerging cloud programming paradigms and its software environments	Apply	PO1,PO3,PO5
CO4	Describe the key application of cloud resource management. Design and develop the backup strategies for cloud data based on features.	Analyze	PO1, PO3, PO10

UNIT-I

Systems modelling, Clustering, and virtualization of Clusters and Data Centres- Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency.

Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Centre Automation.

Outcome: understand the basics of cloud computing and key concepts of virtualization
Activity: virtualization tools and mechanisms

UNIT-II

Cloud Platform Architecture-Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware

Outcome: To gain knowledge on cloud computing service models, architectural design of store clouds

Activity: Critique the consistency of services deployed from a cloud architecture

UNIT-III

Cloud Programming and Software Environments-Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments, Data sources and sinks with an emphasis on MS Azure, Google Cloud

Outcome:

- Able to develop cloud implementation, programming and mobile cloud computing,
- Able to learn key components of Amazon web services

Activity: Compare and contrast the economic benefits delivered by various cloud models based on application requirements, economic constraints and business requirements.

UNIT-IV:

Cloud Resource Management and Scheduling-Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling Map Reduce Applications Subject to Deadlines.

Outcome: understand the application of cloud resource management and scheduling algorithms for computing clouds

Activity: cloud resource management and scheduling algorithms

Unit-V:

Storage Systems-Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service (S3).

Cloud Security and trust Management- Cloud Security defence strategies, Distributed

intrusion/ Anomaly detection. Data and software protection techniques, Reputation guided protection of Data Centres.

Outcome: Analyze and develop the backup strategies for cloud data based on features

Activity: Critically analyze case studies to derive the best practice model to apply when developing and deploying cloud based applications

TEXT BOOKS

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, ArshadeepBahga, Vijay Madisetti, University Press

Reference Books:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH.

Course Code	MANAGEMENT SCIENCE	L	T	P	Credits
1099172203		3	0	0	3

Course Overview:
This course is intended to familiarize the students with the framework for the managers and leaders available for understanding and making decisions relating to issues related organizational structure, production operations, marketing, Human resource Management, product management and strategy

Course Objectives:

1. Management Science is an approach to management decision-making that makes extensive use of quantitative methods
2. This course aims to introduce students to the application of quantitative techniques to problems where models capture problem structure and use it to help optimize the decision outcome.
3. The classes demonstrate how advances in imputing power have made these techniques more accessible to managers and how the techniques can be applied to a range of different situations.
4. Provide a basic understanding of management science and engineering principles, including analytical problem solving and communications skills.
5. Prepare for practice in a field that sees rapid changes in tools, problems, and opportunities.

Course Outcomes:

1. Gives an outline of management and its nature scope and functions and hierarchical levels and organizational structure and managing the culture
2. Able to understand the various functions of production and inventory management
3. Bring out various concepts of strategic management and project management
4. Elucidate the process of matching manager qualifications with position requirements and concept of marketing mix
5. gives outline of various contemporary issues of management

Unit-I: Introduction to Management: Concept –nature and importance of Management – Generic Functions of Management – Principles of Management – Evolution of Management thought- Theories of Motivation (Maslow's, hertz berg and X-Y Theory) – Decision making process-Designing organization structure- Principles of organization.

Outcome: Gives an outline of management and its nature scope and functions and hierarchical levels and organizational structure and managing the culture

Activity: Case study on motivation

Unit-II: Operations Management: Plant location, Principles and Types of plant layout, production methods (job, batch mass production) – Work study- Statistical Quality Control-Control Charts (X Bar chart &R-charts, P-chart and C-chart) Simple problems- Material

Management: Need for Inventory control- Tools and techniques of Inventory Control - EOQ, ABC analysis, HML, SDE, VED, and FSN analyses

Outcome: Able to understand the various functions of production and inventory management

Activity: Group discussion

Unit-III: Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process –Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy, Alternatives. Global strategies, theories of Multinational Companies. **Project Management**: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability (Problems)

Outcome:
Bring out various concepts of strategic management and project management
Activity:
SWOT analysis

Unit-IV: Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans (Problems) – Job Evaluation and Merit Rating – Salient features of The Factories Act 1948 - Marketing Management, Marketing Mix strategies – Product, Price, Place and Promotion.

Outcome:
Elucidate the process of matching manager qualifications with position requirements and concept of marketing mix

Activity:
case study and role-play

Unit-V: Contemporary Management Practices: Basic concepts of MIS, MRP, Justin-Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management ,Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

Outcome: Gives outline of various contemporary issues of management

Activity: Debate on Contemporary Management Practices

Text Books:

1. Dr. P. Vijaya Kumar &Dr. N. Appa Rao, '*Management Science'* Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, *Management Science'* TMH 2011.

Reference Books:

1. Koontz &Weihrich: 'Essentials *of management'* TMH 2011
2. Seth &Rastogi: Global Management Systems, Cengage learning , Delhi, 2011
3. Robbins: Organizational Behaviour, Pearson publications, 2011
4. KanishkaBedi: Production & Operations Management, Oxford Publications, 2011
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
6. Biswajit Patnaik: Human Resource Management, PHI, 2011

DETAILED SYLLABUS

FOR

IV - B.TECH

II SEMESTER

Course Code		L	T	P	Credits
1005174205	CONCURRENT AND PARALLEL PROGRAMMING (ELECTIVE-IV)	3	0	0	3

Course Overview:

This course approaches in two directions. In the first part, the abstractions used in concurrent programming are explored. This part will build the student's intuition on understanding and reasoning about concurrency and parallel programming. The second part of the course will focus on performance. It is imperative for programmers who write concurrent code to understand the fundamentals and the limitations of the underlying architectures. Different implementation models of concurrent programs also explored.

Course Objectives:

1. Learn the abstractions of concurrent and parallel programming.
2. Knowing how to use different synchronization techniques.
3. Understand the limitations of architectures, operating systems, and programming languages
4. Quickly explore the solution space and reduce the response time.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Understand the art of multi core programming	Understanding	PO1, PO2
CO2	Building scalable multithreaded applications and learn how to reduce the energy consumption of the multithreaded applications.	Creating/Applying	PO1, PO3, PO4, PO11, PO12
CO3	For better designs one has to know the usage of different performance monitoring tools.	Design	PO1, PO3, PO4
CO4	Understand the limitations of executing environment	Analysis	PO1, PO3, PO4

Unit-I:

Introduction: Shared objects and synchronization; parallel programming; Threads and monitors, sleeping; Interconnect, memory, caches, cache-conscious programming; Multicore and multithreaded architectures, hardware synchronization instructions.

Outcome:

- Able to understand the introduction of parallel programming

Activity: understand the art of multi core programming

Unit-II:

Abstractions: Mutual exclusion: solutions to two-thread problems; locks, fairness and timestamps; Concurrent objects: different forms of consistency, linearizability, progress and memory models of modern programming languages; Foundations of shared memory, correctness arguments; Synchronization primitives.

Outcome: Knowing how to use different synchronization techniques

Activity: abstraction and concurrent objects

Unit-III:
Implementation of spin locks, test-and-set locks, exponential back off locks, composite and hierarchical locks. Performance optimization tools: perf and jRAPL.

Outcome: Understand the limitations of architectures, operating systems, and programming languages

Activity: Implementation of spin locks

Unit-IV:
Concurrent implementation of linked lists using coarse grained, fine grained, optimistic and lazy and non-blocking synchronization techniques; Concurrent implementation of queues and stacks; Linearization points.

Outcome:
Quickly explore the solution space and reduce the response time

Activity: implementation of linked list, queues, stacks

Unit-V:
Concurrent hashing and priority queues; Barriers and transactional memory.

Outcome: Understand the limitations of executing environment

Activity: Concurrent hashing and priority queues

Text Books:

1. "The Art of Multiprocessor Programming" by Maurice Herlihy and NirShavit, Morgan Kaufmman Publishers, 1st Edition, Indian Reprint 2012.
2. "An Introduction to Parallel Programming" by Peter Pacheco, Morgan Kaufmann, 1st Edition, 2011

Reference Books:

1. "The Art of Concurrency: A Thread Monkey's Guide to Writing Parallel Applications" by O' Reilly Media, 1st Edition, 2009
2. "Java Concurrency in Practice" by Brian Goetz, Tim Peierls, Joshua Block, Joseph Bowbeer, David Holmes and Doug Lea, Addison Wesley, 1st Edition, 2006
3. Selected reading from papers published in conferences like MICRO, ISCA, HPCA, IPDPS, ICDCS, PODC, SC, ICS, PPoPP, PLDI, OOPSLA, ASPLOS and PACT.

Course Code		L	T	P	Credits
	CYBER SECURITY				
1012174201		**3**	**0**	**0**	**3**

Course Overview:

The students will gain a comprehensive overview of the cyber security principles and concepts and learn the challenges of designing a security program. This course helps the student to develop and manage an Information Security Program, perform business impact analysis, and carry out disaster recovery testing.

Course Objectives:

The Cyber security Course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

Course Outcomes:

	Course outcome	**Cognitive Level as per Bloom's Taxonomy**	**PO**
CO1	Cyber Security architecture principles and Identifying System and application security threats and vulnerabilities	Remembering, Understanding	PO1,PO2,PO3
CO2	Identifying different classes of attacks and Cyber Security incidents to apply appropriate response	Understanding	PO2,PO4
CO3	Describing risk management processes and practices	Applying, Analyzing	PO6,PO8
CO4	Evaluation of decision making outcomes of Cyber Security scenarios	Understanding, Analyzing, Evaluation	PO3,PO4

Unit-I: Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security ,Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

Unit-I Outcome: Cyber Security architecture principles Identifying System and application security threats and vulnerabilities

Activity/Event on Unit-1: Analyze the Cybercrimes Classification

Unit-II: Cyber offenses:

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector

Cloud Computing.

Unit-II Outcome: Identifying different classes of attack .

Activity/Event on Unit-2: Analyze attack vector cloud computing

Unit-III: Cybercrime Mobile and Wireless Devices:

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

Tools and Methods Used in Cybercrime:

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity, Theft: Introduction, Phishing, Identity Theft (ID Theft)

Unit-III Outcome: Cyber Security incidents to apply appropriate response Describing risk management processes and practices

Activity/Event on Unit-3: Create project for password cracking

Unit-IV: Cybercrimes and Cyber security:

Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program, Continuing Strategies

Unit-IV Outcome: Cyber Security incidents to apply appropriate response Describing risk management processes and practices

Activity/Event on Unit-4: Create project on digital signatures

Unit-V: Understanding Computer Forensics:

Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Ant forensics

Unit-V Outcome: Evaluation of decision making outcomes of Cyber Security scenarios

Activity/Event on Unit-5: Analyze the Cyber Forensics and digital evidence

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, SunitBelapure, Wiley.
2.Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, Cengage Learning.

Reference Books:

1. Information Security, Mark Rhodes, Ousley, MGH

Course Code	FUNDAMENTALS OF BLOCKCHAIN TECHNOLOGY	L	T	P	Credits
1005174201		3	0	0	3

Course Overview: This course discusses about various types of agreements and abstract models of Black Chain. It also focuses on Bitcoin technology, various cryptographic payment systems both e-cash and credit card based technologies. Finally this course dealt with trends in Block chain technologies.

Course Objectives:

- To understand abstract models of block chain technology
- Ability to know how the various payment systems will work on real time.
- Understand the mathematical analysis of the bit coin technology.

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Familiarize the functional/operational aspects of crypto currency ECOSYSTEM	Understanding	PO1, PO2
CO2	Understand emerging abstract models for Block chain Technology	Understanding	PO1, PO2
CO3	Identify major research challenges and technical gaps existing in between theory and practice in crypto currency domain	Analyzing	PO1, PO3, PO4
CO4	Develop a course project using a Bit coin technology	Applying	PO1, PO3, PO4, PO5, PO11, PO12

UNIT-I

Cryptography, Digital Signatures, Public VS Private Key Cryptography, MD VS SHA, Hashing Algorithm (SHA-256), Merkle Tree

Outcome: Gives a brief introduction about cryptography and basic algorithms

Activity: Hashing algorithms

UNIT-II

Tracking origin, Challenges of current transaction system, The emergence of bit coin, Revolutionizing the traditional business network, Explore, Benefits of block chain, Questions of trust

Outcome: Able to understand benefits and challenges of block chain technology

Activity: Bitcoin technology

UNIT-III

Introduction to Bit coin, Double Spending Problem, Transactions, Time-Stamp Server, Proof-of-Work

Outcome: Understand emerging abstract models of block chain technology

Activity: Bit coin and time stamp server

UNIT-IV:

Network, Incentive, Reclaiming Disk Space ,Usage of Merkel Tree, Simplified payment verification, Combining and Splitting Values, Privacy

Outcome: Identify major research challenges and technical gaps existing between theoretical and practise in cryptocurrency domain

Activity: Usage of Merkel trees

Unit-V:

Why the name, Business Suitability(Shared Ledger, Permissions, Consensus),Types of frictions, Achieving friction free business , Transforming Ecosystems, Use cases(Financing, Insurance, Supply chain management, Healthcare, IOT)

Outcome: Understand the mathematical analysis of the bit coin technology

Activity: Simple project on bit coin technology

TEXT BOOKS

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
2. Blockchain: Ultimate guide to understanding blockchain, bitcoin, cryptocurrencies, smart contracts and the future of money, Mark Gates, Wise Fox Publisher, 2017

Reference Books:

1. Mastering Bitcoin: Programming the Open Blockchain, Andreas M. Antonopoulos, O' Reilly
2. Selected papers from IEEE Symposium on security and Privacy, EUROCRYPT and PODC

Course Code		L	T	P	Credits
1012174202	SOFTWARE QUALITY ASSURANCE	3	0	0	3

Course Overview:

This course explores the activities and the challenges faced by test managers and how these challenges can be handled. This course explore topics for understanding the reasons for testing at several points during development. The course will explore the usage of automated tools. Definitions and theory is mostly based on industry accepted quality and testing practices.

Course Objectives:

1. Describe approaches to quality assurance
2. Understand quality models
3. Evaluate the system based on the chosen quality model

Course Outcomes:

	Course outcome	Cognitive Level as per Bloom's Taxonomy	PO
CO1	Upon Completion of the course, the students will be able to	Understanding	PO1,PO3
CO2	Describe different approaches to testing software applications	Understanding, Apply	PO1,PO2,PO3
CO3	Analyze specifications and identify appropriate test generation strategies	Analyze	PO1,PO2,PO3, PO4,PO11
CO4	Develop an appropriate test design for a given test object	Apply and Analyze	PO1,PO2,PO3, PO4

Unit-I: Introduction:

The Software Quality Challenge. What is Software Quality?

Software Quality Factors: The Components of the Software Quality Assurance System - Overview **Pre-Project Software Quality Components**

Unit-I Outcome: Upon Completion of the course, the students will be able to know the software quality

Activity/Event on Unit-1: Design A Project for software quality

Unit-II: SQA Components in the Project Life Cycle

Integrating Quality Activities in the Project Life Cycle, Reviews Software Testing - Strategies Software Testing –Implementation, Assuring the Quality of Software Maintenance

Unit-II Outcome: Describe different approaches to testing software applications

Activity/Event on Unit-2: Design a project and apply different testing stratagies

Unit-III: Software Quality Infrastructure Components

Procedures and Work Instructions. Supporting Quality Devices Staff Training, Instructing and Certification. Preventive and Corrective Actions.

Software Quality Management Components

Project Progress Control: Software Quality Metrics, Software Quality Costs

Unit-III Outcome: Describe different approaches to testing software applications and Analyze specifications and identify appropriate test generation strategies

Activity/Event on Unit-3: Design a project and progress the control

Unit-IV: Standards, Certification and Assessment: SQA Standards ISO 9001 Certification Software, Process Assessment, SEI CMM.

Unit-IV Outcome: Analyze specifications and identify appropriate test generation strategies

Activity/Event on Unit-4: analyze the process assessment

Unit-V: Organizing for Quality Assurance

Management and its Role in Quality Assurance, The Software Quality Assurance

Unit-V Outcome: Develop an appropriate test design for a given test object

Activity/Event on Unit-5: Analyze the software Quality assurance

Text Books:

1. Software Quality Assurance, Theory of implementation-Daniel Galin, Pearson
2. Mauro Pezze and Michal Young, "Software Testing and Analysis. Process, Principles, and Techniques", John Wiley 2008

Reference Books:

1. Boriz Beizer, "Software Testing Techniques", 2nd Edition, DreamTech, 2009.
2. Aditya P. Mathur, "Foundations of Software Testing", Pearson, 2008
3. Mauro Pezze and Michal Young, "Software Testing and Analysis. Process, Principles, and Techniques", John Wiley 2008
4. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", 2nd Edition, Pearson, 2003
5. Kshirasagar Naik and PriyadarshiTripathy (Eds), "Software Testing and Quality Assurance: Theory and Practice", John Wiley, 2008