ACADEMIC REGULATIONS
COURSE STRUCTURE & SYLLABUS

For

B.Tech

COMPUTER SCIENCE AND ENGINEERING

(Applicable for batches admitted from 2019-20)

PRAGATI ENGINEERING COLLEGE
(AUTONOMOUS)

Permanently Affiliated to JNTUK, Kakinada, Accredited by NAAC with "A" Grade
Recognized by UGC 2(f) and 12(b) under UGC act, 1956
1-378, ADB Road, Surampalem – 533 437
Near Peddapuram, E.G. Dist, Andhra Pradesh

VISION AND MISSION OF THE INSTITUTE

VISION

To emerge as a Premier Institution for Technical Education in the Country through Academic Excellence and to be recognized as a Centre for Excellence in Research & Development, Catering to the needs of our Country.

MISSION

To realize a strong Institution by consistently maintaining State-of-art-Infrastructure and building a cohesive, World Class Team and provide need based Technical Education, Research and Development through enhanced Industry Interaction.

VISION AND MISSION OF THE DEPARTMENT

VISION
To emerge as a center of technical expertise in the field of computer science and engineering by producing globally competent professionals with technical & research capabilities, ethical values and team spirit.

MISSION

M1:   To produce competent software professionals.
M2:   To induce application oriented and research capabilities in students for the betterment of society.
M3:   To inculcate ethics and human values in students to adapt to the dynamism in the field of computing technology.

PROGRAM EDUCATIONAL OBJECTIVES

PEO1: Graduates are prepared to be engineering practitioners in the areas of computer science and engineering to solve industry's technological problems.
PEO2: Graduates are prepared to be employed in IT industries through advanced education, research and development and entrepreneurial skills.
PEO3: Graduates are prepared to be responsible computing professionals in an ethical manner.

PROGRAM OUTCOMES (POs)

After successful completion of the program, the graduates will be able to

PO1	**Engineering knowledge** : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6	**Environment and sustainability**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Ethics**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Individual and team work**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

PSO-1	Analyze the problem and identify computing requirements appropriate to its solution.
PSO-2	Design and development of software based solutions to the real world problems.
PSO-3	Adapt to a rapidly changing environment by learning and employing emerging software tools and technologies.

Bloom's Taxonomy Knowledge Level	Knowledge Level Representation	Mapping/correlation levels
Remember	K1	1: Low
Understand	K2	
Apply	K3	2:Medium
Analyze	K4	
Evaluate	K5	3. High
Create	K6	

<center>**R19-ACADEMIC REGULATIONS FOR B.TECH (REGULAR)**</center>

Applicable for the students of B.Tech (Regular) Admitted from the academic year 2019-2020.

1. AWARD OF B.TECH DEGREE

A Student shall be declared eligible for the award of B.Tech Degree if he/she fulfills the following academic regulations.

1.1   A Student shall be declared eligible for the award of the B.Tech Degree, if he/she pursues a course of study for not less than four and for not more than eight academic years.

1.2   The candidate shall register for 160 credits and secure all the 160 credits.

2. PROGRAMMES OF STUDY

Following B.Tech Programmes are offered with English as medium of instruction.

S. No.	Name of the Programme	Code
1	Civil Engineering (CE)	01
2	Electrical and Electronics Engineering (EEE)	02
3	Mechanical Engineering (ME)	03
4	Electronics and Communications Engineering (ECE)	04
5	Computer Science and Engineering (CSE)	05
6	Information Technology (IT)	12

3. INDUCTION PROGRAMME

At the beginning of the first year in the zero semester there shall be three weeks induction programme to help new students adjust and feel comfortable in the new environment, inculcate in them the culture of the institution.

4. DISTRIBUTION AND WEIGHTAGE OF MARKS

4.1 The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for theory/drawing/design courses and 75 marks for laboratory courses. The project work shall be evaluated for 200 marks. The mini project/Socially relevant activity has a weightage of 50 marks and evaluated internally.

4.2 Theory Courses

a) Internal assessment : 30 marks

For the Mid examinations there shall be two tests, one conducted in the middle and the other at the end of each semester. Each mid examination consists of an examination and assignment. The question paper contains **Part-A** and **Part-B**. The duration for the answering the question paper is 100 minutes. For First mid examination Part-A consists of three questions, one question from first unit, one question from Second unit each for   8 marks and one question from first half of third unit for 4 marks. For second mid examination Part-A consists of three questions, one question from second half of third unit for 4 marks, one question from fourth unit and one question from fifth unit each for 8 marks. Part-B consists of ten objective type questions each carries half mark totaling to 5 marks. Answering all questions is compulsory.

Students shall submit two assignments in a semester. The first assignment will be on first two units and first half of the third unit. The second assignment will be on the second half of third unit and last two units. The marks allotted for each assignment is 5.

Internal Marks based on mid examinations including assignments (30 Marks) are calculated with 80% weightage for best of the two mid examinations and 20% weightage for other mid examination.

The formula for finding the total marks of internal assessment (30 marks) =[0.80 x higher marks scored between the two internal tests + 0.20 x marks scored in the other test]

b) External assessment: 70 Marks

The end semester examination is of 3 hours duration and it covers the topics in 5 units and weightage is 70 marks.

End examination consists of 5 questions and each question for 14 marks. Two Questions from each unit with internal choice i.e, either or choice (total 10 questions with 2 questions from each unit)

4.3 Laboratory Courses

a)   Internal assessment : 25 marks
There shall be continuous evaluation during the semester for 25 marks as shown below:
Day-to-Day work   -   10 marks
Laboratory record   -   5 marks
One internal test at the end of the semester   -   10 marks

                                    Total   **-**   **25 Marks**
                                                                   ----

b)   External Assessment : 50 marks
At the end of the semester an examination for 3 hours duration shall be conducted for 50 marks by the concerned teacher and an external examiner.

4.4 Drawing/Similar Course

i)   For Engineering Drawing course,

a)   Internal assessment : 30 marks
     There shall be continuous evaluation with a weightage of 30 marks as shown below :
     Day-to-Day work   -   15 marks
     Internal tests :
     There shall be two internal tests One in the middle of the
     semester and the other at the end. Marks for Internal
     Tests = 0.8 x higher marks scored between the two tests
      + 0.2 x marks scored in the other test.   -   15 marks

                                    Total   **-**   **30 Marks**
                                                                   ----

b) External assessment : 70 Marks
          Same as for theory courses given in 4.2 (b)

ii)   **For Machine Drawing course,**

a) Internal assessment : 30 marks
There shall be continuous evaluation with a weightage of 30 marks as shown below :
Day-to-Day work   -   15 marks
Internal tests :
There shall be two internal tests One in the middle of the
semester and the other at the end. Marks for Internal
Tests = 0.8 x higher marks scored between the two tests
+ 0.2 x marks scored in the other test.   -   15 marks

                               Total   **-   30 Marks**
                                                                ----

b) External assessment : 70 Marks

The end semester examination is of 3 hours duration and it covers the topics in two parts and weightage is 70 marks.
End examination consists of two parts i.e PART-A and PART-B. PART-A consists of 3 questions and out of which two questions are to be answered and each carries 14 marks. PART-B contains one compulsory question for 42 marks.

iii) **Courses such as Building Planning and Drawing, Design and Detailing of Reinforced Concrete Structures, Design and Detailing of Steel Structures, Estimation, Specifications and Contracts.**

a) Internal assessment : 30 marks
There shall be continuous evaluation with a weightage of 30 marks as shown below :
Assignments   -   10 marks
Internal tests :
There shall be two internal tests One in the middle of the
semester and the other at the end. Marks for Internal
Tests = 0.8 x higher marks scored between the two tests
+ 0.2 x marks scored in the other test.   -   20 marks

                               Total   **-   30 Marks**
                                                                ----
b) External assessment : 70 Marks

The end semester examination is of 3 hours duration and it covers the topics in 5 units and weightage is 70 marks.

End examination consists of two parts i.e PART-A   and PART-B. PART-A consists of 2 questions and out of which one question has to be answered and carries 28 marks. PART-B contains 5 Questions out of which three questions has to be answered and each carries 14 marks.

4.5 Socially Relevant Activity

To enhance social responsibility among students a Socially relevant Activity is introduced in the II year I / II semester. Each student has to participate in various social awareness programmes viz. Swachh Bharat, Water Harvesting, Health and Hygiene. Each student has to work 15 hours continuously in the semester for this work. It has a weightage of 50 marks and evaluated internally at the end of the semester.

4.6 Mini Project

There shall be a Mini Project in the III year I / II semester. It has a weightage of 50 marks and evaluated internally at the end of the semester.

4.7 Project Work

Out of a total of 200 marks for the Project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. The End Semester Examination (Viva-voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. The Evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project and evaluated by an internal committee.

4.8 Mandatory Audit/Non Credit Courses

Following are the mandatory audit courses offered to all the programmes.

   i. Environmental Science
   ii. Constitution of India
   iii. Essence of Indian Traditional Knowledge
   iv. Professional Ethics and Human Values
   v. IPR and Patents
   vi. MOOCs/Industry course approved by the department.

4.8.1 Evaluation Procedure:
4.8.1.1 Mandatory Audit/Non Credit Courses (i - v):

For the Mandatory Audit/Non credit courses i-v listed above an internal test shall be conducted at the end of the semester. A student is required to score minimum 40 marks out of 100 marks in each of the mandatory audit/non credit courses.

4.8.1.2 MOOCs Course/ industry course approved by the department::

A student shall register either MOOCs or industry course approved by the department.

i. MOOCs:

There shall be a Discipline Centric mandatory Course through Massive Open Online Course (MOOC). The student shall register for the course (Minimum of 8 weeks) offered by authorized Institutions/Agencies through online with the approval of Head of the Department which is not covered in the curriculum,. For those students who have not cleared the online MOOCs course, respective Head of the Department shall appoint one mentor for each of the MOOC subjects offered and the mentor appointed shall conduct an internal test. A student is required to score 40 marks out of 100 marks.

ii. Industry course approved by the department:

For the industry course an industry trained faculty member nominated by the Head of the department shall conduct a course during the semester. At the end of the semester an internal test shall be conducted. A student is required to score 40 marks out of 100 marks.

The B.Tech degree shall only be awarded if a student gets satisfactory grade (CS-Completed Successfully) in each of the mandatory audit/non credit courses besides acquiring 160 (120 for lateral entry) credits.

5. ATTENDANCE REQUIREMENTS :

5.1 A student shall be eligible to appear for semester end examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.

5.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

5.3 Shortage of Attendance below 65% in aggregate shall in <u>NO CASE</u> be condoned.

5.4 A stipulated fee shall be payable towards condonation of shortage of attendance to the College.

5.5 Students whose shortage of attendance is not condoned in any semester are not eligible   to take their end examinations of that semester and their registration shall stand cancelled.

5.6 A student will not be promoted to the next semester unless he/she satisfies the attendance requirements of the present semester. They may seek readmission for that semester when offered next.

6. MINIMUM ACADEMIC REQUIREMENTS

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned under rule 5.0.

6.1 A Student is deemed to have satisfied the minimum academic requirements if he has **earned the credits allotted to each theory/laboratory, design/drawing subject/project by securing not less than 35% of marks in the end semester exam, and minimum 40% of marks in the sum total of the internal marks and end semester examination marks.**

6.2 A student shall register and put in minimum attendance in all 160 credits and earn all 160 credits.

7. PROGRAMME PATTERN
7.1 The entire programme of study is for four academic years, all the years are on semester pattern.

7.2 A student eligible to appear for the end semester examination in a subject, but absent or failed in the end semester examination, may write the examination in that subject when conducted next.

7.3 When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted into the same semester / year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

8. PROMOTION TO NEXT HIGHER CLASS
8.1 A Student shall be promoted from I year to II year if he fulfills the minimum attendance requirement under rule 5.

8.2 A Student shall be **promoted from II year to III year**, if he fulfills the academic requirement of **50% of the credits up to II year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.**

8.3 A student shall be **promoted from III year to IV year** if he fulfills the academic requirements of **50% of the credits up to III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.**

9. CUMULATIVE GRADE POINT AVERAGE (CGPA)

Theory/Laboratory Design/Drawing/Project work/mini project/socially relevant activity (%)	Letter Grade	Level	Grade Point
≥ 90	O	Outstanding	10
≥ 80 to < 90	S	Excellent	9
≥ 70 to < 80	A	Very Good	8
≥ 60 to < 70	B	Good	7
≥ 50 to < 60	C	Fair	6
≥ 40 to < 50	D	Satisfactory	5
<40	F	Fail	0
--	--	Absent	0

Computation of Semester Grade Point Average (SGPA)

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

The **SGPA** is the ratio of sum of 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.

$$\textbf{SGPA (Si)} = \sum (C_i \times G_i) / \sum C_i$$

Where C_i is the number of credits of the ith course and G_i is the grade point scored by the student in the ith 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 semester of a programme i.e.,

$$\textbf{CGPA} = \sum (C_i \times S_i) / \sum C_i$$

- Where S_i is the SGPA of the ith semester and C_i is the total number of credits in that semester.
- The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- Equivalent Percentage = (CGPA – 0.75) x 10

10. 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 shall be placed in one of the following four classes.

Class Awarded	CGPA to be secured	
First Class with Distinction	≥ 7.75	**From the CGPA secured from 160 credits**
First Class	≥ 6.75 to < 7.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 4.75 to < 5.75	

11. <u>MINIMUM INSTRUCTIONS DAYS.</u>

The minimum instruction days for each semester shall be 90 working days

12. <u>STUDENT TRANSFERS</u>

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

12.2 Pragati Engineering College (Autonomous) follows the practice of JNTUK/ State Government guidelines for transfer of students.

13. <u>TRANSITORY REGULATIONS</u>

13.1 Discontinued or Detained Students are eligible for readmission as and when next offered. The readmitted students will be governed by the regulations under which the student has been admitted.

13.2 a) In case of transferred students from other universities/colleges, the credits shall be transferred to Pragati Engineering College (Autonomous) R19 Academic Regulations and course structure of the respective discipline.

     b) The students seeking transfer to Pragati Engineering College (Autonomous) from other universities/institutions have to obtain the credits of equivalent courses as prescribed by the college. In addition the transferred students have to pass the courses in which they failed at the earlier institute.

14. <u>GENERAL :</u>

14.1 Whenever the words "he", "him", "his" secure in the regulations, they include "she", "her", "hers".

14.2 The academic rules and regulations should be read as a whole for the purpose of interpretation.

14.3 In case of any doubt or ambiguity in the interpretation of rules, the decision of the Principal of the college is final.

14.4 The college may change or amend the academic rules and regulations or syllabi at any time and the changed rules come into effect from the date of issue of such orders.

ACADEMIC REGULATIONS FOR B.TECH LATERAL ENTRY SCHEME (LES)

Applicable for the students admitted into II year B.Tech I semester from the Academic year 2020-21.

1. **AWARD OF B.TECH DEGREE**

   A Student will be declared eligible for the award of B.Tech Degree if he fulfills the following academic regulations.

   1.1. A Student shall be declared eligible for the award of the B.Tech Degree, if he pursues a course of study for not less than three academic years and not more than six   academic years.
   1.2 The candidate shall register for 120 credits and secure all the 120 credits.

2. The attendance regulations of B.Tech (Regular) shall be applicable to B.Tech (LES) students as well.

3. **PROMOTION RULES**

   3.1 A student shall be **promoted from III year to IV year** if he fulfills the academic requirements of **50% of the credits up to III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.**

4. **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 shall be placed in one of the following four classes.

Class Awarded	CGPA to be secured	
First Class with Distinction	≥ 7.75	**From the CGPA secured from 120 credits**
First Class	≥ 6.75 to < 7.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 4.75 to < 5.75	

5. All the other regulations as applicable to **B.Tech 4-year degree course (Regular) will hold good for B.Tech (Lateral Entry Scheme) also.**

MALPRACTICE RULES

DISCIPLINARY ACTION FOR MALPRACTICE/ IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1(a)	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 subject 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 subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only
(b)	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 subject 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	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3	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 subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects 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	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 subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects 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	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to examiner requesting him to award pass marks	Cancellation of the performance in that subject.
6	Refuses to obey the orders of the Chief 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 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case will be registered against them.
7	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 subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects 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	Possess any lethal weapon or firearm in the examination hall	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects 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 subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects 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	Comes in a drunken condition to the examination Hall	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects 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 subject and all other subjects 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 Principal for further action to award suitable punishment	

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

⇨ **Ragging within or outside any educational institution is prohibited.**

⇨ **Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student**

	Imprisonment upto		Fine Upto
Teasing, Embarrassing and Humiliation	**6** Months	+	**Rs. 1,000/-**
Assaulting or Using Criminal force or Criminal intimidation	1 Year	+	**Rs. 2,000/-**
Wrongfully restraining or confining or causing hurt	2 Years	+	**Rs. 5,000/-**
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	5 Years	+	**Rs. 10,000/-**
Causing death or abetting suicide	10 Months	+	**Rs. 50,000/-**

LET US MAKE PRAGATI RAGGING FREE COLLEGE

Ragging

ABSOLUTELY
NO TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**

2. **Ragging entails heavy fines and/or imprisonment.**

3. **Ragging invokes suspension and dismissal from the College.**

4. **Outsiders are prohibited from entering the College and Hostel without permission.**

5. **Girl students must be in their hostel rooms by 7.00 p.m.**

6. **All the students must carry their Identity Cards and show them when demanded**

7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

LET US MAKE PRAGATI RAGGING FREE COLLEGE

COURSE STRUCTURE

Zero Semester

Induction program (mandatory)	3 weeks duration
Induction program for students to be offered right at the start of the first year.	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch and Innovations

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. Precious little is done by most of the institutions, except for an orientation program lasting a couple of days. We propose a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after the induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.2 The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it. The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

I Year – I Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
1	Humanities, Social Sciences including Management	19HE1T01	Professional Communicative English	3	-	-	3
2	Basic Sciences	19BM1T01	Linear Algebra and Differential Equations	3	-	-	3
3	Basic Sciences	19BP1T02	Applied Physics	3	-	-	3
4	Engineering Sciences	19CS1T01	Programming for Problem Solving using C	3	-	-	3
5	Engineering Sciences	19ME1T01	Engineering Drawing	1	-	3	2.5
6	Humanities, Social Sciences including Management	19HE1L01	Professional Communicative English Laboratory- I	-	-	3	1.5
7	Basic Sciences	19BP1L02	Applied Physics Laboratory	-	-	3	1.5
8	Engineering Sciences	19CS1L01	Programming for Problem Solving using C Laboratory	-	-	3	1.5
9	Mandatory Courses	19HM1T07	Professional Ethics and Human Values	2	-	-	0
			Total Credits				**19**

I Year – II Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
1	Basic Sciences	19BM2T02	Numerical Methods and Multivariable Calculus	3	-	-	3
2	Basic Sciences	19BM2T03	Integral Transforms and Vector Calculus	3	-	-	3
3	Basic Sciences	19BC2T02	Applied Chemistry	3	-	-	3
4	Professional Core	19IT2T01	Data Structures	3	-	-	3
5	Engineering Sciences	19EE2T02	Basic Electrical and Electronics Engineering	3	-	-	3
6	Basic Sciences	19BC2L02	Applied Chemistry Laboratory	-	-	3	1.5
7	Professional Core	19IT2L01	Data Structures Laboratory	-	-	3	1.5
8	Engineering Sciences	19EE2L02	Basic Electrical and Electronics Engineering Laboratory	-	-	3	1.5
9	Humanities, Social Sciences including Management	19HE2L02	Professional Communicative English Laboratory-II	-	-	3	1.5
10	Mandatory Courses	19BE2T01	Environmental Science	2	-	-	0
			Total Credits				**21**

II Year – I Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
1	Basic Sciences	19BM3T04	Probability and Statistics	3	-	-	3
2	Engineering Sciences	19CS3T03	Python Programming	3	-	-	3
3	Professional Core	19CS3T04	Digital Marketing	3	-	-	3
4	Engineering Sciences	19EC3T06	Digital Logic Design	3	-	-	3
5	Professional Core	19IT3T04	Mathematical Foundations of Computer Science	3	-	-	3
6	Humanities, Social Sciences including Management	19HM3T01	Managerial Economics and Financial Analysis	3	-	-	3
7	Engineering Sciences	19CS3L02	Python Programming Laboratory	-	-	3	1.5
8	Professional Core	19CS3L03	Digital Marketing Laboratory	-	-	3	1.5
9	Mandatory Courses	19HM3T06	Essence of Indian Traditional Knowledge	2	-	-	0
						Total Credits	**21**

II Year – II Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
1	Professional Core	19CS4T05	Object Oriented Programming through Java	3	-	-	3
2	Professional Core	19IT4T06	Operating Systems	3	-	-	3
3	Professional Core	19IT4T02	Data Base Management Systems	3	-	-	3
4	Professional Core	19CS4T06	Computer Organization	3	-	-	3
5	Professional Core	19CS4T07	Formal Languages and Automata Theory	3	-	-	3
6	Professional Core	19CS4L04	Object Oriented Programming through Java Laboratory	-	-	3	1.5
7	Professional Core	19IT4L05	Operating Systems Laboratory	-	-	3	1.5
8	Professional Core	19IT4L02	Data Base Management Systems Laboratory	-	-	3	1.5
9	Project	19CS4P01	Socially Relevant Activity*	-	-	-	0.5
10	Mandatory Courses	19HM4T05	Constitution of India	2	-	-	0
						Total Credits	**20**

*15 Hours in Semester

III Year – I Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
1	Professional Core	19CS5T08	Computer Networks	3	-	-	3
2	Professional Core	19CS5T09	Web Application Development using J2EE	3	-	-	3
3	Professional Core	19CS5T10	Software Engineering	3	-	-	3
4	Professional Core	19CS5T11	Compiler Design	3	-	-	3
5	Professional Core	19CS5T12	Data Warehousing and Data Mining	3	-	-	3
6	Professional Elective		**Professional Elective-I**	3	-	-	3
7	Professional Core	19CS5L05	Web Application Development using J2EE Laboratory	-	-	3	1.5
8	Professional Core	19CS5L06	Data Mining Laboratory	-	-	3	1.5
9	Project	19CS5P02	Mini Project	-	-	2	1
10	Mandatory Courses	19HM5T08	IPR and Patents	2	-	-	0
						Total Credits	**22**

III Year – II Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
1	Professional Core	19CS6T18	AI Tools and Techniques	3	-	-	3
2	Professional Core	19CS6T19	Mobile Computing	3	-	-	3
3	Engineering Sciences	19EC6T10	Internet of Things	3	-	-	3
4	Professional Core	19CS6T20	Design and Analysis of Algorithms	3	-	-	3
5	Open Elective		**Open Elective-I**	3	-	-	3
6	Professional Elective		**Professional Elective-II**	3	-	-	3
7	Professional Core	19CS6L07	AI Tools and Techniques Laboratory	-	-	3	1.5
8	Engineering Sciences	19EC6L11	Internet of Things Laboratory	-	-	3	1.5
9	Mandatory Courses	19CS6T38	MOOCs/Industry Courses approved by Department**	-	-	-	0
			Total Credits				**21**

**- Student can select the course of any discipline under MOOCs. However agency will be decided by the respective BOS.

IV Year – I Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
			IV-I				
1	Professional Core	19IT7T08	Cryptography and Network Security	3	-	-	3
2	Professional Core	19CS7T25	Object Oriented Analysis and Design using UML	3	-	-	3
3	Open Elective		**Open Elective-II**	3	-	-	3
4	Professional Elective		**Professional Elective-III**	3	-	-	3
5	Professional Elective		**Professional Elective-IV**	3	-	-	3
6	Professional Core	19IT7L06	Cryptography and Network Security Laboratory	-	-	3	1.5
7	Professional Core	19CS7L08	Object Oriented Analysis and Design using UML Laboratory	-	-	3	1.5
						Total Credits	**18**

IV Year – II Semester

S. No.	Course Category	Course Code	Course Title	L	T	P	C
1	Humanities, Social Sciences including Management	19HMBT02	Management Science	3	-	-	3
2	Open Elective		**Open Elective-III**	3	-	-	3
3	Professional Elective		**Professional Elective-V**	3	-	-	3
4	Project	19CS5P03	Project	-	-	18	9
						Total Credits	**18**

Professional Elective-I

S. No.	Course Category	Course Code	Course Title
1	Professional Elective	19CS5T13	Advanced Data Structures and Algorithms
2	Professional Elective	19CS5T14	NO SQL databases
3	Professional Elective	19CS5T15	Ethical Hacking
4	Professional Elective	19CS5T16	Functional Programming
5	Professional Elective	19CS5T17	Computer Graphics

Professional Elective-II

S. No.	Course Category	Course Code	Course Title
1	Professional Elective	19IT6T07	Software Testing
2	Professional Elective	19CS6T21	Data Science
3	Professional Elective	19CS6T22	Ad-hoc and Sensor Networks
4	Professional Elective	19CS6T23	Mobile Application Development
5	Professional Elective	19CS6T24	Information Retrieval Systems

Professional Elective-III

S. No.	Course Category	Course Code	Course Title
1	Professional Elective	19CS7T26	Software Project Management
2	Professional Elective	19CS7T27	Big Data Analytics
3	Professional Elective	19CS7T28	Cyber Security
4	Professional Elective	19CS7T29	Client side Scripting Languages
5	Professional Elective	19CS7T30	Computer Vision

Professional Elective-IV

S. No.	Course Category	Course Code	Course Title
1	Professional Elective	19CS7T31	Design Patterns
2	Professional Elective	19CS7T32	Social Network Analysis
3	Professional Elective	19IT7T13	Block chain Technology
4	Professional Elective	19IT7T14	High Performance Computing
5	Professional Elective	19CS7T33	Cloud Computing

Professional Elective-V

S. No.	Course Category	Course Code	Course Title
1	Professional Elective	19CS8T34	Agile Methodologies and DevOps
2	Professional Elective	19IT8T12	Machine Learning
3	Professional Elective	19CS8T35	Digital Forensics
4	Professional Elective	19CS8T36	Server side Scripting Languages
5	Professional Elective	19CS8T37	Human Computer Interaction

Open Elective-I

S. No.	Course Category	Course Code	Course Title
1	Open Elective	19CE6T18	Environmental Impact Assessment and Management
2	Open Elective	19EE6T24	Energy Audit, Conversation and Management
3	Open Elective	19EC6T35	RFID Sensors and Data Acquisition
4	Open Elective	19ME6T28	Industrial Robotics
5	Open Elective	19HE6T02	Soft Skills and Interpersonal Communication

Open Elective-II

S. No.	Course Category	Course Code	Course Title
1	Open Elective	19CE7T24	Wastewater Management
2	Open Elective	19EE7T36	Power Safety and Management
3	Open Elective	19EC7T31	Embedded Systems
4	Open Elective	19ME7T27	Mechatronics
5	Open Elective	19HM7T03	Entrepreneurship

Open Elective-III

S. No.	Course Category	Course Code	Course Title
1	Open Elective	19CE8T38	Remote Sensing and GIS
2	Open Elective	19EE8T12	Power Electronics
3	Open Elective	19EC8T33	Biomedical Instrumentation
4	Open Elective	19ME8T29	Supply Chain Management
5	Open Elective	19HM8T04	Marketing Management

I Year I Semester
Professional Communicative English
(Common to CE, EEE, MECH, ECE, CSE & IT)

Course Category	Basic Sciences	Course Code	19HE1T01
Course Type	Theory	L-T-P-C	3 – 0 – 0 – 3
Prerequisites	LSRW + Vocabulary Synonyms, antonyms, Grammar.	**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts. To develop extensive reading skill and comprehension for pleasure and profit.
2	The lesson centers on the pros and cons of the development of science and technology. To develop extensive reading skill and comprehension for pleasure and profit.
3	Depicts of the symptoms of Cultural Shock and the aftermath consequences. To develop extensive reading skill and comprehension for pleasure and profit.
4	Portrays the ways of living life in its true sense. To develop extensive reading skill and comprehension for pleasure and profit.
5	Supports the developments of technology for the betterment of human life. To develop extensive reading skill and comprehension for pleasure and profit.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Emphasizes that the ultimate aim of education is to enhance wisdom and inspires the readers to serve their nation with their self-enrichment.	K2
CO2	Enables the learners to promote peaceful co-existence and universal harmony in the society and empowers the learners to have initiation in innovation.	K2
CO3	Imparts the students to manage different cultural shock due to globalization and to develop multiculturalism to appreciate diverse cultures and also motivates the learners to contribute to their nation.	K3
CO4	Arouse the thought of life to lead in a well path by recognizing the importance of work besides enhancing their LSRW skills.	K2
CO5	Inspires the learners at the advancement of software by the eminent personalities and motivates the readers to think and tap their innate talents.	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	2	1	-	-	1	-	3	-	-
CO2	2	1	-	-	-	1	3	1	-	1	-	1	-	-
CO3	-	-	-	-	-	1	2	-	-	1	-	-	-	-
CO4	-	-	-	-	-	1	-	1	2	-	-	-	-	-
CO5	-	-	1	2	1	-	-	-	-	1	-	-	-	-

COURSE CONTENT

UNIT I
1. 'The Greatest Resource- Education' from Professional Communicative English.
2. 'War' from 'Panorama: A Course on Reading'

UNIT II
1. ' A Dilemma' from Professional Communicative English.
2. 'The Verger' from 'Panorama: A Course on Reading'

UNIT III
1. 'Cultural Shock': Adjustments to new Cultural Environments from Professional Communicative English.
2. ' The Scarecrow' from Panorama: A Course on Reading

UNIT IV
1. The   Secret of Work' from Professional Communicative English.
2. 'A Village Lost to the Nation' from Panorama: A Course on Reading

UNIT V
1. ' The Chief Software Architect' from Professional Communicative English.
2. 'Martin Luther King and Africa' from Panorama: A Course on Reading

TEXT BOOKS
1. PROFESSIONAL COMMUNICATIVE ENGLISH. Published by Maruthi Publishers.
2. PANORAMA: A COURSE ON READING, Published by Oxford University Press India

REFERENCE BOOKS
1. ENGLISH GRAMMAR AND COMPOSITION – WREN & MARTIN
2. LEARNER'S ENGLISH GRAMMAR AND COMPOSITION – N.D.V. Prasada Rao

WEB RESOURCES
Online Dictionaries:
https://dictionary.cambridge.org/
https://www.oxfordlearnersdictionaries.com/

Grammar:
https://www.oxfordlearnersdictionaries.com/grammar/
https://dictionary.cambridge.org/grammar/british-grammar/

Synonyms and Antonyms:
https://www.thesaurus.com/browse/search
https://www.englishclub.com/vocabulary/synonyms-antonyms.htm

Introduction:
In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus is on the skills of listening, speaking, reading and writing. The non-detailed Textbooks are meant for extensive reading for pleasure and profit. Thus the stress in the syllabus is primarily on the development of communicative skills and fostering ideas.

Objectives:
1. To improve the language proficiency of the learners in English with emphasis on LSRW skills.
2. To enable the learners to study and comprehend the prescribed course effectively relating to their theoretical and practical components.
3. To develop the communication skills of the learners in both formal and informal situations.

LISTENING SKILLS
Objectives:
1. To enable the learners to appreciate the role of listening skill and improve their pronunciation.
2. To enable the learners to comprehend the speech prescribe of people belonging to different backgrounds and regions.
3. To enable the learners to listen for general content, to fill up information and infer the content.

SPEAKING SKILLS
Objectives:
1. To make the learners aware of the importance of speaking for their personal and professional communication.
2. To enable the learners to express themselves fluently and accurately in social and professional set up.
3. To help the learners describe objects, situations and people.
4. To make the learners participate in group activities like role-plays, discussions and debates.
5. To make the learners participate in Just a Minute talks.

READING SKILLS
Objectives:
1. To enable the learners to comprehend a text through silent reading.
2. To enable the learners to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the learners to skim and scan a text.
4. To enable the learners to identify the topic sentence.
5. To enable the learners to identify discourse features.
6. To enable the learners to make intensive and extensive reading.

WRITING SKILLS
Objectives:
1. To make the learners understand that writing is an exact formal skill.
2. To enable the learners to write sentences and paragraphs coherently and cohesively.
3. To make the learners identify and use appropriate vocabulary.
4. To enable the learners to narrate and describe.
5. To enable the learners capable of note-making.
6. To make the learners to write formal and informal letters.
7. To enable the learners to describe graphs using expressions of comparison.

8. To enable the learners to write technical reports.

Methodology:

1. The classes are to be learning-centred where the learners participate in the language learning activities with the peer group and the facilitator.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be animated with the help of learning positive activities such as pair work, Group Discussion and so on.
4. The facilitator is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The facilitator activities the learning in a particular mode.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches) of Pragati Engineering College, Surampalem from the academic year 2019-20 (R-19 Regulations)

DETAILED TEXTBOOK:

- **PROFESSIONAL COMMUNICATIVE ENGLISH** *Published by Maruthi Publishers.*

NON-DETAILED TEXTBOOK:

- *-PANORAMA: A COURSE ON READING, Published by Oxford University Press India*
  The course content along with the study material is divided into six units.

UNIT 1:

1. *'The Greatest Resource- Education' from Professional Communicative English.*
   Objective: Schumacher describes the education system by saying that it was mere training, something more than knowledge of facts.

   Outcome: Underscores that the ultimate aim of Education is to enhance wisdom.

2. *'War' from 'Panorama: A Course on Reading'*
   Objective: To develop extensive reading skill and comprehension for pleasure and profit.

   Outcome: Acquisition of LSRW skills

UNIT 2:

1. *' A Dilemma' from Professional Communicative English.*
   Objective: The lesson centers on the pros and cons of the development of science and technology.

   Outcome: Enables the students to promote peaceful co-existence and universal harmony among people in the society.

2. *'The Verger' from 'Panorama: A Course on Reading'*
   Objective: To develop extensive reading skill and comprehension for pleasure and profit.

   Outcome: Acquisition of LSRW skills

UNIT 3:

1. 'Cultural Shock': Adjustments to new Cultural Environments from Professional Communicative English.
    Objective: Depicts of the symptoms of Cultural Shock and the aftermath consequences
    Outcome: Enables the students to manage different cultural shocks due to globalization.

2. ' The Scarecrow' from Panorama: A Course on Reading
    Objective: To develop extensive reading skill and comprehension for pleasure and profit.
    Outcome: Acquisition of LSRW skills

UNIT 4:

1.'The   Secret of Work' from *Professional Communicative English.*
    Objective: Portrays the ways of living life in its true sense.

    Outcome: Arouses the thought to lead life in a good path by recognizing the importance of work.

2.'A Village Lost to the Nation' from Panorama: A Course on Reading
    Objective: To develop extensive reading skill and comprehension for pleasure and profit.

    Outcome: Acquisition of LSRW skills

UNIT 5:

1. ' The Chief Software Architect' from Professional Communicative English.
    Objective: Supports the developments of technology for the betterment of human life.

    Outcome: Pupil gets inspired by eminent personalities who toiled for the present day advancement of software development.

2. 'Martin Luther King and Africa' from Panorama: A Course on Reading
    Objective: To develop extensive reading skill and comprehension for pleasure and profit.

    Outcome: Acquisition of LSRW skills

I Year I Semester
Linear Algebra and Differential Equations
(Common to CE, EEE, ME, ECE, CSE & IT)

Course Category	Basic Sciences	Course Code	19BM1T01
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Exposure to Basics of matrices, Differentiation, Integration	**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Solve systems of linear equations, determine the rank, find the eigenvalues and eigenvectors, diagonalization of a matrix.	K3
CO2	Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics.	K2
CO3	Solve first order differential equations and its applications	K3
CO4	Solve the linear differential equations with constant coefficients by appropriate method	K3
CO5	Find partial derivatives of multivariable functions and apply them to find extreme values of a function.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I
Solving system of linear equations, Eigen Values and Eigen vectors
Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss elimination method for solving system of equations – Eigenvalues and Eigen vectors and their properties.

UNIT II
Cayley-Hamilton Theorem and Quadratic forms
Cayley-Hamilton theorem (without proof) – Finding inverse and powers of a matrix by Cayley-Hamilton theorem – Reduction to diagonal form-Quadratic forms-nature of the quadratic form - reduction of quadratic form to canonical form by orthogonal transformation.

UNIT III
Differential equations of first order and first degree
Linear – Bernoulli – Exact – Reducible to exact.
Applications: Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories.

UNIT IV
Linear differential equations of higher order
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x^n, $e^{ax}V(x)$, $x^mV(x)$ - Method of Variation of parameters.

UNIT V
Partial differentiation
Introduction – Homogeneous function – Euler's theorem – Total derivative – Chain rule – Generalized Mean value theorem for single variable (without proof) – Taylor's and

Maclaurin's series expansion of functions of two variables – Jacobian – Functional dependence.
Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

TEXT BOOKS

B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India

REFERENCE BOOKS
Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edition.
Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press.
Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
T.K.V. Iyengar et. al., Engineering Mathematics Volume I & III S Chand Publications.

WEB RESOURCES
UNIT I: Solving system of linear equations, Eigen Values and Eigen vectors
https://en.wikipedia.org/wiki/System_of_linear_equations
https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
UNIT II: Cayley-Hamilton Theorem and Quadratic forms
https://www.math.hmc.edu/calculus/tutorials/eigenstuff/
https://en.wikipedia.org/wiki/Quadratic_form
UNIT III: Differential equations of first order and first degree
https://en.wikipedia.org/wiki/Differential_equation
http://um.mendelu.cz/maw-html/index.php?lang=en&form=ode
https://www.khanacademy.org/math/differential-equations/first-order-differential-equations
UNIT IV: Linear differential equations of higher order
https://en.wikipedia.org/wiki/Differential_equation
http://um.mendelu.cz/maw-html/index.php?lang=en&form=ode
https://nptel.ac.in/courses/122107037/20
UNIT V: Partial Differentiation
https://en.wikipedia.org/wiki/Partial_derivative
https://www.whitman.edu/mathematics/calculus_online/section14.03.html

I Year I Semester
APPLIED PHYSICS
(ECE, CSE & IT)

Course Category	BASIC SCIENCES		Course Code	19BP1T02
Course Type	Theory		L-T-P-C	3 - 0 - 0-3
Prerequisites	Exposure to Intermediate Physics		Internal Assessment	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES	
1	Impart Knowledge of Physical Optics phenomena like Interference and Diffraction required to design instruments with higher resolution.
2	Understand the physics of Semiconductors and their working mechanism for their utility in Engineering applications.
3	Impart the knowledge of Dielectric and Magnetic materials with characteristic utility in appliances.

COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Analyze the optical applications using the concepts of Interference and diffraction.	K4
CO2	Apply the concepts of quantum mechanics for calculation of free quantum particle energies.	K3
CO3	Apply the basics of Laser Mechanism and fiber optics for the communications systems.	K3
CO4	Understand the electrical conductivities in semiconductors and study the types of semiconductors using Hall Effect.	K2
CO5	Understand the polarization phenomenon in dielectric materials and magnetic materials to study dependence on temperature and frequency response.	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	1	1	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	1	-	-	-
CO5	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I
WAVE OPTICS
INTERFERENCE
Introduction-Principle of Superposition – Coherent Sources – Interference in parallel and non - parallel thin films (reflection geometry), Newton's rings & Applications.

DIFFRACTION
Introduction- Differences between Interference and Diffraction, Differences between Fresnel and Fraunhoffer diffraction Fraunhoffer diffraction in single slit (Qualitative), Fraunhoffer diffraction Double slit(Qualitative), Grating equation (analytical Treatment)-Rayleigh criterion of resolution and Resolving power of grating,

UNIT II
QUANTUM MECHANICS
Introduction – Matter waves – de Broglie's hypothesis – Davisson-Germer experiment – G.P.Thomson experiment –

Heisenberg's Uncertainty Principle –interpretation of wave function – Schrödinger Time Independent and Time Dependent wave equations – Particle in a potential box.

UNIT III
LASERS
Introduction-Characteristics–Spontaneous and Stimulated emission of radiation – population inversion - Pumping Mechanisms - Ruby laser – Helium Neon laser – Semiconductor laser– Applications

FIBER OPTICS:
Introduction- Structure of Optical Fiber – Total Internal Reflection-Numerical Aperture and Acceptance Angle-classification of Optical fibers- optical fiber communication system- Advantages of Optical fibers- Applications

UNIT IV
SEMICONDUCTOR PHYSICS
Introduction–Intrinsic semi conductors - density of charge carriers- Electrical conductivity – Fermi level – extrinsic semiconductors - p-type &n-type - Density of charge carriers -Hall effect- Hall coefficient - Applications of Hall effect.

UNIT V
DIELECTRICS
Introduction - Dielectic polarization– Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations- Electronic Ionic and Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation -Applications of dielectrics.

MAGNETIC PROPERTIES
Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials(Analytical)--Hysteresis-soft and hard magnetic materials & applications

TEXT BOOKS
1. "A Text book of Engineering Physics"by M.N.Avadhanulu, P.G.Kshirsagar -S.Chand Publications.
2. "Engineering Physics" by M.R.Srinivasan, New Age international publishers.
3. Solid State Physics" by SO Pilai., - New age International Publishers.

REFERENCE BOOKS
1. Kettles Introduction to Solid state Physics-Charles Kittel,Wiley India Edition.
2. Solid State Physics ,AJ Dekker, I Edition,Macmillan Publishers India Private Limited.

WEB RESOURCES

1. https://youtu.be/NVllY3LlNqc
   https://youtu.be/1TRdOjVpm-0
   https://youtu.be/0tHcWDNCJ-o

2. https://study.com/academy/lesson/the-de-broglie-hypothesis-definition-significance.html
   https://www.youtube.com/watch?v=uPvWlwOhCTo

3. https://www.youtube.com/watch?v=fdS12EaXH3A
   http://folk.uio.no/ravi/cutn/cmp/band1.pdf

4. https://www.electronics-tutorials.ws/diode/diode_1.html
   https://youtu.be/3csUvwZdsOg
   https://www.youtube.com/watch?v=_40dpUzzfhA

5. https://youtu.be/TuvLv6SBO5s
   https://youtu.be/u0Qf9jVh2kc

I Year I Semester
Programming for Problem solving using C
(Common to CE, ME, EEE, ECE, CSE, IT)

Course Category	Engineering Science		Course Code	19CS1T01
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites			**Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES		
	1	To impart adequate knowledge on the need of programming languages and problem solving techniques.
	2	To develop programming skills using the fundamentals of C Language.
	3	To enable effective usage of arrays, structures, functions, pointers and dynamic memory allocation.
	4	To make use of file handling functions in programming.

COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Apply the fundamentals of C Programming for Problem solving.	K3
CO2	Identify the appropriate Decision statement and Loops for a given Problem.	K2
CO3	Make use of Arrays and Strings to solve the problems in C.	K3
CO4	Apply the concepts of Functions and Pointers in Problem solving.	K3
CO5	Develop solutions for problems using Structures, Unions and Files.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	-	-	-	-	-	-	-	1	1	-
CO2	3	3	3	3	1	-	-	-	-	-	-	-	1	1	-
CO3	3	3	3	2	1	-	-	-	-	-	-	-	2	1	-
CO4	2	3	3	3	1	-	-	-	-	-	-	-	2	2	-
CO5	3	3	3	3	1	-	-	-	-	-	-	-	2	2	-

COURSE CONTENT

UNIT I
Introduction to Programming–Introduction to Computer Software, Classification of Computer Software, Representation of Data – Bits and Bytes, Programming Languages –High and Low Level Languages, Generation of Programming Languages, Program Design Tools: Algorithms, Flowcharts, Pseudo code, Types of Errors, Testing & Debugging Approaches.
Introduction to C – Structure of a C Program, Writing the First C Program, Header Files used in C Program, Compiling and Executing C Programs.

UNIT II
Tokens in C: Basic Data Types in C – Keywords, Identifiers, Variables, Constants, Input / Output statements in C, Operators in C, Precedence and Associativity Rules, Type Casting Types.
Decision Control: Decision Control Statements: Conditional Branching Statements - if, if – else, nested if, if – else – if, and Switch – Case.
Basic Loop Structures: Iterative Statements - for, while and do - while, Nested Loops, The 'Break', 'Continue', and

'goto' statements.

UNIT III
Arrays: Declaration and Initialization of Arrays, Accessing & Storing the elements of an Array, Operations on Arrays: Traversing, Inserting, Deleting, Searching, Two Dimensional Arrays: Declaring, Initializing, Accessing, Operations on Two Dimensional Arrays (Matrices), Applications of Arrays.
Strings: String Fundamentals, String Input and Output, String Library Functions

UNIT IV
Functions: Function Declaration / Function Prototypes, Function Definition, Function Call (Call by Value), Passing Parameters to Functions, Return Statement, Storage Classes, Recursive Functions, Arrays as Function Arguments.
Pointers: Declaring Pointer Variables, Pointer Arithmetic, Passing Arguments to Function using Pointers (Call by Reference), Pointers and Arrays, Pointer to Pointer, Dynamic Memory Allocation – Malloc, Calloc, Realloc, Free.

UNIT V
Structures: Introduction to Structures, Nested Structures, Array of Structures.
Unions: Introduction, Array of Union Variables, Union inside Structure, Enumerated Data Types, Bit Fields.

Files: Declaring, Opening, and Closing File, Reading from and Writing to Text Files.

TEXT BOOKS
1. Programming in C, Reema Thareja, 2nd Edition, Oxford University Press.
2. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education

REFERENCE BOOKS
1. Programming in C – Ashok N.Kamthane, Amit Ashok Kamthane, 3rd Edition, Pearson.
2. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
3. Programming in C (A Practical Approach) – Ajay Mittal, First Edition, Pearson.

WEB RESOURCES
1. http://nptel.ac.in/courses/106104128/
2. http://students.iitk.ac.in/programmingclub/course/#notes
3. http://c-faq.com/~scs/cclass/cclass.html
4. http://www.youtube.com/watch?v=b00HsZvg-V0&feature=relmfu
5. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/

I Year I Semester
ENGINEERING DRAWING

Course Category	Engineering Science		Course Code	19ME1T01
Course Type	Theory		L-T-P-C	1-0-3-2.5
Prerequisites			Internal Assessment	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES	
1	To introduce the students to use drawing instruments and to draw polygons, Engineering Curves and Scales.
2	To introduce the students to use orthographic projections, projections of points and lines.
3	To make the students draw the projections of the planes.
4	To make the students draw the projections of the various types of solids.
5	To represent the object in 3D view through isometric views.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Construct polygons, scales and engineering curves.	K3
CO2	Identify the position of points and lines with use of orthographic projections.	K3
CO3	Analyze the location and position of plane figures through orthographic projections.	K4
CO4	Analyze the location and position of solid bodies through orthographic projections.	K4
CO5	Develop 2D and 3D objects by converting their views.	K6

*k1- Remembering, k2- Understanding, k3- Applying, k4- Analyzing, k5- Evaluating, k6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes **(1 – Low, 2 - Medium, 3 – High)**															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	-	-	1	-	-	1	-
CO2	3	2	1	2	1	-	-	-	-	-	1	-	-	1	-
CO3	3	2	1	2	1	-	-	-	-	-	1	-	-	1	1
CO4	3	2	1	2	1	-	-	-	-	-	1	-	-	1	1
CO5	3	2	1	3	3	-	-	-	-	-	1	-	-	1	3

COURSE CONTENT

UNIT I
Introduction to Engineering Drawing.
Polygons: Constructing regular polygons by general method.
Curves: Parabola, Ellipse and Hyperbola by general methods tangent & normal for the curves. Cycloid and Involutes.
Scales: Vernier and Diagonal scales.

UNIT II
Orthographic Projections: Introduction, importance of reference lines, projections of points in various quadrants. Projections of straight lines inclined to both the planes, determination of true lengths and angle of inclination.

UNIT III
Projections of planes: Regular planes perpendicular/parallel to one plane.
Regular planes inclined to one plane and parallel to other, inclined to both the planes.

UNIT IV
Projections of Solids: Simple positions of Prisms, Pyramids, Cones and Cylinders. Solids inclined to both the planes.

UNIT V

Isometric Projections: Introduction, Conversion of isometric views to orthographic views, Conversion of orthographic views to isometric views.

Introduction to AutoCAD (Demo only)

TEXT BOOKS
1. Engineering Drawing by N.D. Bhatt, Chariot Publications, 56th Edition.
2. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age International (P) Limited (2008).

REFERENCE BOOKS
1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers, 3rd Edition.
2. Engineering Graphics for Degree by K.C. John, PHI Publishers.
3. Engineering Graphics by PI Varghese, Mc Graw Hill Publishers, 2013.
4. Engineering Drawing by Basant Agarwal, Tata McGraw Hill Publishers, 2014.
5. B.V.R. Gupta & M. Raja Roy, Engineering Drawing, I.K. International Publishing House Pvt. Ltd., 2009.

WEB RESOURCES
1. http://nptel.ac.in/courses/112103019/
2. http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html
3. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_health_science_students/engineeringdrawing.pdf

I Year I Semester
Professional Communicative English Laboratory – I
(For CE, EEE, ME, CSE & IT)

Course Category	Humanities, Social Sciences including Management	**Course Code**	**19HE1L01**
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	25 50 75

PRESCRIBED LABORATORY MANUAL FOR SEMESTER I:
STRENGTHEN YOUR STEPS: A Multimodal Course in Communication Skills' Published by Maruthi Publications.
Objectives:
To enable the students to learn the communication skills; listening, speaking, reading and writing.
Outcome:
The course enables the learner to acquire communication skills which will help the students to become successful in the competitive world.

COURSE OUTCOMES		
CO	**Description**	**Cognitive Level**
CO1	Interpret and responding appropriately in various day to day contexts and will be able to use speech sounds effectively.	K2
CO2	Apply stress, intonation and pronunciation in conversations and learn formal communicative expressions.	K3
CO3	Attain the collection of dialogues and acclimate them to their real life situations with proper intonation.	K2

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO8	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-

The course content along with the study material is divided into six units.

UNIT 1:
        Hello, I'm ……
        Consonant Sounds
UNIT 2:
        I would love to …. But,
        Vowel Sounds
UNIT 3:
        With your Permission, I would like to
        Syllable and Accent
UNIT 4:
        Why don't we……
        Pronunciation and Rhythm
UNIT 5:
        Could you please ……
        Tones
UNIT-6:   Dialogues

I Year I Semester
APPLIED PHYSICS LABORATORY
(ECE, CSE & IT)

Course Category	BASIC SCIENCES		Course Code	19BP1L02
Course Type	Laboratory		**L-T-P-C**	0 - 0 - 3-1.5
Prerequisites	Intermediate Physics	**Internal Assessment**	25	
		Semester End Examination	50	
		Total Marks	75	

COURSE OBJECTIVES	
1	The student will have exposure to various experimental skills which is essential for an Engineering student.
2	To gain practical knowledge by applying the experimental methods to correlate with the Theoretical Physics.
3	Apply the Analytical techniques and graphical analysis to the experimental data

COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Understand the basics of Interference, Diffraction in Physics using instruments like Spectrometer, Travelling microscope.	K2
CO2	Determine the Magnetic and Dielectric constants of materials.	K3
CO3	Apply the basics of Current Electricity and Semiconductors in engineering application	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT: (Any 10 of the following listed 12 experiments)

1. Determination of wavelength of laser by diffraction grating.
2. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
3. Newton's rings – Radius of Curvature of Plano - Convex Lens.
4. Determination of thickness of a spacer using wedge film and parallel interference fringes.
5. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
6. Energy Band gap of a Semiconductor p - n junction.
7. Characteristics of Thermistor – Temperature Coefficients.
8. Determination of dielectric constant by charging and discharging method.
9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
10. Dispersive power of diffraction grating.
11. To Study the V-I Characteristics and determine the breakdown voltage of a Zener Diode
12. Determination of Hall Voltage and Hall coefficients of a given semiconductor using Hall effect.

TEXT BOOKS
1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)

REFERENCE BOOKS
1. College customized manual

WEB RESOURCES
1. https://www.youtube.com/watch?v=h_hUBXz-G-Y
2. https://youtu.be/dgxFFw_1gMo
3. https://www.youtube.com/watch?v=v2B0QyW8XJ0
4. https://www.youtube.com/watch?v=AYQLmFqFtlw
5. https://youtu.be/toggy3WVxV4
6. https://youtu.be/1CyFsGk-_l4

I Year I Semester
Programming for Problem solving using C Laboratory
(Common to CE, ME, EEE, ECE, CSE, IT)

Course Category	Engineering Science		Course Code	19CS1L01
Course Type	Laboratory		**L-T-P-C**	0-0-3-1.5
Prerequisites		**Internal Assessment**		25
		Semester End Examination		50
		Total Marks		75

COURSE OBJECTIVES	
1	To learn various steps in program development using Raptor.
2	To write C programs using basic concepts in C like operators, control statements etc.,
3	To design modular, reusable and readable C programs using concepts like Arrays, Functions and Pointers.
4	To write programs using Structures and Unions.
5	To write programs to perform file operations.

COURSE OUTCOMES Upon successful completion of the course, the student will be able to:	Cognitive level
CO1	Translate given algorithms to a working programs.	K2
CO2	Design programs using Pointers to access Arrays, Strings and Functions.	K3
CO3	Develop programs using Structures, Unions and File operations.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	-	-	-	-	-	-	-	2	2	1
CO2	3	3	3	3	2	-	-	-	-	-	-	-	2	2	1
CO3	3	3	3	3	2	-	-	-	-	-	-	-	2	2	1

COURSE CONTENT

1. Construct flowcharts using Raptor Tool to
   a) calculate the maximum, minimum and average of three numbers.
   b) calculate area of a triangle given three sides using Heron's formula.

2. Construct flowcharts using Raptor Tool to
   a) calculate simple interest for various parameters specified by the user.
   b) swapping of two numbers with and without using the third variable.

3. Write a C Program to Perform Addition, Subtraction, Multiplication and Division of two numbers.

4. Write a C Program to find the Grade of a student by taking input of percentage using all Relational Operators ($>, >=, <, <=, ==, !=$)

Theory (%)	Letter Grade	Level
≥ 90	O	Outstanding
≥ 80 to < 90	S	Excellent
≥ 70 to < 80	A	Very Good
≥ 60 to < 70	B	Good
≥ 50 to < 60	C	Fair
≥ 40 to < 50	D	Satisfactory
<40	F	Fail

5. Write a C Program to swap two given input numbers
    a)   With using a temporary variable.   b) Without using a temporary variable.

6. Write a C Program to implement arithmetic operations using two operands and one operator using
    a)   if – else – if condition.   b) Switch – Case statement.

7. Write a C Program to print the following patterns
    a)   Floyd's Triangle.   b) Pascal Triangle.

8. Write a C Program
    a)   To find the sum of its individual digits for a given positive number.
    b)   To check whether the given number is Prime or not.

9. Write a C Program
    a)   To check whether the given number is a Palindrome or not.
    b)   To check whether the given number is an Armstrong or not

10. Write a C Program using Functions to find both the largest and smallest number in an given array numbers.

11. Write C programs to perform swapping of two numbers by passing a value and reference.

12. Write a C Program for two Matrices by checking the compatibility
    a) Addition.   b) Multiplication.

13. Write a C program on Strings to implement the following operations without string handling functions
    a) Concatenation of two given input strings.   b)Length of a string.
    c) Reverse of a given string.

14. Write C programs that use both recursive and non-recursive functions for the following
            i)   To find the factorial of a given integer.
            ii) To find the GCD (greatest common divisor) of two given integers.
            iii) To find Fibonacci sequence

15. Write a C program using Pointers to work on
      a) Matrix Addition.   b) Transpose of a Matrix.

16. Write a C program to read and print the details of an Employee (Name, Date of the Birth, Designation, Salary) using Structures.

17. Write a C program
    a) to read and print the student details (Name, Register number, Address, Intermediate %) using Union.
    b) to display the name of the colour using Enum data type

18. Write a C Program to
    a) Copy one file to another.   b)Count the number of characters, words and lines in a file.

I Year I Semester
Professional Ethics and Human Values

Course Category	Humanities including Management	Subject Code	19HM1T07
Course Type	Theory	**L-T-P-C**	2 -0 -0-0
Prerequisites		**Total Marks** (Internal Assessment)	100

	Course Outcomes	Cognitive Level
	On successful completion of the course, the student will be able to	
CO 1	Understand different concepts in Professional Ethics and Human Values.	K2
CO 2	Apply ethical principles to resolve the problems that arise in work place.	K3
CO 3	Make use of Engineers rights to fulfill their responsibilities.	K3
CO 4	Understand the responsibility of an engineer in designing safety.	K2
CO 5	Analyze the social media accounts in order to create and maintain a positive digital footprint.	K4

Contribution of Course Outcomes towards achievement of Program Outcomes: 1 – Low, 2 - Medium, 3 – High

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO1	PSO3
CO1	-	-	2	-	-	3	2	3	-	2	-	1	-	-	-
CO2	-	-	2	-	-	2	2	3	-	1	-	2	-	-	-
CO3	-	-	2	-	-	3	2	3	-	2	-	1	-	-	-
CO4	-	-	2	-	-	3	2	3	-	2	-	1	-	-	-
CO5	-	-	2	-	-	2	2	3	-	1	-	1	-	-	-

COURSE CONTENT

UNIT - I
Professional Ethics and Human values:
Ethics -History of Ethics-Types of Ethics, Professional Ethics and its forms - Morals, Values – Integrity –Civic Virtue –Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time –Co-operation – Loyalty- Collegiality-Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT - II
Engineering & Organization Ethics:
Engineering Ethics-Meaning & Purpose of Engineering Ethics- Consensus and Controversy –Work Place Ethics and Business Ethics –Ethics in HRM, Finance & Marketing – Ethical Theories-Meaning & Uses of Ethical Theories-Theories of moral Development-Kohlberg's Theory – Gilligan's Argument –Heinz's Dilemma.

UNIT - III
Engineers Responsibilities and Rights:
Key Characteristics of Engineering Professionals – Professional Roles to be played by an Engineer - Ethical egoism-Collective bargaining-Confidentiality- Acceptance of Bribes/Gifts when is a Gift and a Bribe-examples of Gifts v/s Bribes-Whistle Blowing and its types-when should it be attempted-preventing whistle blowing.

UNIT - IV
Engineers' Responsibility for Safety and Risk:
Concept of Safety-Types of Safety, Risk-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
Ethical issues in Social Media:
Social Media- Various Social Media Platforms: Google, Facebook, YouTube, Instagram -Social Media set-up and Uses-Ethical use of Social media-Effects of Social Media on Public- Social Media (vs) News- Social Media Fame and Reputation-Trolling, Harassing, and Hating on Social Media-Legal Aspects of Social Media.

REFERENCES :
1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar- PHI Learning Pvt. Ltd-2009.
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana- Maruthi Publications.
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications
4. "Professional Ethics and Human Values" by Prof.D.R.Kiran
5. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication
6. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger -Tata McGraw- Hill -2003
7. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

WEB RESOURCES:
1. https://study.com/academy/lesson/ethical-issues-in-internet-social-media-marketing.html
2. https://www.tutorialspoint.com/engineering_ethics/engineering_ethics_rights_of_engineers
3. https://link.springer.com/article/10.1007/s11948-997-0039-x

I Year II Semester
Numerical Methods and Multi-variable Calculus
(Common to CE, ME, ECE, CSE, &IT)

Course Category	Basic Sciences	Course Code	19BM2T02
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Differentiation, Integration	**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:	Cognitive Level
CO1	Apply Newton, Gauss and Lagrange interpolation formulae to find interpolating polynomials for the given data.	K3
CO2	Find the approximate roots of transcendental equations by using different numerical methods	K2
CO3	Solve ordinary differential equations by using different numerical schemes	K3
CO4	Find areas and volumes using double and triple integrals	K2
CO5	Apply a range of techniques to find solutions of standard PDEs	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I
Interpolation
Introduction– Errors in polynomial interpolation – Finite differences – Forward differences– Backward differences – Central differences – Symbolic relations and separation of symbols – Differences of a polynomial-Newton's formulae for interpolation –Gauss formulae for interpolation- Interpolation with unequal intervals – Lagrange's interpolation formula.

UNIT II
Solution of Algebraic and Transcendental Equations
Introduction- Bisection method – Method of false position – Secant method- Iteration method – Newton-Raphson

method (One variable).

UNIT III
Numerical Integration and solution of Ordinary Differential equations
Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series- Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).

UNIT IV
Multiple integrals
Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.
Applications: Finding Areas and Volumes.

UNIT V

Partial Differential Equations

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

TEXT BOOKS
1. **B. S. Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.

REFERENCE BOOKS
1. **Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson Edition
2. **Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press.
3. **Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
4. **Srimanta Pal, Subodh C. Bhunia**, Engineering Mathematics, Oxford University Press.
5. **T.K.V. Iyengar et. al.,** Engineering Mathematics Volume I & III S Chand Publications.
6. T.Amarnath, **An Elementary Course in Partial Differential Equations, Narosa Publications**

WEB RESOURCES
UNIT I: Interpolation
https://en.wikibooks.org/wiki/Introduction_to_Numerical_Methods/Interpolation

UNIT II: Solution of Algebraic and Transcendental Equations
https://en.wikibooks.org/wiki/Numerical_Methods/Equation_Solving
https://www.slideshare.net/100005232690054/algebraic-and-transcendental-equations

UNIT III: Numerical Integration and solution of Ordinary Differential Equations
https://nptel.ac.in/courses/111107063/

UNIT IV: Multiple Integrals
https://en.wikipedia.org/wiki/Multiple_integral
http://tutorial.math.lamar.edu/Classes/CalcIII/MultipleIntegralsIntro.aspx

UNIT V: **Partial Differential Equations**
https://en.wikipedia.org/wiki/Partial_differential_equation

I Year II Semester
Integral Transforms and Vector Calculus
(Common to CE, EEE, ME, ECE, CSE & IT)

Course Category	Basic Sciences		Course Code	19BM2T03
Course Type	Theory		L-T-P-C	3-0-0-3
Prerequisites	NIL		Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES	
1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Examine the properties of Laplace transformation	K3
CO2	Solve ordinary differential equations by using Laplace transformation technique	K2
CO3	Expand a periodic function as a Fourier series and find Fourier transform of a given function.	K3
CO4	Understand vector differential properties of scalar and vector point functions and their applications.	K2
CO5	Apply Green's, Stokes and Divergence theorem to evaluate line, surface and volume integrals.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I
Laplace transforms: Laplace transforms of standard functions – Properties - Periodic functions - Unit step function – Dirac's delta function.

UNIT II
Inverse Laplace transforms: Inverse Laplace transforms – Properties – Convolution theorem (without proof).
Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT III
Fourier Analysis: Introduction- Periodic functions – Dirichlet's conditions - Fourier series of a function, even and odd functions –Change of interval – Half-range sine and cosine series. Fourier integral theorem (without proof) –

Fourier sine and cosine integrals – sine and cosine transforms – Inverse transforms.

UNIT IV
Vector Differentiation: Gradient - Directional derivative - Divergence – Curl – Laplacian and second order operators – Vector identities.

UNIT V
Vector Integration: Line integral – Work done – Potential function – Area, Surface and volume integrals - Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

TEXT BOOKS
1. **B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India

REFERENCE BOOKS
1. **Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
2. **Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
3. **Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
4. **Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
5. **T.K.V. Iyengar et. al.,** Engineering Mathematics Volume I & III S Chand Publications.
6. **Murray R Speigel,** Schaum's Outline of Vector Analysis, Schaum's Outline.
7. **Shanti Narayan**, Integral Calculus – Vol. 1 & II

WEB RESOURCES
UNIT I: Laplace transforms
https://en.wikipedia.org/wiki/Laplace_transform
https://web.stanford.edu/~boyd/ee102/laplace.pdf

UNIT II: Inverse Laplace transforms
https://www.intmath.com/laplace-transformation/7-inverse-laplace-transform.php

UNIT – III: Fourier Series
https://www.mathsisfun.com/calculus/fourier-series.html
https://lpsa.swarthmore.edu/Fourier/Xforms/FXformIntro.html

UNIT IV: Vector Differentiation
https://en.wikipedia.org/wiki/Vector_calculus

UNIT V: Vector Integration
https://en.wikipedia.org/wiki/Divergence_theorem
http://tutorial.math.lamar.edu/Classes/CalcIII/StokesTheorem.aspx

I Year II Semester
APPLIED CHEMISTRY
(CSE)

Course Category	Basic Sciences	Course Code	19BC2T02
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Intermediate Chemistry	Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES	
1	To learn about Electrochemical cells, Batteries and Fuel cells
2	To know about spinels, magnetic materials and semi conductors
3	To study about Nano materials, their preparation, characterization, applications and also about principles of green chemistry and green engineering applications
4	To know about Polymers, plastics and Elastomers
5	To learn about non conventional energy sources and also Spectroscopic techniques

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	To compare different types of batteries and explain the merits of fuel cell.	K1
CO2	Discuss the use and importance of semiconductors, magnetic materials and spinels.	K4
CO3	To explain the Green methods of Synthesis and applications of Green technologies .	K3
CO4	Analyze the importance of polymers in engineering applications.	K4
CO5	List out various sources of non conventional energy**.**	K5

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	2	2	-	2	-	-	-	2	-	-	-	-
CO2	2	2	1	-	-	1	1	-	-	-	1	-	-	-	-
CO3	1	1	-	1	2	-	-	-	-	-	-	1	-	-	-
CO4	2	2	-	1	-	-	1	-	-	-	-	1	-	-	-
CO5	1	1	1	-	-	-	1	-	-	-	2	1	-	-	-

COURSE CONTENT

UNIT I
ELECTROCHEMICAL ENERGY SYSTEMS
Electrode Potential, Nernst Equation for a single electrode, EMF of the cell, Electro chemical Series and uses, Types of Electrodes - Hydrogen and Calomel electrode, Electrochemical Cell, Galvanic Cell vs Electrolytic Cell, Types of Ion Selective Electrodes- glass membrane electrode
Batteries- Characteristics, classification and Important applications. Classical batteries- Dry/Lechlanche cell, Modern batteries- Zinc air, Lithium cells-Li MnO_2 cell.
Fuel cells- Introduction, H_2-O_2 fuel cell.
Learning outcomes:
After the completion of the Unit I, the student will be able to
- **Explain** the significance of electrode potentials.**(L-2)**
- **Compare** different types of cells and batteries. **(L-2)**
- **Classify** ion selective electrodes. (**L-2**)
- **Explain** the concepts involved in the construction of lithium cells. **(L-2)**
- **Apply** redox principles for construction of batteries and fuel cells. **(L-3)**

UNIT II
SOLID STATE CHEMISTRY
Solids – Crystalline and amorphous solids- 2D and 3D close packing of atoms and ions - spinels - normal and inverse spinels, semi conductor – Elemental semi conducting materials - Non-elemental semiconducting Materials:- Stoichiometric, non stoichiometric controlled valency & Chalcogen semiconductors, Preparation of Semiconductors by Zone refining and Czocharlski crystal pulling method.
Semiconducting Devices - p-n junction diode as rectifier and junction transistor.
Electrical Insulators and Applications of solid, liquid and gaseous insulators.
Magnetic materials- Ferro and ferri magnetism. Hall effect and its applications.

Learning Outcomes:
After the completion of the Unit II, the student will be able to
- Explain 2D and 3D close packing of crystals (**L-3**)
- identify different types of spinels. (**L-3**)
- describe the mechanism of photo copying. (**L-2**)
- explain the applications of electrical insulators. (**L-3**)

UNIT III
NANOMATERIALS AND GREEN CHEMISTRY
III-A: Nano Materials: Introduction to Nano materials, Preparation of Carbon Nano Tubes(CNTs) by Laser Ablation and Chemical Vapor Deposition Methods, Fullerenes -Preparation, Properties and Applications; Chemical synthesis of nano materials : Sol-gel method, Characterization of nano mateirals by BET & TEM (basic principles), Applications of nano materials in waste water treatment, lubricants, Medicine and sensors.
III-B: Green Chemistry: Introduction-Principles of green chemistry, Green synthesis Methods- Phase Transfer Catalysis (PTC), Super critical fluid extraction method, Green engineering applications in environmental and power quality monitoring.

Learning outcomes:
After the completion of the Unit III, the students will be able to
- **explain** the basic principles of green chemistry. (**L-3**)
- **identify** different preparation methods of CNTs**. (L-3)**
- **discuss** the applications in green engineering. **(L-2)**

UNIT IV
POLYMER CHEMISTRY
Polymers: Introduction-Methods of Polymerization (Emulsion and Suspension), Conducting polymers – Mechanism of conduction in poly acetylene – applications, Bio – degradable polymers.
Plastics: Thermoplastics and thermo setting resins; Preparation, properties and applications of Polystyrene and Bakelite.
Elastomers: Natural Rubber, Vulcanization of rubber; Synthetic Rubbers -Preparation, properties and applications of Buna-S and Thiokol.

Learning Outcomes:
At the end of this unit, the students will be able to
- **explain** different types of polymerisation mechanisms (**L-2**)
- **distinguish** between thermoplastic and thermo setting resigns (**L-4**)
- **explain** the preparation, properties and applications of Bakelite and polystyrene (**L-2**)
- **describe** the mechanism of conduction in conducting polymers (**L-2**)
- **discuss** Buna-S and Thiokol elastomers and their applications (**L-2**)

UNIT V
Non Conventional Energy Sources & Spectroscopic Techniques
Non Conventional Energy Sources : Introduction-Photo voltaic cell & Organic Photo voltaic cell - Design, Principle, advantages and disadvantages; Hydropower-Geo thermal Power -Tidal Power-Ocean thermal Energy Conversion.
Spectroscopic Techniques: Electro Magnetic Spectrum- Introduction, Principles of UV and IR Spectroscopic

techniques and their applications.

Learning outcomes

After the completion of the Unit V, the student will be able to

- **list** different non conventional energy sources. (**L-1**)
- **explain** the basic principle involved in the working of power plants. (**L-2**)
- **compare** Spectroscopic techniques and their importance . (**L-2**)

TEXT BOOKS

1. P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi (2014).
2. Engineering Chemistry by Shikha Agarwal: Cambridge University Press,2019 edition

REFERENCE BOOKS

1. Sashi Chawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, (2003)
2. B.S Murthy and P. Shankar, A Text Book of NanoScience and NanoTechnology, University Press (2013).
3. S.S. Dara, A Textbook of Engineering Chemistry, S.Chand & Co, (2010)

WEB RESOURCES

1. Electrochemical Energy Systems
    https://en.wikipedia.org/wiki/Electrochemical_cell

2. Solid state chemistry
   https://en.wikipedia.org/wiki/Solid-state_chemistry
   www.engineeringenotes.com › Engineering › Electronics › Semiconductors

3. Nanomaterials and Green Chemistry
   https://en.wikipedia.org/wiki/Green_chemistry
   https://www.acs.org/.../greenchemistry/principles

4. Polymer Chemistry
   https://en.wikipedia.org/wiki/Polymer_chemistry

5. Non Conventional Energy Sources & Spectroscopic Techniques
   https://en.wikipedia.org/wiki/Geothermal_power;
   https://en.wikipedia.org/wiki/Ocean_thermal_energy_conversion
   www.rsc.org/learn-chemistry/collections/spectroscopy/introduction

I Year II Semester
DATA STRUCTURES
(Common to CSE and IT)

Course Category:	Professional Core	Course Code:	19IT2T01
Course Type:	Theory	L-T-P-C:	3-0-0-3
Prerequisites:	Programming for Problem Solving using C	Internal Evaluation: Semester end Evaluation: Total Marks:	30 70 100

COURSE OBJECTIVES	
1	To assess how the choice of data structures and algorithm design methods impacts the performance of programs.
2	To choose the appropriate data structure and algorithm design method for a specified application.
3	To solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs and writing programs for these solutions.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Implement sorting and searching algorithms.	K3
CO2	Develop algorithms for stacks, queues.	K3
CO3	Apply concepts of linked lists.	K3
CO4	Develop programs using concepts of trees.	K3
CO5	Implement algorithms on Graphs.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	-	-	-	-	-	-	2	1	-
CO2	2	3	1	2	1	-	-	-	-	-	-	-	1	1	1
CO3	2	3	1	1	1	-	-	-	-	-	-	-	1	1	1
CO4	2	3	1	1	1	-	-	-	-	-	-	-	1	1	1
CO5	3	3	1	1	1	-	-	-	-	-	-	-	1	1	1

COURSE CONTENT

UNIT I
 SEARCHING: Introduction, linear search, binary search, Fibonacci search.
 SORTING: Introduction, Bubble Sort, Selection sort, insertion sort, merge sort.

UNIT II

Abstract Data Types (ADTs)

STACKS: Introduction, stack operations, applications.

QUEUES: Introduction, operations on queues, circular queues, priority queues, applications.
Evaluation of expressions, expression- postfix notation- infix to postfix.

NIT III

LINKED LISTS: Introduction, singly linked lists, circular linked lists, doubly linked lists with emphasis on operations and applications.

LINKED STACKS AND LINKED QUEUES: Introduction, operations on linked stacks and linked queues, dynamic memory management, implementation of linked representations, applications.

Recursion: Recursion algorithms and their implementation with stacks.

UNIT IV

TREES AND BINARY TREES: Introduction, Trees: definition and basic terminologies, representation of trees. Binary trees: basic terminologies and types, representation of binary trees, binary tree traversals, applications.

BINARY SEARCH TREES: Introduction, binary search trees: Heap Sort.

UNIT V

GRAPHS: Introduction, definitions and basic terminologies, graph representation, elementary graph Operation, graph traversals - Depth First Search, Breadth First Search, Topological Sorting.

TEXT BOOKS

1. Langsam, Augenstein and Tanenbaum, "Data Structures using C", PHI.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education. Ltd.
3. E. Horowitz, S.Sahni, Dinesh Mehta, "Fundamentals of Data structures in C", Galgotia Publications, 2006.

REFERENCE BOOKS

1. G.A.V Pai, Data Structures and Algorithms, Concepts, Techniques and Applications, Volume 1,1st Edition, Tata McGraw-Hill, 2008.
2. Richard F. Gilberg and Behrouz A. Forouzan, "Data Structures, Pseudo code Approach with C", 2nd Edition, Cengage Learning India Edition, 2007

WEB RESOURCES

1. http://nptel.iitm.ac.in/video.php? subjectId=106105085
2. http://cds.iisc.ac.in/courses/ds286/
3. http://www.geeksforgeeks.org/data-structures

I Year II Semester

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Course Category	Engineering Sciences	**Course Code**	**19EE2T02**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NA	**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

	COURSE OBJECTIVES
1	To learn the basic principles of electrical circuit analysis.
2	To understand constructional details and operating principle of DC machines & Transformers.
3	To understand constructional details and operating principle details of alternator and 3-Phase induction motor.
4	To study operation of PN junction diode, half wave, full wave rectifiers, PNP and NPN transistors and various semiconductor devices.
5	To study the operation of OP-AMPs.

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	**Cognitive Level**
CO1	Analyze various electrical circuits	K4
CO2	Understand constructional details and operating principle of DC machines, single phase transformer, tests and analyze their performance.	K4
CO3	Explain operation of Three phase AC machines.	K2
CO4	Analyze operation of half wave, full wave bridge rectifiers and Explain single stage CE amplifier and concept of various semiconductor devices.	K4
CO5	Analyze operation of OP-AMPs.	K4

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	1	1	-	-
CO2	3	2	2	1	-	-	-	-	-	-	-	1	1	-	-
CO3	3	2	2	1	-	-	-	-	-	-	-	1	1	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	2	2	-	-	-	-	-	-	-	-	1	-	-

COURSE CONTENT

UNIT I
Electrical Circuits
Basic definitions – types of network elements – Ohm's Law – Kirchhoff's Laws – inductive networks – capacitive networks – series – parallel circuits – star-delta and delta-star transformations.

UNIT II
DC Machines & Transformers
Constructional details and operating principle – EMF equation –DC motor – torque equation – applications - speed control methods of DC motor – Swinburne's Test.
Constructional details and operating principle of single phase transformers – EMF equation – equivalent circuit – Losses – OC & SC tests – efficiency.

UNIT III
AC Machines
Constructional details and operating principle of alternators – types –Regulation of alternator by synchronous impedance method.

Principle of operation of 3-Phase squirrel cage induction motor – electromagnetic torque equation - power flow - brake test - efficiency calculation – applications.

UNIT IV
Semiconductor Devices
PN junction diodes – characteristics – half wave and full wave rectifiers - PNP and NPN junction transistor, transistor as an amplifier – transistor amplifier – frequency response of CE amplifier – concepts of feedback amplifier – SCR – MOSFET - IGBT.

UNIT V
Operational Amplifiers
Introduction to operation amplifiers (Ideal OP-AMP) – Characteristics – applications (inverting, non-inverting, integrator and differentiator).

TEXT BOOKS
1. William Hayt and Jack E. Kemmerley, Engineering Circuit Analysis, Mc Graw Hill Company, 6th Edition.
2. Surinder Pal Bali, Electrical Technology, Vol-I, Vol-II, Pearson Publications, 1st Editiom.
3. Basic Electrical and Electronics Engineering by M.S. Sukhija and T.K. Naga Sarkar, Oxford University Press.
4. R.L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, PEI/PHI 2006, 9th Edition.

REFERENCE BOOKS
1. John Bird, Electrical Circuit Theory and Technology, Routledge Taylor and Francis Group, 5th Edition.
2. M.S.Naidu and S.Kamakshiah, Basic Electrical Engineering, TMH Publications, 1st Edition.
3. Rajendra Prasad, Fundamentals of Electrical Engineering, PHI Publications, 2nd edition.
4. R. S. Sedha, A Text Book of Electronic Devices and Circuits, S.Chand & Co. 2nd Edition
5. David A. Bell, Electronic Devices and Circuits, Oxford University Press, 5th Edition.

WEB RESOURCES
1. http://www.ncert.nic.in/html/learning_basket/electricity/electricity/machine/motor.html
2. www.electricaleasy.com
3. www.nptel.ac.in/courses/108108076/
4. https://nptel.ac.in/courses/122106025/

I Year II Semester
Applied Chemistry Laboratory
(CSE)

Course Category	Basic sciences	Course Code:	19BC2L02
Course Type	Laboratory	L-T-P-C:	0-0-3-1.5
Prerequisites	Basic Chemistry	Continuous Evaluation End Examination Total Marks	25 50 75

COURSEOUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Students will learn to estimate the given amount of dissolved compounds in water by using volumetric analysis and preparation of polymers and nano particles	K3
CO2	Students will be able to learn compelxometric titrations to determine the concentration of different metal ions present in water and determine the % moisture in a coal sample.	K3
CO3	Students will be able to identify the accurate value of conductivity of given solutions. and to estimate the viscosity and surface tension of given solutions.	K3

Contribution of Course Outcomes towards achievement of
Program Outcomes (1–Low,2-Medium,3–High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO12	PSO1	PSO2	PSO3
CO1	2	1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	1	-	1	-	-	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT

(Any 10 of the following listed 14 experiments)
LIST OF EXPERIMENTS:
Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis

1. Estimation of HCI using standard Na_2CO_3 solutions

2. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH

3. Estimation of $KMnO_4$ using standard Oxalic acid solution.

4. Estimation of Ferrous iron using standard $K_2Cr_2O_7$ solution

5. Determination of Temporary and permanent Hardness water using standard EDTA solution.

6.Determination of % moisture content in a coal sample.

7.Determination of Mg^{2+} present in an antacid

8.Conductometric Titrations between strong acid and strong base

9.Conductometric Titrations between strong acid and weak base

10. Estimation of Vitamin – C

11. Preparation of Phenol - Formaldehyde Resin

12. Determination of viscosity of a liquid

13. Determination of surface tension of a liquid

14. Preparation of Nano particles.(Cu/Zn)

TEXT BOOKS
1. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers (2000).

2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company (2007).

REFERENCE BOOKS
1. Vogel's Textbook of Quantitative chemical analysis, J. Mendham et.al.
2. [1] College designed manual

WEB RESOURCES
1. www.bsauniv.ac.in/UploadImages/Downloads/Estimation%20of%20Hardness
2. https://pubs.acs.org/doi/abs/10.1021/i560133a023
3. https://pdfs.semanticscholar.org/33d4/3b264bad212a14d660667298f12944ea11d5

I Year II Semester
DATA STRUCTURES LABORATORY
(Common to CSE and IT)

Course Category:	Professional Core		Course Code:	19IT2L01
Course Type:	Laboratory		L-T-P-C:	0-0-3-1.5
Prerequisites:	Programming for Problem Solving using C		**Continuous Evaluation:** **Semester end Evaluation:** **Total Marks:**	25 50 75

COURSE OBJECTIVES	
1	To provide hands on experience to implement basic linear and non-linear data structures. This course covers implementation of Stack, Queue, List, Sorting techniques, Binary Search Trees.

COURSEOUTCOMES

Upon successful completion of the course, the student will be able to:	Cognitive Level
CO1 Implement sorting and searching algorithms.	**K3**
CO2 Implement stacks and queues using arrays Develop programs using recursive functions.	**K3**
CO3 Apply concepts of linked lists.	**K3**
CO4 Develop programs using concepts of trees.	

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	2	1	1	-	-	-	-	-	-	2	1	-
CO2	2	3	1	2	1	-	-	-	-	-	-	-	1	1	1
CO3	2	3	1	1	1	-	-	-	-	-	-	-	1	1	1
CO4	2	3	1	1	1	-	-	-	-	-	-	-	1	1	1

COURSE CONTENT

LAB EXPERIMENTS

1. Write C programs to implement search algorithms

2. Write C programs to implement sorting algorithms

3. Write C programs that implement the following data structures using arrays:

i) Stack   ii) Queue.

4. Write C programs to implement the following Stack applications
   i)   Conversion of a given infix expression into postfix.
   ii)   Evaluations of postfix expression

5. Write C programs to implement the following types of Lists
   i)   Singly linked list
   ii)   Circular Linked list
   iii)   Doubly linked list.

6. Write C programs to implement the following data structures using Lists
   i) Stack   ii) Queue.

7. Write a program to implement the binary search tree operations

8. Write a C program to implement binary tree using arrays and to perform binary tree traversals using recursion
   i) in order   ii) post order   iii) preorder.

I Year II Semester
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

Course Category	Engineering sciences	Course Code	**19EE2L02**
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites	Basic Electrical & Electronics Engineering	Internal Assessment Semester End Examination Total Marks	25 50 75

COURSE OBJECTIVES	
1	To determine the voltage, current and power in star and delta connected loads.
2	To predetermine the efficiency of DC shunt machine using Swinburne's test.
3	To predetermine the efficiency and regulation of 1-phase transformer with O.C and S.C tests.
4	To obtain performance characteristics of DC shunt generator & 3-phase induction motor.
5	To find out regulation of an alternator with synchronous impedance method.
6	To control speed of dc shunt motor using Armature voltage and Field flux control methods.
7	To find out the characteristics of PN junction diode & transistor.
8	To determine the ripple factor of half wave & full wave rectifiers.
9	To find out the band width of transistor CE amplifier.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Determine the voltage, current and Power in Star and Delta Connected loads.	K3
CO2	Compute the efficiency of DC shunt machine without actual loading of the machine.	K3
CO3	Estimate the efficiency and regulation at different load conditions and power factors for single phase transformer with OC and SC tests.	K5
CO4	Analyze the performance characteristics to determine critical speed and resistance of DC shunt generator & efficiency of 3-Phase induction motor.	K4
CO5	Pre-determine the regulation of an alternator by synchronous impedance method.	K4
CO6	Control the speed of DC shunt motor using Armature voltage and Field flux control methods.	K3
CO7	Draw the characteristics of PN junction diode & transistor.	K2
CO8	Determine the ripple factor of half wave & full wave rectifiers.	K3
CO9	Analyze the frequency response of to find the bandwidth of CE amplifier.	K4

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO7	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO9	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT

LIST OF EXPERIMENTS:

Section A: Electrical Engineering(Any 6 of the following experiments are to be conducted)	
Experiment 1	Measurement of voltage, current and Power in Star and Delta Connected loads.
Experiment 2	Magnetization characteristics of DC Shunt Generator.
Experiment 3	Swinburne's test on D.C. Shunt machine (predetermination of efficiency of a given D.C. shunt machine working as motor and generator).
Experiment 4	Speed control of D.C. Shunt motor by a) Armature Voltage control b) Field control method.
Experiment 5	OC and SC tests on single phase transformer (predetermination of efficiency and regulation at given power factors).
Experiment 6	Load Test on Single Phase Transformer.
Experiment 7	Brake test on 3-phase Induction motor (determination of performance characteristics)
Experiment 8	Regulation of alternator by Synchronous impedance method.
Section B: Basic Electronics(Any 4 of the following experiments are to be conducted)	
Experiment 1	PN junction diode characteristics a) Forward bias b) Reverse bias
Experiment 2	Transistor CE characteristics (input and output)
Experiment 3	Half wave rectifier with and without filters.
Experiment 4	Full wave rectifier with and without filters.
Experiment 5	CE amplifiers.
Experiment 6	OP- amp applications (integrator and differentiator).

I Year II Semester

PROFESSIONAL COMMUNICATIVE ENGLISH LABORATORY- II
(For CE, EEE, CSE & IT)

Course Category	Humanities, Social sciences including management	Course Code	19HE2L02
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	25 50 75

COURSE OUTCOMES		
CO	**DESCRIPTION**	**COGNITIVE LEVEL**
CO1	Develop the required communication skills to present effective presentations and interviews with clarity and impact.	K2
CO2	Able to create constructive and elaborative discussions to share their ideas on several issues.	K3
CO3	Ensure to use of argumentative and critical thinking skills by elaborating ideas relevantly and improve team work.	K3

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-

PRESCRIBED LABORATORY MANUAL FOR SEMESTER II:

'**STRENGTHEN YOUR STEPS**: A Multimodal Course in Communication Skills', Published by Maruthi Publications.

OBJECTIVES: To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

OUTCOME: A study of the communicative items in the laboratory will help the students become successful in the competitive world.

 The course content along with the study material is divided into six units.

UNIT-1:
    Small Talk & JAM Session
UNIT-2:
    Interviews
UNIT-3:
    Effective Telephonic Interviews
UNIT-4:
    Group Discussions
UNIT-5:
    Presentations & Public Speaking
UNIT-6:
    Debates

I Year II Semester
Environmental Science
(Common to All Branches)

Course Category	Mandatory Courses	Course Code	19BE2T01
Course Type	Theory	**L-T-P-C**	3 – 0 – 0 – 0
Prerequisites	Exposure Basic Knowledge in Environment and protection.	**Total Marks**(Internal Assessment)	100

	COURSE OBJECTIVE:	
1	To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.	

COURSE OUTCOMES		**Cognitive level**
Upon successful completion of the course, the student will be able to:		
CO1	Recognize the interconnectedness of human dependence on the earth's ecosystems	**K 2**
CO2	Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities	**K1**
CO3	Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century	**K1**
CO4	Gain a higher level of personal involvement and interest in understanding and solving environmental problems.	**K2**
CO5	Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices	**K3**
CO6	Influence their society in proper utilization of goods and services.	**K1**

Contribution of Course Outcomes towards achievement of Program
Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	1	-	-	1	2	-	-	-	1	-	-	-
CO2	-	1	-	-	-	-	1	-	-	-	-	-	-	-
CO3	-	-	-	-	2	-	1	-	-	-	-	-	-	-
CO4	-	-	-	-	1	1	3	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	3	1	-	-	-	-	-	-

COURSE CONTENT

UNIT I
Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance-Need for public awareness.
Natural Resources:
Forest resources : deforestation – Mining, dams and other effects on forest and tribal people.
Water resources :Use and over utilization of surface and groundwater.
Food resources: World food problems, effects of modern agriculture, fertilizer-pesticide problems.
Energy resources: renewable and nonrenewable energy sources.
Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.
LEARNING OUTCOMES:
Students will be able to

1. *Articulate the basic structure, functions, and processes of key social systems affecting the environment*
2. Explain why renewable and non-renewable energy resources are important..
3. Explain how water resources should be used.

UNIT II
Ecosystems, Biodiversity and its conservation: Definition of Ecosystem and its structure, Functions

Biodiversity Definition-Value of biodiversity, India as a mega-diversity nation, Threats to biodiversity, Conservation of biodiversity

LEARNING OUTCOMES:
Students will be able to
1. Get a clear picture of structure and functions of ecosystems.
2. Demonstrate knowledge and understanding of theories in the field of Biodiversity and Systematic in the broad sense.

UNIT III
Environmental Pollution: Definition, Cause, Effects of Air pollution, Water pollution, Noise pollution, Radioactive pollution, Role of an individual in prevention of pollution.
Solid Waste Management: Sources, effects and control measures of urban and industrial waste.
LEARNING OUTCOMES Students will be able to
1. Understand Cause, effects and control measures of air pollution.
2. Explain the enforcement of Environmental legislation
3. Understand solid waste management.

UNIT IV
Social Issues and the Environment: Air (Prevention and Control of Pollution) Act 1981. –Water (Prevention and control of Pollution) Act 1974,EPA act 1986 ,Issues involved in enforcement of environmental legislation**,** Rain water harvesting, Global Environmental challenges climate change and mitigations and Adaptations (Engineering technologies)
LEARNING OUTCOMES:
Students will be able to
1. Explain the enforcement of Environmental legislations
2. Acquire knowledge on various environmental challenges induced due to unplanned anthropogenic activities.

UNIT V

Human population and the Environment:
Population growth,Women and child welfare, Role of Information technology in environment and human health Awareness to Environmental Assessment& clearance ,Audit .Environmental Governance in india
E-Waste management Rules (Biomedical Waste, Solid Waste) **Field work: A** mini project related to Environmental issues / To visit a local polluted site (Submission of project by every student)
LEARNING OUTCOMES Students will have
1. *Explain various types of information technologies*
2. Explain the theories of population explosion

TEXT BOOKS
1. Environmental Studies for undergraduate courses by ErachBharucha, UGC.
2. A Textbook of Environmental Studies by Dr.S.AzeemUnnisa,Acadamic publishing company.
3. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai.
4. A Textbook EIA Notification 2006(2019)

REFERENCE BOOKS
1. Text Book of Environmental Studies by Deeshita Dave & P. UdayaBhaskar, Cengage learning.
2. Glimpses of Environment by K.V.S.G. Murali Krishna Published by Environmental Protection Society, Kakinada, A.P.
3. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi.

WEB RESOURCES
UNIT-1: MULTI DISPLINARY NATURE OF ENVIRONMENT and NATURAL RESOURCES
http://www.defra.gov.uk/environment/climatechange
UNIT-2:ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION
 http://conbio.net/vl/ *and* www.biodiversitya-z.org/content/biodiversity
UNIT-3: ENVIRONMENTAL POLLUTION
https://www.omicsonline.org/environment-pollution-climate-change.php and
UNIT-4: Social Issues and the Environment
http://www.publichealthnotes.com/solid-waste-management/
UNIT-5: HUMANPOPULATION AND THE NVIRONMENT
http://IPCC.com

II Year I Semester
Probability & Statistics
(Common to CE, CSE & IT)

Course Category	Basic Sciences		Course Code	19BM3T04
Course Type	Theory		L-T-P-C	3-0-0-3
Prerequisites	NIL		Internal Assessment	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES

1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies	K3
CO2	interpret the properties of normal distribution and its applications	K2
CO3	find the confidence intervals for a statistic from the given population	K3
CO4	apply the concept of hypothesis testing to real world problems	K2
CO5	find a curve which approximate the given data, coefficient of correlation and lines of regression.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I
Discrete Distributions: Introduction – Discrete Random variables – Distribution function – Discrete distribution: Binomial and Poisson distributions.

UNIT II
Continuous distributions: Introduction -Continuous Random variables – Normal distributions, standard normal distribution, normal approximation to Binominal, Gamma and Weibull distributions.

UNIT III
Sampling Theory: Introduction – Population and samples – Sampling distribution of means for large and small samples (with known and unknown variance) – Proportion, sums and differences of means – Sampling distribution of variance – Point and interval estimation.

UNIT IV

Test of Hypothesis: Introduction – Type I and Type II errors – Maximum error – One tail and two tail tests –Tests concerning single mean, two means and several means. Tests concerning single, two and several proportions – Problems using Z-test, t-test, F-test and Chi –square test.

UNIT V

Curve fitting and Correlation: Introduction- Method of least squares – Fitting a straight line – Second degree curve – exponential curve – power curve. Simple correlation and regression – rank correlation – multiple linear regression.

TEXT BOOKS
1. **Miller and John E. Freund,** Probability and Statistics for Engineers, Prentice Hall of India.
2. **B.V. Ramana,** Higher Engineering Mathematics, Tata Mcgraw Hill.

REFERENCE BOOKS
1. **Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
2. **Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
3. **Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
4. **S.L. Myers, K. Ye, Ronald E Walpole,** Probability and Statistics for Engineers and Scientists, Pearson, 8th Edition.

WEB RESOURCES
UNIT I: Discrete Distributions
https://en.wikipedia.org/wiki/List_of_probability_distributions
https://en.wikipedia.org/wiki/Binomial_distribution

UNIT II: Continuous distribution
https://en.wikipedia.org/wiki/Normal_distribution

UNIT III: Sampling Theory
https://en.wikipedia.org/wiki/Sampling_(statistics)
https://nptel.ac.in/courses/111104073/

UNIT IV: Test of Hypothesis
https://en.wikipedia.org/wiki/Statistical_hypothesis_testing
https://machinelearningmastery.com/statistical-hypothesis-tests/

UNIT V: Curve fitting and Correlation
https://en.wikipedia.org/wiki/Regression_analysis
https://www.surveysystem.com/correlation.htm

II Year I Semester
Python Programming
(Common to CE, ME, EEE, ECE, CSE, IT)

Course Category	Engineering Science	Course Code	19CS3T03
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Exposure to Programming for Problem Solving using C	Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES	
1	To impart various programming constructs in Python.
2	To introduce the usage of fundamental data structures like List, Tuples and Dictionaries.
3	To imbibe the philosophy of object oriented programming in Python.
4	To bring the awareness of file handling.

COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Develop python programs using conditional statements and expressions	K3
CO2	Apply loop statements for List and String manipulations	K3
CO3	Differentiate Tuples and Dictionary data structures	K2
CO4	Design classes with private and public members	K3
CO5	Develop Python programs using file concepts.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO2	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO3	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO4	3	2	2	3	3	-	-	-	-	-	-	1	3	3	2
CO5	3	2	2	3	3	-	-	-	-	-	-	1	3	3	2

COURSE CONTENT

UNIT I
Basics of Python Programming & Decision Statements
Features of Python, Writing and Executing First Python Program, Literal Constants, Variables and Identifiers, Data Types, Input Operation, Comments, Reserved words, Indentation, Operators and Expressions, if, if-else, Nested if and if-elif-else.

UNIT II
Control Statements and Lists
while loop, for loop, nested loops, break statement, continue statement and pass statement.
Strings- Concatenating, Appending and Multiplying strings, Slice operation,
Lists: Access values in List, Updating values in List, Nested Lists, Basic List Operations, List Methods

UNIT III
Tuples and Dictionaries
Tuples: Creating a Tuple, Accessing values in a Tuple, updating Tuple, Basic Tuple operations, Nested Tuples, Checking the index, Counting the elements, List comprehension and Tuples, Advantages of Tuple over List.
Dictionaries: Creating a Dictionary, Accessing values, Adding and modifying an item I a Dictionary, deleting items, Sorting Items in a Dictionary, Looping over a Dictionary, Nested Dictionaries, Difference between a List and a Dictionary.

UNIT IV
Functions- Introduction, Function Definition, the return statement, Required Arguments, Keyword Arguments, Default Arguments, Variable length Arguments.
Object Oriented Programming: Features of OOP, Merits and Demerits of OOP, Defining Classes, Creating Objects, Data Abstraction, and Hiding through classes, Class Method and Self Argument, The __init__() method, Public and Private data members, Private Methods.

UNIT V
Inheritance- Introduction, Inheriting Classes in python, Types of Inheritance- Single, Multiple, Multi-level, Multi-path inheritance.
File Handling- Introduction, Types of Files, Opening and Closing Files, Reading and Writing Files.

TEXT BOOKS
1. Python: The Complete Reference, Martin C Brown, McGraw Hill Education
2. Python Programming using Problem Solving Approach, Reema Thareja, OXFORD University Press, 2017.

REFERENCE BOOKS
1. Fundamentals of Python, Kenneth A Lambert, B L Juneja, Cengage Learning
2. Programming and Problem Solving with Python, Ashok Namdev Kamthane, Amit Ashok Kamthane, McGraw Hill Education

WEB RESOURCES
1. https://docs.python.org/3/tutorial/index.html
2. https://swayam.gov.in/nd1_noc19_cs40/preview
3. https://www.udemy.com/pythonforbeginnersintro/
4. https://www.coursera.org/learn/python-programming

II Year I Semester
Digital Marketing
(CSE)

Course Category	Professional Core	Course Code	19CS3T04
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Exposure to Programming for Problem Solving using C	Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES	
1	To introduce markup languages which helps in designing websites.
2	To introduce Java Script for client side validation of websites.
3	To understand the role and importance of digital marketing in a rapidly changing business landscape.

COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Design web pages with basic html tags using CSS, XML.	K3
CO2	Develop client-side scripts with JavaScript and DHTML.	K3
CO3	Apply search engine optimization techniques to a website.	K3
CO4	Make use of Social Media Channels for Digital Marketing.	K3
CO5	Develop a marketing strategy using Mobile, E-mail, and Content.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	-	-	-	-	-	-	1	2	1	1
CO2	3	3	3	3	3	-	-	-	-	-	-	1	2	1	1
CO3	3	1	2	1	3	-	-	-	-	-	-	1	-	-	-
CO4	3	1	2	1	3	-	-	-	-	-	-	1	-	-	-
CO5	3	1	2	1	3	-	-	-	-	-	-	1	-	-	-

COURSE CONTENT

UNIT I
HTML: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5, audio Element, video Element, organizing Elements
CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, Property-value Forms, Font Properties, color, Background Images, <span> and <div> tags, The Box Model, Conflict Resolution.

UNIT II
JavaScript: The Basic of JavaScript, Objects, Primitives Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions, Positioning Moving and Changing Elements using Java Script.
XML: Syntax of XML, XML Document Structure, Namespaces, XML Schemas, XSLT Style Sheets, XML Processors.

UNIT III

SEO: Search Engine Marketing, Search Engine Optimization, Measuring SEO Success, Mapping with SEO Journey,
Search Advertising: Online Advertising Payment Models, Search Advertising (Desktop & Mobile Devices), Planning & Executing a search Advertising Campaign, Strategic Implications of Advertising on the Search Network.

UNIT IV

Social Media Marketing: What is Social Media? Social Media Marketing, Social Media Marketing Strategy, Adopting Social Media in Organizations: Internal Learning, Paid-Owned-Earned Media, Social CRM,
Mobile Marketing: Mobile Internet in India, what is Mobile Marketing? Mobile Marketing Strategy, Forms of Mobile Marketing, Mobile Advertising, M-Commerce.

UNIT V

E-mail Marketing: E-mail Marketing in India, what is E-mail Marketing? E-mail Marketing Strategy, Executing E-mail Marketing.

Internet Marketing: Internet Marketing Strategy, Content Marketing, Content Marketing in India.

TEXT BOOKS

1. Programming the World Wide Web, Robet W Sebesta, Pearson, 8th edition, 2015.
2. Internet Marketing – A Practical approach in the Indian Context by Moutusy Maity, Oxford University Press 2017.

REFERENCE BOOKS

1. Web Technologies, Uttam K Roy, Oxford, 2010
2. The Web Warrior Guide to Web Programming,‖ Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage, 2003
3. Digital Marketing Handbook: A Guide to Search Engine Optimization by Shivani Karwal
4. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns by Ian Dodson, Wiley

WEB RESOURCES

1. www.w3schools.com
2. https://neilpatel.com/what-is-digital-marketing/
3. https://learndigital.withgoogle.com/digitalunlocked/course/digital-marketing

II Year I Semester
DIGITAL LOGIC DESIGN
(Common to CSE & IT)

Course Category	Professional Core	Course Code	**19EC3T06**
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To solve a typical number base conversion and analyze new error coding techniques.
2	Theorems and functions of Boolean algebra and behavior of logic gates, Boolean function simplification using Karnaugh maps and Quine-McCluskey methods
3	To understand concepts of combinational circuits
4	To understand concepts of basic sequential circuits
5	To develop advanced sequential circuits

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Classify different number systems and apply to generate various codes.	K2
CO2	Use the concept of Boolean algebra and K-map technique in minimization of switching functions.	K2
CO3	Design different types of combinations logic circuits.	K3
CO4	Apply knowledge of combinational logic for designing flip-flops	K3
CO5	Design registers and counters.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	-	1	-	-	-	-	-	-	-	-	1	-
CO2	3	-	-	2	-	-	-	-	-	-	-	-	-	1
CO3	3	-	-	3	-	-	-	-	-	-	-	-	1	-
CO4	3	-	-	3	-	-	-	-	-	-	-	-	-	1
CO5	3	-	-	3	-	-	-	-	-	-	-	-	1	-

COURSE CONTENT

UNIT I
NUMBER SYSTEMS
Binary, Octal, Decimal, Hexadecimal Number Systems. Conversion of Numbers from One Radix To Another Radix, r's Complement and (r-1)'s Complement Subtraction of Unsigned Numbers, Problems, Signed Binary Numbers, Weighted and Non weighted codes, error detection and correction codes.

UNIT II
LOGIC GATES AND BOOLEAN ALGEBRA
Basic Gates NOT, AND, OR, Boolean Theorems, Complement And Dual of Logical Expressions, Universal Gates, Ex-Or and Ex-Nor Gates, SOP,POS, Minimizations of Logic Functions Using Boolean Theorems, Two level Realization of Logic Functions Using Universal Gates, Karnaugh Map Method (K-Map): Minimization of Boolean Functions maximum up to Four Variables, POS and SOP, Simplifications With Don't Care Conditions Using K-Map.

UNIT III
COMBINATIONAL LOGIC CIRCUITSI
Design of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Ripple Adders and Subtractors, Ripple Adder/Subtractor Using Ones and Twos Complement Method.
COMBINATIONAL LOGIC CIRCUITSII
Design of Decoders, Encoders, Multiplexers, De-multiplexers, Priority Encoder, Code Converters, Magnitude Comparator, PLA,PAL,PROM.

UNIT IV
INTRODUCTION TO SEQUENTIAL LOGIC CIRCUITS
Classification of Sequential Circuits, Basic Sequential Logic Circuits: Latch and Flip-Flop, RS- Latch Using NAND and NOR Gates, Truth Tables. RS,JK, T and D Flip Flops, Truth and Excitation Tables.

UNIT V

REGISTERS AND COUNTERS

Design of Registers, Buffer Register, Control Buffer Registers, Bidirectional Shift Registers, Universal Shift Register, Design of Ripple Counters, Synchronous Counters and Variable Modulus Counters, Ring Counter, Johnson Counter.

TEXT BOOKS
1. Switching and finite Automata theory - Zvi kohavi, third edition, Cambridge university press
2. Switching Theory and Logic Design by A. Anand Kumar, PHI, 3rd Edition.
3. **Digital Logic and Computer Design by M Morris Mano, PHI.**

REFERENCE BOOKS
1. Modern Digital Electronics by RP Jain, TMH, 4th Edition.
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 5th Edition
3. **Digital electronics logic and design-Cherry Bhargava, BS Publications, 2019**

WEB RESOURCES
1. https://www.youtube.com/watch?v=4fV47wABBj8
2. Lecture series on Digital Circuits & Systems by Prof.S.Srinivasan, Department of Electrical Engineering, IIT Madras.For more details on NPTEL visit http://nptel.iitm.ac.in
3. https://www.elprocus.com/tutorial-on-sequential-logic-circuits/
4. http://web.ee.nchu.edu.tw/~cpfan/FY92b-digital/Chapter6.pdf
5. https://www.electronics-tutorials.ws/combination/comb_1.html

II Year I Semester
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE and IT)

Course Category	Professional Core	Course Code	19IT3T04
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To familiarize with the syntax and semantics of propositional and predicate logic.
2	To understand number theory.
3	To explain with examples the basic terminology of functions, relations, and sets.
4	To use graph theory for solving problems
5	To imbibe how basic concepts in Algebra can be applied in computer science.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:	Cognitive Level
CO1	Distinguish Propositional Logic from Predicate Logic.	K3
CO2	Practice problems related to fundamental theorems.	K3
CO3	Illustrate with examples the basic terminology of functions, relations and demonstrate knowledge of their associated operations.	K2
CO4	Represent graphs as mathematical structure and apply graph theory in solving computer science problems.	K3
CO5	Describe the properties of homomorphism and poset and lattices and solve problems in Abstract Algebra.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	-	3	2	1
CO2	1	2	2	-	-	-	-	-	-	-	-	-	1	1	1
CO3	3	2	1	-	-	-	-	-	-	-	-	-	1	1	1
CO4	2	2	1	-	-	-	-	-	-	1	-	1	2	1	1
CO5	3	2	2	-	-	-	-	-	-	-	-	-	1	1	1

COURSE CONTENT

UNIT I
Mathematical logic: Propositional calculus: statements and notations, connectives, Truth tables, Tautologies, Equivalence of formulas, Tautological Implications, Normal forms, Theory of inference for statement calculus. Predicate Calculus: predicate logic, statement functions, variables and quantifiers, free and bound variables.

UNIT II
Number Theory: Properties of integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing Prime numbers, The Fundamental Theorem of Arithmetic (Fermat's Theorem and Euler's Theorem) Mathematical induction– Principle of Mathematical Induction, Exercises

UNIT III
Relations: Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Hasse diagram, Lattice and its Properties.
Functions: Inverse Function Composition of functions, recursive Functions.

UNIT IV
Graph Theory: Basic Concepts of Graphs, Matrix representation of graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian graphs, Planar Graphs, Graph coloring, spanning trees.

UNIT V
Algebraic Structures: Algebraic systems – Semi groups and monoids, Homomorphism of Semi group and Monoids, Groups, Cosets. Partial ordering – Posets – Lattices as Posets Elementary Combinatorics: Basis of counting, Combinations & Permutations, with repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion. Pigeon hole principle and its application.

TEXT BOOKS
1. Mott, Kandel, and Baker, "Discrete Mathematics for Computer Scientists and Mathematicians", 2nd Edition, PHI.
2. Trembly J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill, 30th Re-print (2007).
3. Kenneth H Rosen, " Discrete Mathematics and its Applications", 7th Edition, McGraw – Hill.

REFERENCE BOOKS
1. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, 2002.
2. Thomas Koshy, "Discrete Mathematics with Applications", Elsevier Publications, 2006.
3. Seymour Lipschutz and Mark Lipson, "Discrete Mathematics", Second edition, Schaum's Outlines, Tata McGraw – Hill, 2007.

WEB RESOURCES
1. https://www.cs.cmu.edu/~emc/15414-f12/lecture/propositional_logic.pdf.
2. https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_propositional_logi c.htm
3. https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_functions.htm
4. http://discretemathnotes.blogspot.in/2008/08/groups.html
5. https://people.cs.pitt.edu/~milos/courses/cs441/lectures/Class25.pdf

II Year I Semester
Managerial Economics and Financial Analysis

Course Category	Humanities including Management	Course Code	19HM3T01
Course Type	Theory	**L-T-P-C**	3 -0 -0-3
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

	COURSE OUTCOMES	Cognitive Level
	On successful completion of the course, the student will be able to	
CO 1	Make use of the concepts of managerial economics and demand in managerial decision making and predicting demand for goods and services	K3
CO 2	Assess the functional relation among production, cost of production, cost concepts and Break-Even Analysis.	K5
CO 3	Classify market structures as perfect and imperfect markets for price and output decisions	K2
CO 4	Appraise the forms of business organizations and trade cycles in economic growth.	K5
CO 5	Apply accounting and capital budgeting techniques in financial decision making	K3

Contribution of Course Outcomes towards achievement of Program Outcomes: 1 – Low, 2 - Medium, 3 – High

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	1	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	1	-	-	-	-

COURSE CONTENT :

UNIT – I
Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Basic Economic Tools used in Managerial Economics-Concepts of Demand-Types-Determinants-Law of Demand its Exceptions-Elasticity of Demand-Types and Measurement- Law of Supply -Demand forecasting and Methods of demand forecasting.

UNIT – II
Production and Cost Analysis: Production function- Law of Variable proportions- Iso-quants and Isocosts-Laws of Returns to Scale-Cobb-Douglas Production function-Economies of Scale-Cost Concepts- Fixed vs Variable Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problems).

UNIT – III
Introduction to Markets: Market Structures: Perfect Competition, Monopoly, Monopolistic and Oligopoly – Features – Price and Output Determination.

Theories of the Firm & Pricing Policies: Managerial Theories of firm: Marris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

UNIT – IV
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 Cycles.

UNIT – V
Introduction to Accounting and Capital Budgeting: Introduction to Double Entry Systems-Journal-Ledger-Trail Balance - Preparation of Financial Statements
Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

TEXTBOOKS:
1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
2. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
3. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011

REFERENCE BOOKS :
1. V. Maheswari: Managerial Economics, Sultan Chand.
2. Suma Damodaran: Managerial Economics, Oxford 2011.
3. Prof. J.V.PrabhakaraRao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.
4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications. 7. S. A. Siddiqui & A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012

WEB RESOURCES:
1. https://economictimes.indiatimes.com/definition/law-of-supply
2. https://sites.google.com/site/economicsbasics/managerial-theories-of-the-firm
3. https://www.managementstudyguide.com/capitalization.htm

II Year I Semester
Python Programming Laboratory
(Common to CSE, IT)

Course Category	Engineering Science	Course Code	19CS3L01
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites	Exposure to Programming for Problem Solving using C Laboratory	**Internal Assessment**	25
		Semester End Examination	50
		Total Marks	75

COURSE OBJECTIVES	
1	To introduce the usage of fundamental data structures like List, Tuples and Dictionaries.
2	To imbibe the philosophy of object oriented programming using Python
3	To perform file handling in python.

COURSE OUTCOMES **Upon successful completion of the course, the student will be able to:**		Cognitive Level
CO1	Develop python programs using conditional statements and expressions	K3
CO2	Apply List and String manipulations to solve given problem.	K3
CO3	Develop programs with Tuples and Dictionary data structures	K3
CO4	Develop Python programs using file concepts.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	-	-	-	2	3	3	2
CO2	3	2	1	1	1	-	-	-	-	-	-	2	3	3	2
CO3	3	2	1	1	1	-	-	-	-	-	-	2	3	3	2
CO4	3	2	2	3	3	-	-	-	-	-	-	2	3	3	2

COURSE CONTENT	
1	a) Write a program to compute distance between two points taking input from the user b) Light travels at 3 * 108 meters per second. A light-year is the distance a light beam travels in one year. Write a program that calculates and displays the value of a light year. c) The marks obtained by a student in 5 different subjects are input through the keyboard. Print the student SGPA as per the Pragati Engineering College examination policy as shown below. Assume all the five subjects have 3 credits **SGPA table and formula below**

Theory (%)	Letter Grade	Level	Grade Point
≥ 90	O	Outstanding	10
≥ 80 to < 90	S	Excellent	9
≥ 70 to < 80	A	Very Good	8
≥ 60 to < 70	B	Good	7
≥ 50 to < 60	C	Fair	6
≥ 40 to < 50	D	Satisfactory	5
<40	F	Fail	0
		Absent	0

The SGPA is the ratio of sum of 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.

$$\text{SGPA } (S_i) = \sum (C_i \times G_i) / \sum C_i$$

Where C_i is the number of credits of the ith course and G_i is the grade point scored by the student in the ith course.

2	a) Write a program to calculate the Income Tax as per the rules of Indian Government. b) Develop a program that performs arithmetic operations (Addition, Subtraction, Multiplication, and Division) on integers. Input the two integer values and operator for performing arithmetic operation through keyboard. The operator codes are as follows: •For code '+', perform addition. • For code '-', perform subtraction. • For code '*', perform multiplication. • For code '/', perform division. c) If the first name of a student is input through the keyboard, write a program to display the vowels and consonants present in his/her name.
3	a) The factorial of an integer N is the product of all of the integers between 1 and N, inclusive. Write a while loop that computes the factorial of a given integer N. b) The $\log_2$ of a given number N is given by M in the equation $N = 2^M$. The value of M is approximately equal to the number of times N can be evenly divided by 2 until it becomes 0. Write a loop that computes this approximation of the $\log_2$ of a given number N. c) The German mathematician Gottfried Leibniz developed the following method to approximate the value of π: $\pi/4 = 1 – 1/3 + 1/5 -1/7 +\ldots\ldots$ Write a program that allows the user to specify the number of iterations used in this approximation and that displays the resulting value.
4	a) A list of integers is said to be a valley if it consists of a sequence of strictly decreasing values followed by a sequence of strictly increasing values. The decreasing and increasing sequences must be of length at least 2. The last value of the decreasing sequence is the first value of the increasing sequence. Write a Python program that takes a list of integers and returns True if the list is a valley and False otherwise. Here are some examples to show how your program should work. [3,2,1,2,3] True [3,2,1] False [3,3,2,1,2] False b) Write a python program 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. c) Two numbers r (number of rows) and c (number of columns) in a single line separated by a space. Print the Elements of the generated matrix. Each row should be printed in a new line with each element separated by a space. Also, the matrix should have elements starting from 1 to r × c with an increment of one in row manner.
5	a) Write a program to create a list 'A' to generate squares of a number (from 1 to 10), list 'B' to generate cubes of a number (from 1 to 10) and list 'C' with those elements that are even and present in list 'A', using List Comprehension. b) Demonstrate the usage of + operator, * operator and slicing operator on Tuples.
6	a) Write a program to read a text sentence from the user and create a dictionary with the number of occurrences of each word in the given sentence. Print the word which occurred more number of times in the sentence as output. b) Demonstrate Insert, Modify, Delete and Traversal of Dictionary.
7	a) Write a function eval_Quadratic_Equation(a,b,c,x) which returns the value of any quadratic equation of the form ax^2+bx+c b) Write a function calc_GCD_recur(a,b) which calculates the GCD recursively of two numbers. The function should take two positive integers and should an integer as GCD.
8	a) Write a program to create a class called Rectangle, with the method named Calc_Rect_Area( ) which takes the length and breadth as parameters and returns the computed area. Demonstrate the usage of the method Calc_Rect_Area( ) of class Rectangle. b) Write a program to create a class called Box with three member variables like width, height and depth. Provide the __init__ ( ) method for initialization. Also define the method calculate_volume( ) to compute and return the volume of the box. Demonstrate the usage of the method calculate_volume ( ) of class Box.
9	a) Write a program to create a base class called Point. Define the method Set_Coordinate(X,Y). Define the new class New_Point, which inherits the Point class. Also add draw( ) method inside the subclass to display the x and y coordinate values. b) Write a simple program to demonstrate the concept of multilevel inheritance.
10	a) Write a program to generate a list of numbers which are multiples of 5 from 1 to 1000. Write all the odd numbers in this list to a file named 'OddMultiplesOfFive.txt' and write all the even numbers in this list to file named 'EvenMultiplesOfFive.txt' b) Write a function Find_Largest( ) which accepts a file name as parameter and reports the longest line in the input text file.

II Year I Semester
Digital Marketing Laboratory
(CSE)

Course Category	Professional Core	Course Code	19CS3L03
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites	Exposure to Programming for Problem Solving using C Laboratory	Internal Assessment Semester End Examination Total Marks	25 50 75

COURSE OBJECTIVES		
1	To acquire knowledge of XHTML, Java Script and XML to develop web sites.	
2	To impart the usage of digital marketing tools such as SEO, SEM, Social media and Blogs.	

COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Develop static web sites using XHTML and Java Scripts	K3
CO2	Implement XML and XSLT for web applications.	K3
CO3	Develop, evaluate, and execute a comprehensive digital marketing strategy	K3
CO4	Make use of the major digital marketing channels - online advertising: mobile, search engine, and social media	K4

Contribution of Course Outcomes towards achievement of Program
Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	-	-	-	-	-	-	1	2	1	1
CO2	3	3	3	3	3	-	-	-	-	-	-	1	2	1	1
CO3	3	2	2	2	3	-	-	-	-	-	-	1	2	1	1
CO4	3	2	2	2	3	-	-	-	-	-	-	1	2	1	1

COURSE CONTENT	
1	a) Write a HTML code to create a Home page having three links: About Us, Our Services and Contact Us. b) Apply CSS (fonts, background and images) for above pages.
2	Create a "registration form "with the following fields and validate using JavaScript. a. Name (Text field) b. Password (password field) c. E-mail id (text field) d. Phone number (text field) e. Sex (radio button) f. Date of birth (date picker) g. Languages known (check boxes – English, Telugu, Hindi, Tamil) h. Address (text area) i. ID Proof (select box)
3	Write a HTML page including any required JavaScript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show "out of range" and if it is not a number, it should show "not a number" message in the result box.

4	Write a XML file which will display the Book information in a tabular format using XSLT which includes the following:
	     1) Title of the book 2) Author Name
	     3) ISBN number 4) Publisher name
	     5) Edition 6) Price

5	Create your own blog or set up your own website and optimize it (Use Google Webmaster, Moz).
6	Develop a list of keywords for above website/blog using Keyword Building Tools (Google AdWords, Keywordtool.io).
7	Monitoring the traffic that reaches your blog or website using Google Analytics and build a strategy to increase the traffic
8	Develop a strategy to Promote website or blog using Social Media Channels (Facebook, Twitter, Insta, etc.)
9	Create and Manage content for your own web site or blog.
10	Develop a strategy to drive traffic using E-mail Marketing Strategy

II Year I Semester

Essence of Indian Traditional Knowledge

Course Category	Humanities including Management	Course Code	19HM3T06
Course Type	Theory	L-T-P-C	2 -0 -0-0
Prerequisites		Total Marks (Internal Assessment)	100

COURSE OUTCOMES		Cognitive Level
On successful completion of the course, the student will be able to		
CO 1	Understand the significance of Indian Traditional Knowledge.	K2
CO 2	Classify the Indian Traditional Knowledge	K4
CO 3	Compare Modern Science with Indian Traditional Knowledge system.	K5
CO 4	Analyze the role of Government in protecting the Traditional Knowledge	K4
CO 5	Understand the impact of Philosophical tradition on Indian Knowledge System.	K2

Contribution of Course Outcomes towards achievement of Program Outcomes: 1 – Low, 2 - Medium, 3 – High

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	2	-	-	3	-	1	-	2	-	-
CO2	-	-	2	-	-	2	-	2	-	-	-	-
CO3	-	-	2	-	-	3	-	1	1	2	2	1
CO4	-	-	2	-	-	2	-	2	-	-	-	-
CO5	-	-	1	-	-	3	-	1	-	3	-	1

COURSE CONTENT

UNIT I
Introduction to Traditional Knowledge: Define Traditional Knowledge- Nature and Characteristics- Scope and Importance- kinds of Traditional Knowledge- The historical impact of social change on Traditional Knowledge Systems- Value of Traditional knowledge in global economy.

UNIT II
Basic structure of Indian Knowledge System: Astadash Vidya- 4 Ved - 4 Upaved (Ayurved, Dhanurved, Gandharva Ved & Sthapthya Adi), 6 vedanga (Shisha, Kalppa ,Nirukha, Vykaran, Jyothisha & Chand), 4 upanga (Dharmashastra, Meemamsa, purana & Tharka Shastra).

UNIT III
Modern Science and Indian Knowledge System-Indigenous Knowledge, Characteristics- Yoga and Holistic Health care-cases studies.

UNIT IV
Protection of Traditional Knowledge: The need for protecting traditional knowledge -Significance of Traditional knowledge Protection-Role of government to harness Traditional Knowledge.

UNIT V
Impact of Traditions: Philosophical Tradition (Sarvadarshan) Nyaya, Vyshepec, Sankhya, Yog, Meemamsa, Vedantha, Chavanka, Jain & Boudh - Indian Artistic Tradition - Chitra kala, Moorthi kala, Vasthu kala , Sthapthya, Sangeetha, Nruthya Yevam Sahithya

REFERENCE BOOKS :
1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and
3. Vipin Kumar Singh, Pratibha Prakashan 2012.
4. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya Vidya
5. Swami Jitatmanand, Holistic Science and Vedant, Bharatiya Vidya Bhavan
6. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata.
7. Pramod Chandra, India Arts, Howard Univ. Press, 1983.
8. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.

WEB RESOURCES:
1. https://www.wipo.int/wipo_magazine/en/2017/01/article_0004.html
2. http://iks.iitgn.ac.in/wp-content/uploads/2016/01/Indian-Knowledge-Systems-Kapil-Kapoor.pdf
3. https://www.wipo.int/edocs/mdocs/tk/en/wipo_grtkf_ic_21/wipo_grtkf_ic_21_ref_facilitators_text.pdf

II Year II Semester
Object Oriented Programming through Java

Course Category	Professional Core		Course Code	19CS4T05
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites	Exposure to Programming for Problem Solving using C		**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To understand how to use Java to write applications.
2	To impart primitive data types in Java and programming constructs.
3	To make use of Java Classes and Objects, methods and constructors.
4	To understand the concepts of Inheritance, Interfaces and Packages.
5	To implement Java programs using exceptions and multithreading.

COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Apply the fundamentals of Java to solve problems	K3
CO2	Differentiate the application of decision and iteration control structures	K2
CO3	Implement classes and method overloading concepts	K3
CO4	Apply the concepts of inheritance and packages	K3
CO5	Implement Java programs using exceptions and multithreading	K3

Contribution of Course Outcomes towards achievement of Program
Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	-	-	-	-	-	-	-	3	3	2
CO2	3	3	3	2	3	-	-	-	-	-	-	-	3	3	2
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	2

COURSE CONTENT

UNIT I
Introduction to JAVA: The History of Java, Java Virtual Machine, Java Buzzwords, Evolution of Java, An overview of Java, Object Oriented Programming and its principles, First Java Program, Lexical Issues-Identifiers, Java Keywords, Java Primitive Data types, Variables, Type Conversion and Casting, Arrays.
Programming Constructs: Operators- Arithmetic, Bitwise, Relational, Boolean Logical, Assignment, ? Operator, Operator Precedence, Control Statements – Selection, Iteration and Jump Statements.

UNIT II
Classes and Objects: Class Fundamentals, declaring Objects, Introducing Methods, Constructors, The this Keyword, Garbage collection.
A Closer look at Methods and Classes: Overloading Methods, using objects as parameters, returning objects, Introducing Access Control, Understanding static, introducing final, Nested and Inner Classes, Exploring the String class, using Command-Line Arguments.

UNIT III

Inheritance: Types of Inheritance, Using super, Method Overriding, Using Abstract class, Using final with Inheritance.

Interfaces& Packages: Interfaces, Multiple Inheritance Issues, Defining a Package, Finding Packages and CLASSPATH, Access protection, Importing packages, package example, Introducing to *java. lang* and *java.io* packages.

UNIT IV

Exceptions: Introduction, Exception handling fundamentals, Exception types, using try and catch, Multiple catch clauses, nested try statements, throw, throws, finally block, Java's Built-in-Exceptions, user defined exception, Chained Exceptions, using Exceptions.

UNIT V

Multi-Threading: The Java Thread Model, the Main Thread, Creating a Thread, Multiple threads, Using isAlive() and join(), Thread priorities, Synchronization, Interthread Communication, Suspending, Resuming threads and Stopping Threads, using Multithreading.

TEXT BOOKS

1. The Complete Reference Java, 9ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabh choudhary,   Second Edition, Oxford.

REFERENCE BOOKS

1. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Buyya, Selvi, Chu TMH
2. Core Java Volume 1.Fundamentals, 8ed, Cay S.Horstmann, Gray Cornell, Pearson.
3. Advanced Programming in Java2: Updated to J2SE6 with Swing, Servlet and RMI, K.Somaundaram.

WEB RESOURCES

1. https://nptel.ac.in/courses/106105191/
2. https://docs.oracle.com/javase/tutorial/java/index.html
3. https://www.w3schools.com/java/

II Year II Semester
OPERATING SYSTEMS
(Common to CSE and IT)

Course Category	Professional Core	Course Code	19IT4T06
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To introduce the structure and functions of Operating Systems.
2	To impart process, disk and memory management.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Classify the operating system services.	K2
CO2	Evaluate Scheduling algorithms for process management.	K4
CO3	Compare various memory management schemes.	K2
CO4	Illustrate process synchronization techniques to avoid deadlocks.	K2
CO5	Analyze the structure of file systems on secondary storage devices.	K4

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	2	-	1	-	-	-	-	-	-	-	1	-	-
CO2	2	2	-	1	-	-	-	-	-	-	-	-	1	-	-
CO3	2	2	-	-	3	-	-	-	-	-	-	-	1	1	-
CO4	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	2	3	-	-	-	-	-	-	-	2	-	-

COURSE CONTENT

UNIT I
Operating System Overview: Operating systems objectives and functions, evolution of operating systems, system calls, types of system calls.

UNIT II
Process Management: Process concept – The process, process state diagram, process control block, process scheduling – scheduling queues, schedulers, context switch, operations on processes, inter-process communication, multithreading models, threading issues, scheduling – basic concepts, scheduling criteria, scheduling algorithms.

UNIT III
 Memory Management Strategies: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation
Virtual Memory Management: Virtual memory, demand paging, page-replacement algorithms, thrashing

UNIT IV

Concurrency: Process synchronization, the critical-section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of synchronization, monitors, synchronization examples

Principles of deadlock: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock

UNIT V

File system Interface: The concept of a file, access methods, directory structure, file system mounting, files sharing, protection.

File System Implementation: File system structure, allocation methods, free-space management, secondary storage structure – overview of mass-storage structure, disk scheduling and algorithms

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley and Sons Inc., 8th Edition, 2012.
2. William Stallings, "Operating Systems – Internals and Design Principles", Prentice Hall, 7th Edition, 2011.

REFERENCE BOOKS

1. Andrew S. Tanenbaum, "Modern Operating Systems", Addison Wesley, 2nd Edition, 2001.
2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata Mc Graw Hill Education", 1996.
3. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Tata Mc Graw-Hill Education, 2nd Edition, 2007.

WEB RESOURCES

1. http://nptel.ac.in/courses/106108101 (Prof. P.C.P. Bhatt, IISc Bangalore)
2. https://www.tutorialspoint.com/operating_system/

II Year II Semester
DATABASE MANAGEMENT SYSTEMS
(Common to CSE and IT)

Course Category	Professional Core	Course Code	19IT4T02
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To impart theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.
2	To familiarize logical design, physical design and implementation of relational databases.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Understand database system architecture, data models and construct Entity-Relationship diagrams.	K2
CO2	Write queries using Relational algebra, SQL	K3
CO3	Design a database with understanding on Normalization.	K3
CO4	Apply indexing techniques on relations and store data as per some RAID levels.	K3
CO5	Understand Transactions and their concurrency issues, protocols.	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	-	-	-	-	-	-	-	-	-	1	3	-
CO2	2	3	3	1	-	-	-	-	1	-	-	1	1	1	2
CO3	1	1	2	1	1	-	-	-	1	-	-	1	1	1	1
CO4	3	3	1	3	-	-	-	-	1	-	-	1	1	1	2
CO5	3	3	1	3	1	1	-	-	1	1	-	1	1	1	2

COURSE CONTENT
UNIT I
Overview & Introduction to Database Design: Managing data, File systems versus a DBMS, advantages of a DBMS, describing and storing data in a DBMS, Database system structure, Database Design and ER Diagrams, Entities, Attributes, Entity sets, Relationship, Relationship sets, additional features of the ER Model, Conceptual Design with the ER Model

UNIT II
The Relational Model: Introduction to Relational Model, Integrity Constraints over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Database Design: ER Relational, Introduction to Views, Destroying/ Altering Tables and views
Relational Algebra and Calculus: Preliminaries, Relational Algebra, Relational Calculus, Expressive power of Algebra Calculus

UNIT III
SQL - Queries, Constraints, Triggers: Overview, the form of a basic SQL query, UNION, INTERSECT, EXCEPT, nested queries, aggregate Operators, NULL values, complex integrity constraints in SQL, Triggers and Active

Databases.

Schema Refinement and normal Forms: Introduction to schema refinement, functional dependencies, normal forms, Properties of Decompositions, Normalizations.

UNIT IV

Overview of Storage and Indexing: Database files organizations and Indexing, Index Data Structures,
Storing Data: Disks and Files, Redundant Arrays of Independent Disks
Tree- Structured Indexing: Indexed sequential access Method (ISAM), B+ Trees- Search, Insert, Delete Operations
Hash-Based Indexing: Static hashing, Extendible Hashing, Linear Hashing

UNIT V

Overview of Transaction Management: Acid Properties, Transactions and Schedules, Concurrent Execution of Transactions

Concurrency Control: 2PL, Serializability, Recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks, Concurrency Control without Locking

Crash Recovery: Introduction to ARIES, The log, other recovery-related structures, the Write-Ahead Log Protocol, Check Pointing, Recovering from a System Crash

TEXT BOOKS
1. Raghuram Krishnan, Johannes Gehrke "Database Management Systems", 3/e, Mc GrawHill, 2003.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database. System Concepts", Sixth Edition, McGraw Hill Education, 2010.
3. Ramez Elmasri, Shamkant B. Navathe, "Database Systems", 6/e Kindle.

REFERENCE BOOKS
1. C.J. Date, "Introduction to Database Systems", 8/e, Pearson Education, 2006.
2. Corlos Coronel, Steven Morris, Peter Robb, "Database Principles Fundamentals of Design Implementation and Management, Cengage Learning.

WEB RESOURCES
1. http://www.myreadingroom.co.in/notes-and-studymaterial/65-dbms/534-concurrency-control-with-locking.html
2. http://www.service-architecture.com/articles/database/concurrency_control_and_locking.html
3. http://codex.cs.yale.edu/avi/db-book/db4/slide-dir/ch1-2.pdf
4. https://www.techopedia.com/definition/24361/database-management-systems-dbms
5. http://www.myreadingroom.co.in/notes-and-studymaterial/65-dbms/534-concurrency-control-with-locking.html

II Year II Semester
Computer Organization
(Common to CSE, IT)

Course Category	Professional Core		Course Code	19CS4T06
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites	Exposure to Digital Logic Design		**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To understand the internal organization and operations of a computer functional units.
2	To familiarize with the single and multiprocessor design architectures.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Identify the architecture and data types of modern computer.	K2
CO2	Apply Register Transfer Language to perform micro-operations and instructions	K3
CO3	Illustrate the CPU operations to deal with computer arithmetic.	K2
CO4	Compare memory mapping techniques in a computer.	K4
CO5	Outline interfacing of input- output devices in single and multi processor systems	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	1	-	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I
Basic Structure of Computers: Computer Types, Functional unit, Basic Operational concepts, Bus structures.
Data Representation: Data types, complements, fixed point representation, floating – point representation, other binary codes, Error detection codes.

UNIT II
Register Transfer Language, Micro-operations: Register transfer language. Register transfer bus and memory transfers, arithmetic micro operations, logic micro operations, shift micro operations, arithmetic logic shift unit.
Basic Computer Organization and Design: Stored Program Organization, Computer Registers Instruction Cycle, Memory – Reference Instructions, Input – Output and Interrupt.

UNIT III
Central Processing Unit: General register organization, stack organization, instruction formats, addressing modes, data transfer and manipulation.

Computer Arithmetic: Fixed point Arithmetic- Addition, subtraction, multiplication and division algorithms.

UNIT IV
The Memory System: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory.

UNIT V
Input-Output Organization: Peripheral devices, Input-Output Interface, Asynchronous data transfer - Strobe Control and Hand Shaking, Modes of transfer, priority interrupts, direct memory access.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures.

TEXT BOOKS
1. Computer Organization, Carl Hamacher, ZvonksVranesic, SafeaZaky, 5/e, McGraw Hill.
2. Computer System Architecture, M.Morris Mano, 3/e, Pearson/PHI

REFERENCE BOOKS
1. Computer Organization and Architecture – William Stallings, 6/e, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4/e, PHI/Pearson
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int.

WEB RESOURCES
1. https://www.tutorialspoint.com/videos/computer_organization/index.htm
2. http://nptel.iitm.ac.in/video.php?subjectId=106106092
3. https://www.reference.com/technology/computer-organization-36c3a064b20f9b33

II Year II Semester
Formal Languages and Automata Theory
(Common to CSE, IT)

Course Category	Professional Core	Course Code	19CS4T07
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Exposure to Mathematical Foundations of Computer Science	**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To understand various types of finite automata
2	To understand the grammar and PDA Push Down Automata for a given language
3	To impart the comprehensive knowledge of Turing Machine

COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Apply core concepts of automata theory and Formal Languages	K3
CO2	Compare different types of Finite Automata and Transducers	K2
CO3	Solve Regular Expressions and Simplification of Context Free Grammars	K3
CO4	Construct Pushdown automata for formal languages	K3
CO5	Construct Turing Machines and List the undecidable problems	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	2	1	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	1	1	-	-	-	-	-	-	-	-	-	-
CO3	2	3	2	2	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	1	1	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	2	1	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I
Fundamentals of Automata: Finite State Machine, Components of Finite State Automata, Elements of Finite State System ,Mathematical representation of Finite State Machine
Formal Language Theory: Symbols, Alphabets and Strings, Operations on Strings, Formal Languages, Operations on Languages

UNIT II
Finite Automata: Deterministic Finite Automata(DFA), Non Deterministic Finite Automata(NFA), Non-Deterministic Automata with Є-moves, Equivalence of NFA/NFA- ε and DFA
Transducers: Moore Machine, Mealy Machine, Equivalence of Moore and Mealy Machines.

UNIT III
Regular Expressions: Regular Languages, Properties of Regular Expressions, Arden's theorem, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma for Regular Languages(RL) Closure Properties of RL.
Context Free Grammar: Formal Definition of CFG, Types of Grammars, Derivation Tree, Ambiguous Grammars, Simplification of CFG, Chomsky Normal Form and Greibach Normal Form, Pumping Lemma for Context Free Languages(CFL), Closure Properties of CFL.

UNIT IV
Pushdown Automata: The formal definition of PDA, Graphical Notation for PDA, Instantaneous Descriptions of PDA, The languages of PDA.

UNIT V

Turing Machine: Components of a TM, Description of a TM, Elements of TM, Instantaneous Descriptions of a TM, Design of Turing Machines
Undecidability: Un-decidable Problem, P and NP Classes of Languages.

TEXT BOOKS
1. Introduction to Automata Theory, languages and computation, John E Hopcroft, Rajeev Motwani, Jeffery D Ullman , 3rd Edition, Pearson Education.
2. A Text Book on Automata Theory, P.K. Srimani, Nasir S.F.B, Cambridge university Press

REFERENCE BOOKS
1. Theory of Computer Science Automata Language and Computation, 3rd edition K. L P Mishra, N.Chandra Sekharan
2. Theory of Computation , a problem solving approach, kavi Mahesh, Wiley

WEB RESOURCES
1. http://nptel.ac.in/courses/106106049/
2. https://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf
3. http://www.ics.uci.edu/~goodrich/teach/cs162/notes/
4. https://www.tutorialspoint.com/automata_theory/automata_theory_tutorial.pdf
5. http://freevideolectures.com/Course/3379/Formal-Languages-and-Automata-Theory

II Year II Semester
Object Oriented Programming through Java Laboratory
(Common to CSE, IT)

Course Category	Professional Core		Course Code	19CS4L04
Course Type	Laboratory		**L-T-P-C**	0-0-3-1.5
Prerequisites	Exposure to Programming for Problem Solving using C	**Internal Assessment**		25
		Semester End Examination		50
		Total Marks		75

COURSE OBJECTIVES	
1	To understand how to use Java to write applications.
2	To impart primitive data types in Java and programming constructs.
3	To make use of Java Classes and Objects, methods and constructors.
4	To understand the concepts of Inheritance, Interfaces and Packages.
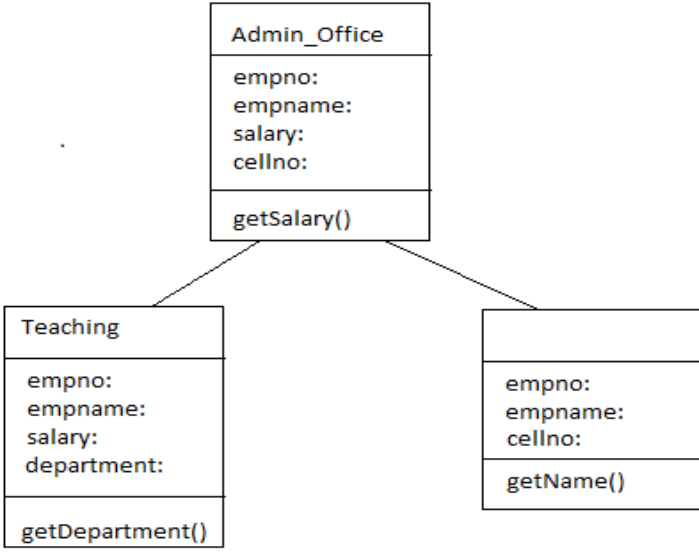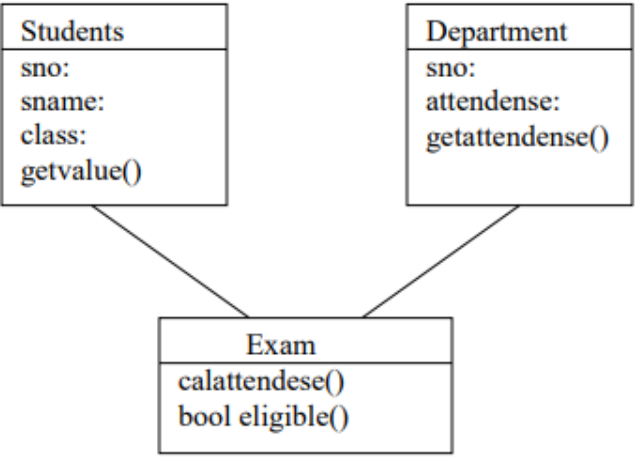
COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Implement object oriented concepts using Java	K3
CO2	Apply the concepts of inheritance and packages.	K3
CO3	Implement Java programs using exceptions and multithreading.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	3	-	-	-	-	-	-	-	3	3	2
CO2	2	2	3	3	3	-	-	-	-	-	-	-	3	3	2
CO3	2	2	3	3	3	-	-	-	-	-	-	-	3	3	2

COURSE CONTENT	
1	A) Write a JAVA program to display default value of all primitive data types of JAVA B) Write a JAVA program to highlight the even numbers in the Fibonacci sequence using recursive and non recursive functions.
2	A) Write a JAVA program to check the number of words which satisfies the palindrome condition in the given string. Example String: "Our Java subject madam is non local". B) Write a JAVA program to sort prices of all the given items as per 2017 price: <table><tr><td>**Grocery item**</td><td>**2007 price**</td><td>**2017 price**</td></tr><tr><td>Pasta</td><td>52</td><td>128</td></tr><tr><td>Dried beans</td><td>72</td><td>132</td></tr><tr><td>Ground beef</td><td>130</td><td>250</td></tr><tr><td>All-purpose flour</td><td>40</td><td>95</td></tr></table>
3	A) Write a JAVA program to display the sum of the arguments passed through command line and also print "can't do addition" if any of the argument is a string. B) Write a JAVA program to sort an array of strings from the given input excluding the Integer values from the input.
4	A)Write a JAVA program to swap two numbers using call by value and call by reference. B) Write a JAVA program to calculate the area of a rectangle using "this" keyword having three different parameterized constructors.

5	A) Write a JAVA program to compute the area of a circle using static variables, methods and block. B) Write a JAVA program to calculate the volume of a shape selected using 'super' keyword
6	A) Write a JAVA program assuming there is a method getInterestRate() which returns the interest rate of a bank. RBI is the superclass and it returns 7 for getInterestRate(). There are various banks like SBI, AXIS, ICICI, etc which extend RBI class and override the getInterestRate() method to return 7.5, 8, 8.5, etc respectively using Method overloading, method overriding and constructor overloading. B) Write a JAVA program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea() that prints the area of the given Shape.
7	A) Write a JAVA program that implements educational hierarchy using inheritance. B) Write a JAVA program to find the details of the students eligible to enroll for the examination (Students, Department combined give the eligibility criteria for the enrollment class) using interfaces.
8	A) Write a program to identify the accessibility of a variable by means of different access specifiers within and outside package. B) Write a JAVA program to create a package named my pack and import it in circle class.
9	A) Write a java program that implements Array Index out of bound Exception using built-in-Exception. B) Write a JAVA program to check a person is eligible for vote or not using user defined exception
10	A) Write an application that displays deadlock between threads. B) Write an application that executes two threads. One thread displays "An" every 1000 milliseconds and other displays "B" every 3000 milliseconds. Create the threads by extending the Thread class.

II Year II Semester
OPERATING SYSTEMS LABORATORY

Course Category	Professional Core	Course Code	19IT4L05
Course Type	Laboratory	**L-T-P-C**	3-0-0-1.5
Prerequisites		**Internal Assessment**	25
		Semester End Examination	50
		Total Marks	75

COURSE OBJECTIVES		
1	To provide an understanding of the design aspects of operating system.	

COURSE OUTCOMES		**Cognitive Level**
Upon successful completion of the course, the student will be able to:		
CO1	Stimulate CPU scheduling algorithms in operating system.	K3
CO2	Evaluate memory management techniques in operating system.	K3
CO3	Implement page replacement algorithms in operating system.	K3
CO4	Illustrate process concurrency.	K3
CO5	Implement file allocation strategies used in operating system.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	-	-	-	-	2	-	-	1	2	3	3
CO2	2	2	2	2	-	-	-	-	2	-	-	1	2	3	3
CO3	2	2	2	2	-	-	-	-	1	-	-	1	2	3	3
CO4	2	1	1	2	-	-	-	-	1	-	-	1	2	3	3
CO5	2	2	2	1	-	-	-	-	2	-	-	1	2	2	3

COURSE CONTENT

LIST OF EXPERIMENTS

1	Simulate the following CPU scheduling algorithms a) Round Robin b) Shortest Job First c) Priority
2	Multiprogramming-Memory management- Implementation of fork (), wait (), exec() and exit(), System calls
3	Simulate the following a) Multiprogramming 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) First In First Out b) Least Recently Used
7	Simulate the following File allocation strategies a) Sequenced b) Indexed

II Year II Semester
DATABASE MANAGEMENT SYSTEMS LABORATORY
(Common to CSE and IT)

Course Category	Professional Core		Course Code	19IT4L02
Course Type	Laboratory		**L-T-P-C**	0-0-3-1.5
Prerequisites			**Internal Assessment**	25
			Semester End Examination	50
			Total Marks	75

COURSE OBJECTIVES		
1	To impart database design, query and PL/SQL.	
COURSE OUTCOMES		**Cognitive Level**
Upon successful completion of the course, the student will be able to:		
CO1	Make use of DDL and DML commands for Database design and manipulation	K3
CO2	Utilize Sub-Query, Nested Query and Joins concepts in a given problem-domain	K3
CO3	Apply Built-in functions on Database	K3
CO4	Develop programs in PL/SQL with Procedures, Functions, Cursors, Packages.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	3	3	-	-	-	-	-	-	-	3	2	1
CO2	2	2	3	2	3	-	-	-	-	-	-	-	3	1	3
CO3	2	-	3	2	2	-	-	-	-	-	1	1	1	3	3
CO4	3	1	3	3	3	-	1	-	1	1	1	1	3	2	3

COURSE CONTENT
LIST OF EXPERIMENTS
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, INTERSECT, 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, substr and instr), dateFunctions (Sysdate, next_day, add months, last day, months between, least, greatest, trunc, Round, to char, to date)
5 i) Creation of simple PL/SQL program which includes declaration section, executable section and exception – Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
  ii) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
6 Develop a program that includes the features NESTED IF, CASE and CASE expression. The Program can be extended using the NULLIF and COALESCE functions.
7 Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, raise-, application error.
8 Programs development using creation of procedures, passing parameters IN and OUT of procedures.
9 Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
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.

II Year II Semester
Constitution of India
(Common to all branches)

Course Category	Humanities including Management	Course Code	19HM4T0
Course Type	Theory	L-T-P-C	2 -0 -0-0
Prerequisites		Total Marks (Internal Assessment)	100

COURSE OUTCOMES		Cognitive Level
On successful completion of the course, the student will be able to		
CO 1	Understand the evolution of Constitution of India	K2
CO 2	Make use of their Fundamental rights.	K3
CO 3	Understand the functioning of the Union Government	K2
CO 4	Understand the functioning of the State and local self Government.	K2
CO 5	Understand the value of Indian Constitution in functioning of the country.	K2

Contribution of Course Outcomes towards achievement of Program Outcomes: 1 – Low, 2 - Medium, 3 – High

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	-	3	-	1	-	2
CO2	-	-	-	-	-	1	-	2	1	1	-	1
CO3	-	-	-	-	-	1	-	1	1	1	-	-
CO4	-	-	-	-	-	1	-	1	1	1	-	-
CO5	-	-	-	-	-	1	1	1	1	1	-	2

COURSE CONTENT :

UNIT – I
Introduction to Indian constitution: Meaning of the term constitution - History and development – Preamble of the Constitution – Constituent Assembly – The salient features of Indian Constitution.

UNIT –II
Fundamental Rights and Directive principles of state policy: Individual and Collective Rights – Limitations of the fundamental Rights – Judicial Interpretation of Fundamental Rights.

UNIT –III
Union Government: Union Legislature – Lok sabha and Rajya sabha (powers and functions) – President of India (powers and functions) – Prime minister of India (powers and functions) – Union Judiciary (supreme court powers and functions).

UNIT – IV STATE AND LOCAL SELF GOVERNMENT:
State Government: State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) – Powers and functions of state legislature – The Chief Minister of the state (powers and functions)
Local Self Government: Election commission of India (Powers and Functions)- The Union Public Service Commission (Powers and Functions)

UNIT – V WORKING OF THE INDIAN CONSTITUTION
The values of the Indian Constitution and Ushering of Social Revolution in India – Nature and Role of Higher Judiciary in India – Amendments (Recent)

REFERENCE BOOKS :
1. 'Indian Polity' by Laxmikanth
2. 'Indian Administration' by Subhash Kashyap
3. 'Indian Constitution' by D.D. Basu
4. 'Indian Administration' by Avasti and Avasti

WEB RESOURCES:
1. https://www.clearias.com/historical-background-of-indian-constitution/
2. https://www.civilserviceindia.com/subject/General-Studies/notes/functions-and-responsibilities-of-the-union-and-the-states.html
3. https://www.tutorialspoint.com/indian_polity/indian_polity_how_constitution_works

III Year I Semester
COMPUTER NETWORKS
(Common to CSE and IT)

Course Category	Professional Core	Course Code	19CS5T08
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Fundamentals of Computers	Internal Assessment Semester End Examination Total Marks	30 70 100

	COURSE OBJECTIVES
1	Understand the basic taxonomy, terminology and architectures of the computer networks.
2	Analyze the services, protocols and features of the various layers of computer networks.
3	Understand the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Enumerate the basic concepts of Computer Networks	K1
CO2	Analyze protocols implemented in Data Link Layer for error and flow control.	K4
CO3	Design applications using internet protocols.	K3
CO4	Implement routing and congestion control algorithms.	K3
CO5	Develop application layer protocols and understand socket programming.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
CO1	3	3	2	1	2	2	0	0	0	0	1	0	3	3	0
CO	3	3	3	3	2	3	0	0	0	0	3	0	3	3	0

2															
CO 3	3	2	2	1	1	3	0	0	0	0	1	0	3	2	0
CO 4	3	3	3	3	3	0	0	0	0	0	0	0	3	3	0
CO 5	3	3	3	3	3	0	0	0	0	0	0	0	3	3	0

COURSE CONTENT	
UNIT I	**Introduction:** Introduction to computer networks, Protocols, Layering Scenario, The OSI/ISO Reference Model, TCP/IP Protocol Suite, Comparison of the OSI and TCP/IP reference model, Internet history standards and administration. **Physical Layer:** Guided transmission media: Twisted pairs, Coaxial cable, Fiber optics, Wireless transmission media, Multiplexing Concepts.
UNIT II	**Data Link Layer**: Design issues, Error Detection and Error Correction codes, CRC codes, Elementary Data Link Layer Protocols, Flow control - Sliding window protocols: stop-and-wait ARQ, Go-back-n ARQ, Selective Repeat ARQ, HDLC **Multi Access Protocols** - ALOHA, CSMA – CSMA/CD, CSMA/CA, Collision free protocols, data link layer switching, Switches, Routers, Bridges and Gateways.
UNIT III	**Network Layer**: Design issues, Store and Forward packet switching connection less and connection-oriented networks-routing algorithms- Optimality principle, Shortest path, Flooding, Distance Vector Routing, Count- to -Infinity Problem, Hierarchical Routing, The Network Layer in the Internet. **Internetworking:** Tunneling, Internetwork Routing, Packet fragmentation, IPv4, introduction to IPv6 Protocol, IP addresses, ICMP, ARP, RARP, DHCP.
UNIT IV	**Transport Layer:** Services provided to the upper layers elements of transport protocol-addressing, Connection Establishment, Connection Release, Crash Recovery. The internet transport protocols – UDP, TCP.
UNIT V	**Application Layer**- Introduction, Providing services, Applications layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS, SSH

TEXT BOOKS	
1.	"Computer Networks," Andrew S Tanenbaum, Pearson Education, 4th Edition, 2003.

2.	"Data Communications and Networking," Behrouz A.Forouzan, TMH, Fifth Edition, 2013.
REFERENCE BOOKS	
1.	"An Engineering Approach to Computer Networks," S. Keshav, Pearson Education, 2nd Edition, 1997.
2.	"Understanding communications and Networks," W. A. Shay, Cengage Learning, 3rd Edition, 2004.
WEB RESOURCES	
1.	http://nptel.ac.in/courses/106105081/1 (Prof. Sujoy Ghosh, IIT, Kharagpur)
2.	http://epgp.inflibnet.ac.in/view_f.php?category=1736
3.	http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e_videonotes/tanenbaum_videoNotes.html

III Year I Semester
Web Application Development using J2EE
(Common to CSE & IT)

Course Category	Professional Core		Course Code	19CS5T09
Course Type	Theory		**L-T-P-C**	3 – 0 – 0 – 3
Prerequisites	Java Programming		**Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

	COURSE OBJECTIVES
1	Getting the student to be well trained in J2EE Application Development
2	Make the students aware of using various J2EE Technologies
3	To understand the application of J2EE Frameworks like Struts

COURSE OUTCOMES	BTL
Upon successful completion of the course, the student will be able to:	
CO1 Code Java Programs using classes and interfaces from Java Collections Framework.	K3
CO2 Develop Web Applications using Servlets.	K3
CO3 Create and execute Java Server Pages using Tomcat Web Server.	K3
CO4 Execute database queries using JDBC.	K3
CO5 Design a simple Web Application using MVC Architecture (Struts Framework).	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO 11	PO 12	PS O1	PS O2	PS O3
CO 1	2	1	3	2	3	-	-	-	-	-	-	-	2	3	3
CO	2	1	3	2	3	-	-	-	-	-	1	-	2	3	3

2															
CO 3	2	1	3	2	3	-	-	-	-	-	1	-	2	3	3
CO 4	2	1	3	2	3	-	-	-	-	-	1	-	3	3	3
CO 5	2	1	3	2	3	-	-	-	-	-	1	-	2	3	3

COURSE CONTENT	
UNIT I	**The J2EE Platform:** Programming for the Enterprise, Enterprise Architecture Styles, The J2EE Platform, J2EE Technologies **Collection Framework:** Collections overview, **Interfaces:** Collection, List, Set, **Classes:** Array List, Hash Set. Accessing a Collection via an Iterator, The Map Interfaces, The Map Classes, The HashMap Class, The TreeMap Class, StringTokenizer.
UNIT II	**Introduction to Servlets**: Lifecycle of a Servlet, Servlet development options, Simple Servlet, The Servlet API, The javax.Servlet Package, Reading Servlet parameters, The javax.Servlet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking.
UNIT III	**Introduction to JSP:** The Problem with Servlet, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Installing the Tomcat Server & Testing Tomcat, Generating Dynamic Content, Using Scripting Elements, Error Handling and Debugging, Sharing Data between JSP pages, Requests, and Users.
UNIT IV	**JDBC: Database Drivers:** Type1, Type2, Type3 and Type4. **Javax.Sql package:** Connection management, Database access, Data Types, Loading a database driver and opening connections, Establishing a connection, Creating and executing SQL statements, Querying the Database, Prepared Statements
UNIT V	**Struts Framework:** Two development models, a closer look at Model-View-Controller architecture, Basic components of struts, Building a simple strut application. **Controller Layer:** Struts & Controller layer, Action Servlet class.

TEXT BOOKS	
1.	The Complete Reference, Java, 9ed, Herbert Schildt, 9th Edition, April 2014 (Units 1,2)
2.	Java Server Pages, Hans Bergstan, Oreilly, 3rd Edition, Dec 2003 (Units 3)
3.	Professional Java Server Programming, Subrahmanyam Allamaraju, Apress, 1.3 Edition, Fourth Indian Reprint 2012 (Unit 1,4)
4.	The Complete Reference Struts, James Holmes, 2nd Edition, 2007, Tata McGraw-Hill (Unit 5)

	REFERENCE BOOKS
1.	Jakarta Struts Cook Book, Bill Siggelkow, SPD, Oreilly (Chapter 8)
2.	Murach's, Beginning Java JDK5, Murach, SPD.
3.	Programming World Wide Web, Sebesta, Pearson
4.	Building Web Applications, NIIT, PHI
5.	Beginning Web Programming, Jon Duckett, Wrox, Wiley
6.	Java server pages, Pekowsky, Pearson
	WEB RESOURCES
1.	http://java.cnam.fr/iagl/biblio/Serlvets%20&%20JSP%20-%20Falkner%20Jones.pdf
2.	https://struts.apache.org/maven/struts2-core/apidocs/index.html
3.	https://docs.oracle.com/javase/tutorial/jdbc/basics/index.html
4.	https://docs.oracle.com/javase/tutorial/collections/intro/index.html

III Year I Semester
<u>SOFTWARE ENGINEERING</u>
(Common to CSE & IT)

Course Category	Professional Core	Course Code	19CS5T10
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
To develop skills that will enable them to construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain.	
1	Give exposure to phases of Software Development, common process models including Waterfall, and the Unified Process, and hands-on experience with elements of the agile process
2	Give exposure to a variety of Software Engineering practices such as requirements analysis and specification, code analysis, code debugging, testing, traceability, and version control
3	Give exposure to Software Design techniques

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
Upon successful completion of the course, the student will be able to:		
CO1	Analyze various software development process models and their suitability to industrial applications	K4
CO2	Compare conventional and agile software methods	K4
CO3	Apply the methods of requirement elicitation, analysis and develop SRS document.	K3
CO4	Apply software testing approaches, reliability and quality management	K3
CO5	Apply software maintenance activities and re-usability of software	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	-	-	-	-	-	-	-	-	-	-	2	-	2

CO2	-	-	-	2	2	-	-	-	2	-	-	-	1	-	2
CO3	-	-	3	-	1	-	-	-	-	-	-	-	1	3	-
CO4	1	1	-	2	-	-	-	-	-	-	-	-	-	2	-
CO5	1	-	-	-	1	-	-	-	-	-	3	-	1	-	2

COURSE CONTENT	
UNIT I	The Nature of Software, Software Crisis, The Unique Nature of WebApps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths. **A Generic Process Model:** Process Assessment and Improvement, phased development life cycle Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models,.
UNIT II	**Agility**, Agile Process, Extreme Programming (XP), Other Agile Process Models, A Tool Set for the Agile Process, Software Engineering Knowledge, Core Principles, Principles That Guide Each Framework Activity, **Requirements Engineering**, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.
UNIT III	**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? Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design
UNIT IV	**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 **Software Quality and Reliability:** Software Quality and factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model, Software Reliability
UNIT V	**Software Maintenance:** Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management. **Software Reuse**: what can be Reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level.

TEXT BOOKS	
1.	Software Engineering a practitioner's approach, Roger S. Pressman, Seventh Edition, McGraw Hill Higher Education,7th Edition,2010

2.	Software Engineering, Ugrasen Suman,Cengage, 2015
3.	Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI,2009
REFERENCE BOOKS	
1.	Software Engineering, A Precise Approach, PankajJalote, Wiley India,2010.
2.	Software Engineering, Ian Sommerville, Ninth Edition,Pearson.
WEB RESOURCES	
1.	https://nptel.ac.in/courses/106/105/106105182/
2.	https://nptel.ac.in/courses/106/101/106101061/
3.	https://www.coursera.org/learn/software-processes-and-agile-practices
4.	http://www.geeksforgeeks.org/software-engineering-gq/

III Year I Semester
COMPILER DESIGN

Course Category	Professional Core	Course Code	19CS5T11
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Formal Languages and Automata Theory	Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES	
1	Understand the basic concepts of compiler design, and its different phases which will be helpful to use tools like LEX, YACC for constructing applications.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Compare different types of language processors and design a lexical analyzer.	K4
CO2	Construct top down parsers.	K3
CO3	Construct bottom up parsers.	K3
CO4	Design a simple code generator by using symbol table.	K4
CO5	Apply machine independent code optimization techniques	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	1	2	0	0	0	0	0	0	0	1	1	1
CO2	2	2	2	2	3	0	0	0	0	0	0	0	1	1	1
CO3	2	2	2	2	2	0	0	0	0	0	0	0	1	1	1

CO 4	2	2	3	2	2	0	0	0	0	0	0	0	1	1	1
CO 5	2	1	1	1	2	0	0	0	0	0	0	0	1	1	1

COURSE CONTENT	
UNIT I	**Overview of language processing**: pre-processors, compiler, assembler, interpreters, linkers &loaders, structure of a compiler, phases of a compiler. **Lexical Analysis**: The role of lexical analysis, Input Buffering, token, lexeme, patterns, Recognitions of tokens, Transition Diagrams, lexical analyzer generator tool-Lex.
UNIT II	**Syntax Analysis:** The role of a parser, Context Free Grammars (CFG)s LMD, RMD, Parse Trees. **Classification of parsing techniques**: Top down parsing: Recursive descent parsing, LL(1) parsing, error recovery in predictive parsing.
UNIT III	**Bottom up parsing**: Shift Reduce Parsing, Introduction to LR Parser, Model of an LR Parsers, SLR parsing, More Powerful LR parsers: CLR, LALR parsers, Error Recovery in LR parsing, YACC tool. **Semantic Analysis**: Syntax Directed Definition, Synthesized Attributes &Inherited attributes Evolution order of SDD's.
UNIT IV	**Intermediate Code Generation**: Variants of Syntax trees, DAGs, Three Address code, Quadruples, Triples, Indirect Triples, Types and Declarations, Type Checking. **Symbol tables**: Need of Symbol tables, Runtime Environments, Stack allocation of space, access to non-local data, Heap Management.
UNIT V	**Code generation**: Issues in design of code generation, The target Language, Basic blocks and Flow graphs, A Simple Code generator, Peephole Optimization. **Machine Independent Code Optimization**: The principle sources of Optimization, Global common sub expression elimination, Copy propagation, Dead code elimination, Constant folding, Strength reduction, Loop optimization, Instruction Scheduling.

TEXT BOOKS	
1.	"Compilers, Principles Techniques and Tools," Alfred V Aho, Monical S. Lam, Ravi SethiJeffery D. Ullman,2nd edition,Pearson,2007.
2.	"Compiler Design," K.Muneeswaran, OXFORD, 2012.
REFERENCE BOOKS	

1.	"Principles of compiler design," Nandhini Prasad, Elsevier, 2nd edition, 2012.
2.	"Compiler Construction, Principles and practice,"Kenneth C Louden,CENGAGE, first edition 2006.
3.	"Implementations of Compiler,A New approach to Compilers including the algebraicmethods,"Yunlinsu,SPRINGER, 2011.
WEB RESOURCES	
1.	http://nptel.ac.in.courses/106108052/1 (Prof. Y.N. Srikanth, IISc Bangalore)

III Year I Semester
DATA WAREHOUSING AND DATA MINING
(Common to CSE & IT)

Course Category	Professional Core		Course Code	19CS5T12
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites	Database Management Systems		**Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES	
1	To understand and implement classical models and algorithms in data warehousing and data mining.
2	To analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
3	To assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

COURSE OUTCOMES	BTL
Upon successful completion of the course, the student will be able to:	
CO1	Summarize the architecture of data warehouse	K2
CO2	Apply different preprocessing methods, Similarity, Dissimilarity measures for any given raw data.	K3
CO3	Construct a decision tree and resolve the problem of model overfitting	K3
CO4	Compare Apriori and FP-growth association rule mining algorithms for frequent itemset generation	K4
CO5	Apply suitable clustering algorithm for the given data set	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0

CO 2	3	3	1	0	1	0	0	0	0	0	0	0	1	0	0
CO 3	3	3	2	1	1	0	0	0	0	0	0	0	1	1	0
CO 4	3	3	2	1	1	0	0	0	0	0	0	0	1	1	0
CO 5	3	3	2	1	1	0	0	0	0	0	0	0	1	1	0

COURSE CONTENT	
UNIT I	**Data Warehouse and OLAP Technology: An Overview:** What Is a Data Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. **(Han & Kamber)**
UNIT II	**Data Mining: Introduction,** What is Data Mining?, Motivating challenges, The origins of Data Mining, Data Mining Tasks, Types of Data, Data Quality. **Data Preprocessing:** Aggregation, Sampling, Dimensionality Reduction, Feature Subset Selection, Feature creation, Discretization and Binarization, Variable Transformation, Measures of Similarity and Dissimilarity. **(Tan & Vipin)**
UNIT III	**Classification:** Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction. **Model Overfitting:** Due to presence of noise, due to lack of representation samples, evaluating the performance of classifier: holdout method, random sub sampling, cross-validation, bootstrap. Bayes Theorem, Naïve Bayes Classifier **(Tan & Vipin)**
UNIT IV	**Association Analysis: Basic Concepts and Algorithms:** Problem Definition, Frequent Item Set Generation, Apriori Principle, Apriori Algorithm, Rule Generation, Compact Representation of Frequent Itemsets, FP-Growth Algorithm. **(Tan & Vipin)**
UNIT V	**Cluster Analysis: Basic Concepts and Algorithms:** Overview**,** What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. **(Tan & Vipin)**

TEXT BOOKS

1.	Introduction to Data Mining : Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Fifth Impression, Pearson, 2015.
2.	Data Mining concepts and Techniques, 3rd Edition, Jiawei Han, Michel Kamber, Elsevier, 2011

REFERENCE BOOKS

1.	Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning, 2010
2.	Data Mining : Introductory and Advanced topics : Dunham, First Edition, Pearson, 2020
3.	Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH, 2008
4.	Data Mining Techniques, Arun K Pujari, Universities Press, 2001

TEXT BOOKS

1.	Introduction to Data Mining : Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2.	Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

REFERENCE BOOKS

1.	Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2.	Data Mining : Introductory and Advanced topics : Dunham, Pearson.
3.	Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
4.	Data Mining Techniques, Arun K Pujari, Universities Press.

WEB RESOURCES

1.	NPTEL Online Course on Data Mining : https://onlinecourses.nptel.ac.in/noc18_cs14/preview

III Year I Semester
Professional Elective-I
ADVANCED DATA STRUCTURES AND ALGORITHMS

Course Category	Professional Elective	Course Code	19CS5T13
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Data Structures	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	Comprehensive understanding of dictionaries, hashing mechanism which supports faster data retrieval.
2	Illustration of Balanced trees and their operations.
3	Comprehension of heaps, queues and their operations Priority Queues.
4	Detailed knowledge of nonlinear data structures and various algorithms using them Graph algorithms.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Compare linear and non linear data structures	K2
CO2	Implement searching, sorting and traversing methods	K3
CO3	Implement symbol table using hashing techniques.	K3
CO4	Analyze algorithms for Height balanced trees like AVL trees, B-trees.	K4
CO5	Analyze the performance of algorithms	K4

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	2	2	0	0	0	0	0	0	0	0	0	1	0	0

CO2	3	2	2	0	0	0	0	0	0	0	0	0	1	0	0
CO3	3	2	2	0	0	0	0	0	0	0	0	0	1	0	0
CO4	3	2	2	0	0	0	0	0	0	0	0	0	1	0	0
CO5	3	2	2	0	0	0	0	0	0	0	0	0	1	0	0

COURSE CONTENT	
UNIT I	**Introduction to Data Structures**: Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double Ended Queue - Applications of stack – Evaluating Arithmetic Expressions -Applications of Queue - Linked Lists - Singly Linked List - Circularly Linked List - Doubly Linked lists – Applications of linked list – Polynomial Manipulation.
UNIT II	**Searching**-Linear and Binary Search Methods. Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick sort, Merge Sort. Trees- Binary trees, Properties, Representation and Traversals (DFT, BFT), Expression Trees (Infix, prefix, postfix).Graphs-Basic Concepts, Storage Structures and Traversals.
UNIT III	**Dictionaries:** ADT, The List ADT, Stack ADT, Queue ADT **Hashing:** Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Double Hashing
UNIT IV	**Search Trees**- Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion. AVL Trees, Definition, Height of AVL Tree, Operations, Insertion, Deletion and Searching, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.
UNIT V	**Algorithm Analysis-**Approximation Algorithms, Randomized algorithms, Amortized analysis.

TEXT BOOKS	
1.	Data Structures: A Pseudocode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage,2005
2.	Data Structures, Algorithms and Applications in C++, 2/e, Sartaj Sahni, University Press,2009

REFERENCE BOOKS	
1.	Data Structures And Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.
2.	Data Structures And Algorithms, 3/e, Adam Drozdek, Cengage.

WEB RESOURCES	
1.	http://lcm.csa.iisc.ernet.in/dsa/dsa.html
2.	http://utubersity.com/?page_id=878
3.	http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures

III Year I Semester
Professional Elective-I
NoSQL DATABASES
(Common to CSE and IT)

Course Category	Professional Elective	Course Code	19CS5T14
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Database Management Systems	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To impart theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.
2	To familiarize logical design, physical design and implementation of NoSQL databases.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	compare the four types of NoSQL Databases	K2
CO2	Enumerate the concepts of MongoDB NoSQL database.	K2
CO3	List the concepts of Apache HBASE NoSQL database.	K2
CO4	Summarize the concepts of Riak NoSQL database.	K2
CO5	List the concepts of Neo4j NoSQL database..	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
CO1	1	1	2	-	-	-	-	-		-	-	-	-	3	-
CO2	2	3	3	1		-	-	-	1	-	-	1	1	1	2

CO 3	1	1	2	1	1	-	-	-	1	-	-	1	1	1	1
CO 4	3	3	1	3		-	-	-	1	-	-	1	1	1	2
CO 5	3	3	1	3	1	1	-	-	1	1	-	-	1	1	2

COURSE CONTENT	
UNIT I	**Introduction:** Overview,and History of NoSQL Databases Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points
UNIT II	NoSQL Key/Value databases using **MongoDB,** Document Databases, What Is a Document Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.
UNIT III	**Apache HBASE –I:** Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, What Is a Column-Family Data Store? **Apache HBASE-II:** Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use
UNIT IV	NoSQL Key/Value databases using **Riak**, Key-Value Databases, What Is a Key-Value Store, Key- Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, When Not to Use, Relationships among Data, Multioperation Transactions, Query by Data, Operations by SetsNot to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure..
UNIT V	**Graph NoSQL databases using Neo4,NoSQL database** development tools and programming languages, Graph Databases, What Is a Graph Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use

TEXT BOOKS	
1.	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence , Author: Sadalage, P. & Fowler, Publication: Pearson Education 23 August 2012.
REFERENCE BOOKS	
1.	Redmond, E. &Wilson , Author: Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement Edition: 1st Edition.
WEB RESOURCES	
1.	**https://www.guru99.com/nosql-tutorial.html**
2.	**https://www.w3resource.com/mongodb/nosql.php**

III Year I Semester
Professional Elective-I
Ethical Hacking
(Common to CSE, IT)

Course Category	Professional Elective	Course Code	19CS5T15
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Explore knowledge about internet and IT security	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	Explain Information security threats & countermeasures To perform security auditing & testing
2	Describe issues relating to ethical hacking To study & employ network defense measures
3	Demonstrate penetration and security testing issues
4	Explain Information security threats & countermeasures To perform security auditing & testing
5	Explore issues relating to ethical hacking To study & employ network defense measures

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Summarize the vulnerabilities, mechanisms to identify threats/attacks.	K2
CO2	Make use of tools for foot printing and port scanning.	K3
CO3	Choosing an approach for System hacking.	K3
CO4	Select right method for hacking web services and session hijacking.	K3
CO5	Explain hacking wireless networks.	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO 11	PO 12	PS O1	PS O2	PS O3

CO 1	3	2	1	2	1	-	-	2	-	-	-	-	-	-	-
CO 2	3	2	1	2	3	-	-	3	-	-	-	-	-	-	-
CO 3	2	3	2	2	2	-	-	2	-	-	-	-	-	-	-
CO 4	3	2	2	2	1	-	-	3	-	-	-	-	-	-	-
CO 5	2	2	3	2	1	-	-	3	-	-	-	-	-	-	-

COURSE CONTENT	
UNIT I	**ETHICAL HACKING OVERVIEW & VULNERABILITIES:** Understanding the importance of security, Concept of ethical hacking and essential Terminologies- Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit. Phases involved in hacking
UNIT II	**FOOTPRINTING & PORT SCANNING**: Foot printing - Introduction to foot printing, Understanding the information gathering methodology of the hackers, Tools used for the reconnaissance phase. Port Scanning - Introduction, using port scanning tools, ping sweeps, Scripting Enumeration-Introduction, Enumerating windows OS & Linux OS.
UNIT III	**SYSTEM HACKING-I:** Aspect of remote password guessing, Role of eavesdropping ,Various methods of password cracking, Keystroke Loggers **SYSTEM HACKING-II:** Understanding Sniffers ,Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing.
UNIT IV	**HACKING WEB SERVICES & SESSION HIJACKING:** Web application vulnerabilities, application coding errors, SQL injection into Back-end Databases, cross-site scripting, cross-site request forging, authentication bypass, web services and related flaws, protective http headers Understanding Session Hijacking, Phases involved in Session Hijacking,Types of Session Hijacking, Session Hijacking Tools.
UNIT V	**HACKING WIRELESS NETWORKS:** Introduction to 802.11,Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLANScanners, WLANSniffers, HackingTools,Securing Wireless Networks.

TEXT BOOKS

1.	Kimberly Graves, "Certified Ethical Hacker", Wiley India Pvt Ltd, 2010
2.	Michael T. Simpson, "Hands-on Ethical Hacking & Network Defense", Course Technology, 2010
REFERENCE BOOKS	
1.	Rajat Khare, "Network Seuciryt and Ethical Hacking", Luniver Press, 2006
2.	Ramachandran V, BackTrack 5 Wireless Penetration Testing Beginner's Guide (3rd ed.). Packt Publishing, 2011
3.	Thomas Mathew, "Ethical Hacking", OSB publishers, 2003
WEB RESOURCES	
1.	**https://nptel.ac.in/courses/106/105/106105217/**
2.	**https://www.tutorialspoint.com/ethical_hacking/index.htm**
3.	**https://www.edureka.co/blog/ethical-hacking-tutorial/**
4.	**https://www.w3schools.in/category/ethical-hacking/**
5.	**https://www.hacking-tutorial.com/#sthash.JysSzMvk.dpbs**

III Year I Semester
Professional Elective-I
FUNCTIONAL PROGRAMMING
(Common to CSE and IT)

Course Category	Professional Elective	**Course Code**	19CS5T16
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Any Programming Language	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To introduce the structure and functions of functional programming.
2	To introduce the data types in Haskell and the concepts of recursion and induction.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Enumerate the basic concepts of functional programming	K2
CO2	List the data types and Built in functions.	K1
CO3	Compare list and infinite list in Haskel	K2
CO4	Summarize the concepts of recursion and induction.	K2
CO5	Make use of abstract data types and trees in problem solving.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO 11	PO 12	PS O1	PS O2	PS O3
CO 1	3	2	1	-	-	-	-	-	-	-	-	-	-	2	1
CO 2	3	2	1	-	-	-	-	-	-	-	-	-	-	2	1

CO 3	3	2	1	-	-	-	-	-	-	-	-	-	-	2	1
CO 4	3	2	1	-	-	-	-	-	-	-	-	-	-	2	1
CO 5	3	2	1	-	-	-	-	-	-	-	-	-	-	2	1

COURSE CONTENT	
UNIT I	**Fundamental Concepts:** Functional programming: Sessions and scripts, Expressions and values: Reduction, Types of Reduction, Functions and definitions: Type information, Forms of definition, Currying, Specifications and implementations.
UNIT II	**Introduction to Haskell :**Numbers: Precedence, Order of association, div and mod, Operators and sections, Example: computing square roots, Booleans: Equality, The logical operators, Examples, Characters and strings: Strings, Layout, Tuples: Example: rational arithmetic, Patterns **Functions:** Functional composition, Operators, Inverse functions, Strict and non-strict functions, Type synonyms, Type inference
UNIT III	**Lists:** List notation, List comprehensions, Operations on lists, Map and filter, The fold operators: Laws, Fold over non-empty lists, Scan, List patterns, Examples: Converting numbers to words, **Infinite Lists:** Infinite lists, Iterate, Example: generating primes, Infinite lists as limits, Reasoning about infinite lists: The take-lemma
UNIT IV	**Recursion and Induction:** Over natural numbers, Over lists, Operations on lists, Zip, Take and drop, Head and tail, Init and last. **Efficiency:** Asymptotic behavior, Models of reduction: Termination, Graph reduction, Head normal form, Pattern matching, Models and implementations, Reduction order and space: Controlling reduction order¸ Strictness, Fold revisited, Divide and conquer: Sorting, Multiplication, Binary search
UNIT V	**Abstract types:** Abstraction functions, Valid representations, Specifying operations, Queues, Arrays, Sets, Infinite sets **Trees:** Binary trees: Measures on trees, Map and fold over trees, Labelled binary trees, Huffman coding trees, Binary search trees: Tree deletion, Balanced trees: Analysis of depth,Arrays.

TEXT BOOKS	
1.	Programming in Haskell, Graham Hutton, University of Nottingham, Cambridge University Press, 1st September 2016, 2nd Edition
2.	Programming in Haskell, Julie Moronuki, Christopher Allen,2016.

REFERENCE BOOKS
1. Thinking Functionally with Haskellm, Richard Bird, University of Oxford
WEB RESOURCES
1. https://nptel.ac.in/courses/106/106/106106137/
2. https://www.tutorialspoint.com/haskell/index.htm

III Year I Semester
Professional Elective-I
Computer Graphics
(Common to CSE & IT)

Course Category	Professional Elective	**Course Code**	19CS5T17
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Exposure to computer graphics concepts	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To make students understand about fundamentals of Graphics.
2	To make the student present the content graphically.
3	To make students understand about Graphics programming.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Analyze algorithms for various graphics shapes such as ellipse, circle by understanding the foundations of computer graphics and Understand filled area primitives	K4
CO2	Apply geometric transformations in 2D necessary for programming computer graphics and viewing transformations	K3
CO3	Analyze basic concepts of representing 3D objects	K3
CO4	Apply geometric transformations in 3D computer graphics applications	K3
CO5	Create interactive computer graphics application using OpenGL	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	3	3	2	0	0	0	0	0	0	0	1	0	0
CO2	2	2	1	3	3	0	0	0	0	0	0	0	1	1	0
CO3	3	3	3	3	3	0	0	0	0	0	0	0	2	2	0
CO4	3	2	2	2	2	0	0	0	0	0	0	0	1	1	0

CO5	3	3	3	3	3	0	0	0	0	0	0	0	2	2	0

COURSE CONTENT	
UNIT I	**Introduction:** Application of Computer Graphics, raster scan systems, random scan systems, raster scan display processors. **Output primitives :** Points and lines, line drawing algorithms (Bresenham's and DDA Line derivations and algorithms), mid-point circle. **Filled area primitives:** Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.
UNIT II	**2-D geometrical transforms**: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms. **2-D viewing:** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Sutherland – Hodgeman polygon clipping algorithm.
UNIT III	**3-D object representation-I:** Polygon surfaces, quadric surfaces, spline representation, Hermite curve **3-D object representation-II:** Bezier curve and B-Spline curves, Bezier and B-Spline surfaces.
UNIT IV	**3-D Geometric transformations**: Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3D Viewing pipeline, clipping, projections (Parallel and Perspective).
UNIT V	**Graphics Programming** Color 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

TEXT BOOKS	
1.	Computer Graphics *C* version, Donald Hearn, M.Pauline Baker, Pearson,2007
2.	Computer Graphics with Virtual Reality Systems, Rajesh K Maurya, Wiley,2014
REFERENCE BOOKS	
1.	Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson
2.	Computer Graphics, Peter, Shirley, CENGAGE
3.	Principles of Interactive Computer Graphics, Neuman , Sproul, TMH

4.	The Computer Graphics manual, Vol 2, David, Soloman, Springer
5.	Procedural elements for Computer Graphics, David F Rogers, 2/e, TMH
6.	Introduction to Computer Graphics, Using Java 2D and 3D, Frank Klawonn, Springer
7.	Computer Graphics, Steven Harrington, TMH
8.	Computer Graphics, Amarendra N Sinha, Arun Udai, TMH
WEB RESOURCES	
1.	https://www.ssmengg.edu.in/weos/weos/upload/EStudyMaterial/Cse/6th%20sem/ computer%20graphics.pdf
2.	https://www.tutorialspoint.com/**computer_graphics**/

III Year I Semester
WEB APPLICATION DEVELOPMENT USING J2EE LABORATORY
(Common to CSE&IT)

Course Category	Professional Core	Course Code	19CS5L05
Course Type	Laboratory	L-T-P-C	0 – 0 – 3 – 1.5
Prerequisites	Java Programming	Internal Assessment	25
		Semester End Examination	50
		Total Marks	75

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Make Use of collection framework for web applications	K3
CO2	Develop web applications using JSP and Servlets.	K3
CO3	Create a basic Struts Application	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	3	3	3	-	-	-	-	-	1	-	2	3	3
CO2	2	2	3	3	3	-	-	-	-	-	1	-	2	3	3
CO3	2	2	3	3	3	-	-	-	-	-	1	-	2	3	3

COURSE CONTENT	
1	Write a java program to demonstrate the usage of ArrayList. Perform the following operations: ✓ Appends the specified element to the end of this list. ✓ Inserts the specified element at the specified position in this list. ✓ Remove all of the elements from this list. ✓ Obtain the element at the specified position in this list.

	✓ Find if this list contains no elements. ✓ Remove the element at the specified position in this list. ✓ Count the number of elements in this list. ✓ Create an array containing all of the elements in this list in proper sequence Trims the capacity of this ArrayList instance to be the list's current size.
2	Write a java program to demonstrate the usage of HashSet. Perform the following operations: ✓ Adds the specified element to this set if it is not already present. ✓ Remove all of the elements from this set. ✓ Find if this set contains the specified element. ✓ Find true if this set contains no elements. ✓ Obtain an Iterator over the elements in this set. ✓ Remove the specified element from this set if it is present. Count the number of elements in this set
3	Write a java program to illustrate the usage of HashMap. Perform the following operations: ✓ Remove all of the mappings from this map. ✓ Find if this map contains a mapping for the specified key. ✓ Find if this map maps one or more keys to the specified value. ✓ Obtain a Set view of the mappings contained in this map. ✓ Get the value to which the specified key is mapped, ✓ Find if this map contains no key-value mappings. ✓ Obtain a Set view of the keys contained in this map. ✓ Associate the specified value with the specified key in this map. ✓ Associate the specified value with the specified key in this map. ✓ Replace the entry for the specified key only if it is currently mapped to some value. Count the number of key-value mappings in this map.
4	Write a java program to illustrate the usage of StringTokenizer. Perform the following operations: ✓ Calculate the number of times that this tokenizer's nextToken method can be called before it generates an exception. ✓ Find if there are more tokens available from this tokenizer's string. ✓ Obtain the next token from this string tokenizer. Obtain the next token in this string tokenizer's string.
5	Write a HttpServlet program to display a greeting message in the browser when a button is clicked.
6	Write a program to receive two numbers from a HTML form and display their sum in the browser by using HttpServlet.
7	Write a program to display a list of five websites in a HTML form and visit to the selected website by using Response redirection.

8	Demonstrate the difference between GET and POST servlet requests with the help of a HTML page and a HttpServlet.
9	Demonstrate the session management using two HTML pages and two HttpServlet programs.
10	Write a JSP program on Scriplets, Expression, and Declarations.
11	Demonstrate a Http Request Response Cycle by using JSP pages as both View and Controller.
12	Write a program by using JDBC to execute a SQL query for a database and display the results.
13	Write a program by using JDBC to execute an update query using Prepared Statement and display the results
14	Develop a simple student profile registration application with the usage of JSP for View, Servlet for Controller and another java class (JDBC Code) for Model to store the student details in a Database.
15	Develop a mini HR application by using struts Framework.(2 Weeks)

DATA MINING LABORATORY
(Common to CSE & IT)

Course Category	Professional Core	Course Code	19CS5L06
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites	Python Programming	Internal Assessment	25
		Semester End Examination	50
		Total Marks	75

COURSE OBJECTIVES	
1	To get practical exposure on implementation of well-known data mining algorithms
2	To evaluate performance of data mining algorithms in a supervised and an unsupervised setting.

COURSE OUTCOMES	BTL
Upon successful completion of the course, the student will be able to:	
CO1 Apply preprocessing techniques on real world datasets	K3
CO2 Apply Apriori, FP-growth algorithms to generate frequent itemsets.	K3
CO3 Apply Classification and clustering algorithms on different datasets	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	1	1	0	0	0	0	0	0	0	1	1	0
CO2	3	3	3	1	1	0	0	0	0	0	0	0	1	2	0
CO3	3	3	3	1	1	0	0	0	0	0	0	0	1	2	0

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

COURSE CONTENT	
1	Demonstrate the following data preprocessing tasks using python libraries. a) Loading the dataset b) Identifying the dependent and independent variables

	c) Dealing with missing data

2	Demonstrate the following data preprocessing tasks using python libraries.
	    a) Dealing with categorical data
	    b) Scaling the features
	    c) Splitting dataset into Training and Testing Sets

3	Demonstrate the following Similarity and Dissimilarity Measures using python
	    a) Pearson's Correlation
	    b) Cosine Similarity
	    c) Jaccard Similarity
	    d) Euclidean Distance
	    e) Manhattan Distance

4	Build a classification model using Decision Tree algorithm on iris dataset
5	Apply Naïve Bayes Classification algorithm on any dataset
6	Generate frequent itemsets using Apriori Algorithm in python and also generate association rules for any market basket data.
7	Apply FP-Growth algorithm on any market basket data.
8	Apply K- Means clustering algorithm on any dataset.
9	Apply Hierarchical Clustering algorithm on any dataset.
10	Apply DBSCAN clustering algorithm on any dataset.

WEB RESOURCES	
1.	https://analyticsindiamag.com/data-pre-processing-in-python/
2.	https://towardsdatascience.com/decision-tree-in-python-b433ae57fb93
3.	https://towardsdatascience.com/calculate-similarity-the-most-relevant-metrics-in-a-nutshell-9a43564f533e
4.	https://www.springboard.com/blog/data-mining-python-tutorial/
5.	https://medium.com/analytics-vidhya/association-analysis-in-python-2b955d0180c
6.	https://medium.com/@pcm1312/implementing-fp-growth-in-python-170f3dc64d78
7.	https://www.datacamp.com/community/tutorials/naive-bayes-scikit-learn
8.	https://www.analyticsvidhya.com/blog/2019/05/beginners-guide-hierarchical-clustering/
9.	https://towardsdatascience.com/dbscan-algorithm-complete-guide-and-application-with-python-scikit-learn-d690cbae4c5d

III Year I Semester
Intellectual Property Rights and Patents

(Common to all branches)

Course Category	Humanities including Management	Credits	0
Course Type	Theory	**Lecture-Tutorial-Practice**	2 -0 -0
Prerequisites		**Total Marks (Internal Assessment)**	100

Course Outcomes		Blooms Taxonomy Level
On successful completion of the course, the student will be able to		
CO 1	Classify Intellectual Property Rights and explain basic concepts of Intellectual Property Rights.	Understanding
CO 2	Appraise the role of Copyright Registration process and evaluate legal requirements for Semi Conductor Chip Protection	Evaluation
CO 3	Identify relationship between Product Patent and Process Patent and how patent will apply for new situations (Inventions).	Application
CO 4	Analyze trade mark registration process and distinguished between different Trademarks.	Analysis
CO 5	Explain Employee Confidentiality Agreement and summarize Trade Secret Litigation Process.	Understanding

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program												
Outcomes: 1 – Low, 2 - Medium, 3 – High												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	2	2	2	2	1	2	1	1	1	1	1
CO2	0	1	0	0	0	0	2	3	0	0	2	2

CO3	0	0	0	0	0	0	2	2	0	0	3	2
CO4	0	0	0	0	0	0	0	3	0	0	2	1
CO5	0	0	0	0	0	0	0	3	0	0	2	1

Course Content :

Unit I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration –Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

Unit II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration– Copyright Formalities and Registration – Limitations – Infringement of Copyright – Semiconductor Chip Protection Act.

Unit III

Introduction to Patent Law – Rights under Patent Law – Patent Requirements – Product Patent and Process Patent- Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting.

Unit IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion.

Unit V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.

Reference Books :
1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning, New Delhi.
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press).
3. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi.
4. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
5. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
6. M. Ashok Kumar and Mohd. Iqbal Ali: "Intellectual Property Right" Serials Pub.

Web Resources:
1.https://www.jakemp.com/en/knowledge-centre/briefings/introduction-to-patents
2. https://www.legalzoom.com/knowledge/trademark/topic/trademark-service-mark-definition
3.http://www.copyrighthub.org/copyright-resources/introduction-to-copyright/

III Year II Semester
AI Tools and Techniques
(Common to ECE, CSE and IT)

Course Category	Professional Core		Course Code	19CS6T18
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites	Mathematics, Probability & Statistics, Python	**Internal Assessment** **Semester End Examination** **Total Marks**		30 70 100

COURSE OBJECTIVES	
1	Introduce fundamental concepts in AI.
2	Present various modeling and formulation techniques to solve problems using AI techniques.
3	Demonstrate the capability to create simple AI applications using Natural Language Processing, Computer Vision.

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Enumerate the fundamental concepts of Artificial Intelligence.	K2
CO2	Analyze the concepts of Knowledge and Logical Reasoning Systems.	K4
CO3	Analyze the concepts of Uncertainty and Reinforcement Learning.	K4
CO4	Summarize the importance of Perception and Chatbots.	K2
CO5	List the applications of natural language processing	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	-	-	-	-	-	-	1	1	1	1

CO 2	3	3	2	3	3	-	-	-	-	-	-	1	1	1	1
CO 3	3	3	2	3	3	-	-	-	-	-	-	1	1	1	1
CO 4	3	3	2	3	3	-	-	-	-	-	-	1	1	1	1
CO 5	3	3	2	3	3	-	-	-	-	-	-	1	1	1	1

COURSE CONTENT	
UNIT I	**Introduction to Artificial Intelligence**: The Foundations of Artificial Intelligence, and the History of Artificial Intelligence. **Intelligent Agents**: Introduction and Structure of Intelligent Agents. **Problem Solving**: Solving problems by Searching. **Informed Search methods**: Best First Search, Heuristic Functions, Memory Bounded Search, Iterative Improvement algorithms
UNIT II	**Knowledge and Reasoning:** Agents that reason logically: A Knowledge-Based Agent, Representation, Reasoning, and Logic and Prepositional Logic. **First order logic:** Syntax and Semantics, Extensions and Notational Variations and Using First-Order Logic. **Logical Reasoning systems**: Logic Programming Systems, Forward-Chaining Production Systems and Frame Systems and Semantic Networks.
UNIT III	**Uncertainty:** Acting under Uncertainty and Bayes' Rule and Its use. Probabilistic Reasoning Systems: Representing Knowledge in an Uncertain Domain, The Semantics of Belief Networks and Inference in Belief Networks. **Reinforcement Learning:** Introduction to Reinforcement Learning, Passive Learning in a Known Environment, Passive Learning in an Unknown Environment, Active Learning in an Unknown Environment, Exploration, Learning an Action-Value Function, Generalization in Reinforcement Learning, Genetic Algorithms and Evolutionary Programming.
UNIT IV	**Perception:** Introduction, Image Formation, Image-Processing Operations for Early Vision, Extracting 3-D Information Using Vision, Using Vision for Manipulation and Navigation, Object Representation and Recognition, Speech Recognition. **ChatBots:** The Rise of Chatbots, How to build a Chatbots, Challenges of Building a Successful Chatbots.

UNIT V	**Practical Natural Language Processing:** Practical Applications, Efficient Parsing, Scaling Up the Lexicon, Scaling Up the Grammar, Ambiguity, Discourse Understanding

TEXT BOOKS	
1.	Stuart J. Russell and Peter Norvig, Artificial Intelligence A Modern Approach,1995
2.	Tom Markiewicz & Josh Zheng, Getting started with Artificial Intelligence, Published by O'Reilly Media,2017
REFERENCE BOOKS	
1.	Aurélien Géron, Hands on Machine Learning with Scikit-Learn and TensorFlow [Concepts, Tools, and Techniques to Build Intelligent Systems], Published by O'Reilly Media, 2017.
WEB RESOURCES	
1.	https://intellipaat.com/blog/top-artificial-intelligence-tools/
2.	https://www.edureka.co/blog/top-12-artificial-intelligence-tools/

III Year II Semester
Mobile Computing
(Common to CSE &IT)

Course Category	Professional Core		Course Code	19CS6T19
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites	Computer Networks	**Internal Assessment**	30	
		Semester End Examination	70	
		Total Marks	100	

COURSE OBJECTIVES	
1	To understand the typical mobile networking infrastructure through a popular GSMprotocol and the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer.
2	To understand the ad hoc networks and related concepts and future generation platforms and protocols used in mobile environment.

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

COURSE OUTCOMES	BTL
Upon successful completion of the course, the student will be able to:	
CO1	Illustrating the mobile computing applications and architecture	K2
CO2	Summarizing the emerging technologies and GSM	K2
CO3	Illustrate GPRS and Wireless LAN architecture and Services	K2
CO4	Analyze the principles of mobile networks by relating them to future generation networks.	K4
CO5	Survey of Mobile Adhoc network protocols for distinguishing them from infrastructure-based networks.	K4

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO1 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO 1	2	1	2	1	0	0	0	0	0	0	0	0	1	1	0

CO 2	2	2	1	1	0	0	0	0	0	0	0	0	1	1	0
CO 3	2	2	1	2	0	0	0	0	0	0	0	0	1	1	0
CO 4	1	2	2	2	0	0	0	0	0	0	0	0	1	1	0
CO 5	2	2	1	2	0	0	0	0	0	0	0	0	1	1	0

COURSE CONTENT	
UNIT I	**Introduction:** Mobility of Bits and Bytes, Wireless – The Beginning, Mobile Computing, Dialogue Control, Networks, Middleware and Gateways, Application and Services, Developing the mobile computing Applications, Security in Mobile computing, Standards – Why are they Necessary? Standard Bodies. **Mobile Computing Architecture:** Architecture for Mobile Computing, Three-tier Architecture**.**
UNIT II	**Emerging Technologies:** Introduction, Bluetooth, Radio Frequency Identification (RFID), Wireless Broadband (WIMAX), Mobile IP **GSM :** GSM, GSM Architecture, GSM Entities, Call Routing in GSM, GSM addresses and Identifiers, GSM Frequency Allocation.
UNIT III	**GPRS:** GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications in GPRS, Limitations of GPRS. **Wireless LAN:** Introduction, Wireless LAN Advantages, IEEE 802.11 Standards, Wireless LAN Architecture, Mobility in wireless LAN, Wireless LAN Security.
UNIT IV	**Protocols and Platforms for Mobile Computing:** WAP, Bluetooth, Introduction to Android and windows CE. Future generation networks: System architecture - 3G, 4G, 5G, LTE Mobile **Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT V	**Mobile Ad hoc Networks (MANETs)**: Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV.

TEXT BOOKS	
1.	"Mobile Computing, Technology Applications and Service Creation," ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL,Second Edition, McGrawHill, 2010.
2.	"Mobile Computing", Raj Kamal, Oxford University Press, 2007.
REFERENCE BOOKS	
1.	"Mobile Communications", Jochen Schiller, Addison-Wesley, Second Edition,2009.
WEB RESOURCES	
1.	https://onlinecourses.nptel.ac.in/noc16_cs13(Prof. Pushpendra Singh,IIIT-Delhi)
2.	https://disco.ethz.ch/courses/ss02/mobicomp/
3.	http://www.tutorialspoint.com/mobile_computing/index.htm
4.	http://en.wikipedia.org/wiki/Mobile_computing#Definitions http://nptel.ac.in/courses/106106147/

III Year II Semester
INTERNET OF THINGS
III B. Tech II Semester

Course Category	Engineering Sciences	Course Code	19EC6T10
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Embedded Systems	**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To assess the vision and introduction of IoT.
2	To Understand IoT Market perspective.
3	To Implement Data and Knowledge Management and use of Devices in IoT Technology
4	To Understand State of the Art - IoT Architecture
5	To classify Real World IoT Design Constraints, Industrial Automation in IoT.

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the concepts of Internet of Things	K2
CO2	Understand Challenges in IoT	K2
CO3	Understand the concept of M2M(machine to machine) with necessary protocols	K2
CO4	Analyze the domain specific applications of IoT	K3
CO5	Develop real life IoT based projects	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO 1	3	2	2	1							1		2	2	
CO	3	2	2	2							1		3	2	

2															
CO 3	3	3	2	1							1		3	2	
CO 4	2	2	1	2							1		2	2	
CO 5	3	3	2	2							1		3	1	

COURSE CONTENT	
UNIT I	**INTRODUCTION TO IOT** Definition of IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs.
UNIT II	**CHALLENGES IN IOT** Design challenges, Development challenges, Security challenges, Technological challenges, Business challenges, Societal problems
UNIT III	**IOT & M2M** Machine to Machine, Difference between IoT and M2M, Software define Network **Hardware Components**- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces. Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP
UNIT IV	**DOMAIN SPECIFIC APPLICATIONS OF IOT** Home automation, Environment, Industry applications, Surveillance applications, Other IoT applications
UNIT V	**DEVELOPING IOTS** Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python.

TEXT BOOKS	
1.	Internet of Things (A Hands-on-Approach), Vijay Madisetti and Arshdeep Bahga, 1st Edition, VPT, 2014. (ISBN: 978-8173719547)
2.	"Fundamentals of Wireless Sensor Networks: Theory and Practice", Waltenegus Dargie, Christian Poellabauer.

	REFERENCE BOOKS
1.	"Internet of Things", Srinivasa K.G., Siddesh G.M.,Hanumantha Raju R. Cengage Publications, 1st Edition 2018
2.	"Internet of Things: Architecture and Design Principles", Raj Kamal, 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224
	WEB RESOURCES
1.	https://link.springer.com/chapter/10.1007/978-3-319-04223-7_3
2.	https://www.businessinsider.com/internet-of-things-devices-applications-examples-2016-8?IR=T

III Year II Semester
DESIGN AND ANALYSIS OF ALGORITHMS
Computer Science and Engineering

Course Category	Professional Core	Course Code	19CS6T20
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Programming for Problem solving, Data Structures	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	The course is designed to teach techniques for effective problem solving in computing
2	The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem
3	The analysis of the algorithm will be used to show the efficiency of the algorithm over the naive techniques.

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	**BTL**
CO-1	Describe asymptotic notation and basic concepts of algorithms	K2
CO-2	Apply divide and conquer paradigm to solve various problems	K3
CO-3	Make use of greedy technique to solve various problems	K3
CO-4	Apply dynamic programming technique to various problems	K3
CO-5	Employ backtracking, branch and bound technique to various problems	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-

CO 2	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO 3	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO 4	3	3	2	3	-	-	-	-	-	-	-	-	-	3	-
CO 5	3	3	2	-	-	-	-	-	-	-	-	-	-	3	-

COURSE CONTENT	
UNIT I	**Introduction:** What is an Algorithm, Algorithm Specification, Pseudo code Conventions, Recursive Algorithm, Performance Analysis, Space Complexity, Time Complexity, Amortized Analysis, Asymptotic Notations. **Divide and Conquer**: General Method, Binary Search, Merge Sort, Quick Sort, Performance Measurement.
UNIT II	**Greedy Method:** General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithms, Single Source Shortest Paths
UNIT III	**Dynamic Programming-I:** General Method, Matrix Multiplication, All pair Shortest path, **Dynamic Programming-II:** Travelling Salesman Problem, 0/1 Knapsack, Reliability Design
UNIT IV	**Backtracking:** General Method, The n-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles
UNIT V	**Branch and Bound:** General Method, Least cost (LC) Search, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem, FIFO Branch-and-Bound Solution, Traveling Salesperson Problem.
TEXT BOOKS	
1.	"Fundamentals of computer algorithms," E. Horowitz S. Sahni, University Press, 2008.
2.	"Introduction to Algorithms," Thomas, H. Cormen, PHI Learning, 2011.

REFERENCE BOOKS	
1.	"The Design and Analysis of Computer Algorithms," Alfred V. Aho, John E.Hopcroft, Jeffrey D Ullman, Pearson, 2009.
2.	"Algorithm Design,"Jon Kleinberg, Pearson, 2012

WEB RESOURCES	
1.	**UNIT I: Introduction and divide and Conquer** https://nptel.ac.in/courses/106/105/106105164/
2.	**UNIT II: Greedy Method:** https://www.hackerearth.com/practice/algorithms/greedy/basics-of-greedy-algorithms/tutorial/
3.	**UNIT III: Dynamic Programming** https://nptel.ac.in/content/storage2/courses/101108057/downloads/Lecture-40.pdf
4.	**UNIT IV: Backtracking** https://www.youtube.com/watch?v=kdBzkxdJ7bI
5.	**UNIT V: Branch and Bound** https://www.youtube.com/watch?v=BbrZsG7zesE

III Year II Semester
Open Elective-I
ENVIRONMENTAL IMPACT ASSESSMENT & MANAGEMENT

Course Category	Open Elective	Course Code	19CE8T18
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	-----	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To impart knowledge on different concepts of Environmental Impact Assessment.
2	To know procedures of risk assessment
3	To learn the EIA methodologies and the criterion for selection of EIA methods.
4	To pre-requisites for ISO 14001certification
5	To know the procedures for environmental clearances and audit

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Prepare EMP, EIS, and EIA report
CO2	Identify the risks and impacts of a project
CO3	Selection of an appropriate EIA methodology
CO4	Evaluate the EIA report
CO5	Estimate the cost benefit ratio of a project

Contribution of Course Outcomes towards achievement of program
Outcomes (1 - Low, 2- Medium, 3-High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	1	-	2	3	3	2	2	-	3	2	1
CO2	2	-	-	-	-	2	-	-	2	-	1	2	3	2	2
CO3	2	3	3	-	1	-	-	2	1	-	-	-	-	2	2
CO4	2	2	3	-	2	-	-	2	-	-	2	2	2	2	2
CO5	-	-	2	2	-	2	-	-	2	-	2	-	2	2	2

COURSE CONTENT	
UNIT-I	**BASIC CONCEPT OF EIA:** Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map-Classification of environmental parameters – role of stakeholders in the EIA preparation –stages in EIA.
UNIT-II	**EIA METHODOLOGIES**: introduction, Criteria for the selection of EIA Methodology, EIA methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis - EIS and EMP.
UNIT-III	**IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE**: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.
UNIT-IV	**PROCUREMENT OF RELEVANT SOIL QUALITY**: Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - EIA with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment.
UNIT-V	**ASSESSMENT OF IMPACT OF DEVELOPMENT ACTIVITIES**: Vegetation and wildlife, environmental Impact of Deforestation EIA notification by Ministry of Environment and Forest (Govt. of India): Provisions in the EIA notification, procedure for environmental clearance, evaluation of EIA report. Environmental legislation objectives, Evaluation of Audit data and preparation of Audit report.

TEXT BOOKS	
1.	Environmental Impact Assessment, Canter Larry W.,McGraw-Hill education Edi (1996)
2.	Environmental Impact Assessment Methodologies, by Y.Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
REFERENCE BOOKS	
1.	Environmental Science and Engineering, by J. Glynn and Gary W.HeinKe – Prentice Hall Publishers.
2.	Environmental Science and Engineering, by Suresh K.Dhaneja – S.K.Katania&Sons Publication, NewDelhi.
3.	Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd., NewDelhi.
WEB REFERENCES	
	www.nptel.ac.in/courses

III Year II Semester

Open Elective-I
Energy Audit, Conservation and Management

Course Category	Open Elective		Course Code	19EE6T24
Course Type	Theory		**L-T-P-C**	**3-0-0-3**
Prerequisites	**NA**		**Internal Assessment**	**30**
			Semester End Examination	**70**
			Total	
			Marks	**100**

	COURSE OBJECTIVES
1	To understand energy efficiency, scope, conservation and technologies.
2	To design energy efficient lighting systems.
3	To estimate/calculate power factor of systems and propose suitable compensation techniques.
4	To understand energy conservation in HVAC systems.
5	To calculate life cycle costing analysis and return on investment on energy efficient technologies.

COURSE OUTCOMES			
Upon successful completion of the course, the student will be able to:		**Cognitive Level**	
CO1	Analyze the principles of energy auditing along with energy conservation schemes and management methods	Analysis	K4
CO2	Employ different illumination and energy conservation methods for effective lighting	Application	K3
CO3	Acquire knowledge on power factor with improvement methods	Knowledge	K1
CO4	Differentiate space heating and ventilation methods. Calculate life cycle costing analysis and return on investment on energy efficient motors	Analysis	K4
CO5	Determination of recovery investment on energy efficient technologies	Analysis	K4

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3
Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
CO 1	2	2	1	1	--	-	-	-	-	-	-	-	-	-	-
CO 2	1	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 3	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO 5	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT	
UNIT 1	**Energy sources** Energy consumption – world energy reserves – prices – alternative sources – power – energy policies – choice of fuels.
	Energy Auditing Energy conservation schemes: Short term - Medium term - Long term energy conservation schemes – Industrial energy use - Energy index – Cost index . Representation of energy consumption: Pie charts - Sankey diagrams – Load Profile. Energy auditing: General Auditing, Detailed Energy Audit.
UNIT 2	**Heat Transfer Theory** Heat – Heat content – Rate of heat transfer – Heat transfer coefficient - Conduction – Convention and radiation. Thermal insulation & its importance - space heating – HVAC system – Heating of Buildings – District heating – Factors & affecting the choice of district heating.

UNIT 3	**Energy Efficient Instruments** Digital Energy Meter – Data loggers – Thermo couples – Pyranometer – Lux meters – Tong testers – Power analyzers – Power factor – effects with non-linear loads – effect of harmonics on power factor – Power Factor Improvement – Capacitor rating – Effects of power factor improvements - Electric lighting – Types of lighting – Luminaries – Energy efficient lighting.
UNIT 4	**Economic Aspects and Financial Analysis** Understanding energy cost: Depreciation methods – time value of money – rate of return – present worth method. Basic payback calculations –depreciation – net present value calculations. Taxes and tax credit – numerical problems.
UNIT 5	**Demand Side Management** Introduction to DSM - concept of DSM - benefits of DSM - different techniques of DSM – time of day pricing - multi-utility power exchange model - time of day models for planning. Load management - load priority technique - peak clipping - peak shifting - valley filling - strategic conservation - energy efficient equipment. Management and organization of energy conservation awareness programs.

	TEXT BOOKS
1	Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2	Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill
	REFERENCE BOOKS
1	Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
2	Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
3	Energy management hand book by W.C.Turner, John wiley and sons.
4	Energy management and conservation –k v Sharma and pvenkataseshaiah-I K International Publishing House pvt.ltd,2011.
	WEB RESOURCES (Suggested)
1	https://nptel.ac.in/courses/105/102/105102175/
2	https://www.youtube.com/watch?v=M1zijCmeXJg

III Year II Semester
Open Elective-I
RFID Sensors and Data Acquisition

Course Category	Open Elective	Course Code	19EC6T35
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Communication Basics	Internal Assessment Semester End Examination Total Marks	30 70 100

Course Objectives:

1. To introduce different RF Sensors
2. To introduce comprehensive knowledge of wearable antenna.
3. To explore and understand basics of RFID technology.
4. To introduce the students with basics of computer interfacing and to provide comprehensive understanding of signal conditioning, signal conversion, data acquisition, signal processing, transmission and analysis.
5. To teach the applicability of various A/D and D/A boards.

Course Outcomes:

	Student will be able to	Cognitive Level
CO1	Understand the proper antenna design to be used in the RF spectral region	K2
CO2	Model specific radiation pattern and evaluate them in different domains	K2
CO3	Anlayze Gain knowledge about the RFID technology	K3
CO4	Understand the basics of various bus topology and computer interfacing Comprehensively analyse signal conditioning, signal conversion, data acquisition, and signal processing	K3
CO5	Understand A/D and D/A converter in various applications	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO	2	2	2										2	2

1														
CO2	3	2	2										3	2
CO3	1	2	2										3	2
CO4	2	2	1										2	2
CO5	2	1	2										3	1

COURSE CONTENTS:	
Unit I	**RF Sensors:** Microwave Antenna-Introduction, types of Antenna, fundamental parameters of antennas, radiation mechanism, Fresnel and Fraunhofer regions. Antenna for communication and Antenna for sensing, radiometer and radar
Unit-II	**RFID Sensors:** Introduction, Components of RFID systems, hardware and software components, RFID standards, RFID applications.
Unit-III	**Personal Area Communications:** Concepts of Printed Antennas, Broadband Microstrip Patch Antennas, Antennas for Wearable Devices, Design Requirements, Modeling and Characterization of Wearable Antennas, WBAN Radio Channel Characterization and Effect of Wearable Antennas, Domains of Operation, Sources on the Human Body, Compact Wearable Antenna for different applications.
Unit-IV	**Fundamentals of Data Acquisition:** Essentials of computer interfacing – configuration and structure –interface systems-interface bus Design of Signal Amplifiers, Signal amplifiers, analog filters, digital and pulse train conditioning, two-wire transmitter, and distributed I/O - high speed digital transmitter, noise reduction and isolation
Unit-V	**A/D Boards and D/A Boards** Plug-in data acquisition boards- parameter setting- programmable gain array - memory buffer- bus interface. Sampling strategies for multi-channel analog inputs- speed Vs throughput. D/A boards-parameter setting - memory buffer- timing circuitry-output amplifier buffer- bus interface, Digital I/O boards. Counter-timer I/O boards-waveform generation-measuring pulse width and frequency

TEXT BOOKS	
1	RFID Handbook, Finkenzeuer Klaus, 2011, 3rd edition, John Wiley and Sons, New Jersey
2	Antenna Theory Analysis and Design, Constantine A. Balanis, 2016, 4th edition, John Wiley and Sons, New Jersey
REFERENCE BOOKS	
1	Remote Sensing and Image Interpretation, Lillesand & Kiefer, 2011, 6th edition, John

	Wiley and Sons, New Jersey.
2	Data Acquisition systems- from fundamentals to Applied Design, Maurizio Di Paolo Emilio, 2013, 1st ed., Springer, New York.
3	Practical Data acquisition for Instrumentation and Control, John Park and Steve Mackay, 2011, 1st ed., Newness publishers, Oxford, UK.

III Year II Semester
Open Elective-I
<u>**INDUSTRIAL ROBOTICS**</u>

Course Category	Open Elective	Course Code	19ME6T28
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	NIL	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To impart knowledge about industrial robots and their configurations.
2	To acquire knowledge about components of industrial robots.
3	To learn sensing and machine vision.
4	To familiarize robot programming.
5	To impart knowledge industrial applications.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:	Cognitive Level
CO1	Explain various robots and their configuration related to industries.	K2
CO2	Demonstrate working of various components of industrial robots.	K2
CO3	Illustrate robot sensing and machine vision.	K2
CO4	Make use of robot programming and artificial intelligence.	K3
CO5	Develop industrial applications in various conditions.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	-	-	-	2	-	-	-	3	-	-
CO2	3	3	2	2	-	-	-	-	2	-	-	-	3	-	-
CO3	3	3	2	2	-	-	-	-	2	-	-	-	3	-	-
CO4	3	3	2	2	-	-	-	-	2	-	-	-	3	-	-
CO5	3	3	2	2	-	-	-	-	2	-	-	-	3	-	-

COURSE CONTENT

UNIT I
Introduction:
Definition of a robot – Basic concepts, types of industrial robots – Robot configurations – Types of robot drives – Basic robot motions – point to point control, continuous path control. Programming of Robots and Vision System-Lead through programming methods- Teach pendent overview

Of various textual programming languages like VAL etc.

UNIT II

Components of the Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Manipulators - Types of Robot end effectors - Grippers - Tools as end effectors - Robot/End - effort interface.

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.

Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

UNIT III

Sensing:

Range sensing - Proximity sensing - Touch sensing - Force and Torque sensing.

Kinematics-Manipulators Kinematics, Rotation Matrix, Homogenous Transformation Matrix, D-H Transformation matrix, D-H method of assignment of frames. Direct and Inverse Kinematics for Industrial robots. Differential Kinematics for planar serial robots

UNIT IV

Trajectory planning: Joint space scheme- Cubic polynomial fit-Obstacle avoidance in operation space-cubic polynomial fit with via point, bleding scheme. Introduction Cartesian space scheme. Control-Interaction control, Rigid Body mechanics, Control architecture- position, path velocity, and force control systems, computed torque control, adaptive control, and Servo system for robot control.

UNIT V

Industrial Applications:

Application of robots in machining - Welding - Assembly - Material handling - Loading and unloading - CIM - Hostile and remote environments.

TEXT BOOKS

1. Industrial Robotics by Mikell P Groover, Pearson Education.
2. Robotics and Control by Mittal R K & Nagrath I J, TMH Publications.

REFERENCE BOOKS

1. Robotic Engineering – An integrated Approach by Richard D Klafter, Thomas Achmielewski and Mickael Negin, Prentice Hall India, New Delhi, 2001.
2. Automation, Production Systems, and Computer-Integrated Manufacturing by Mikell P Groover, Pearson Education, 2015.
3. Robotics Control sensing, Vision and Intelligence by K.S. Fu., R.C. Gonalez, C.S.G. Lee, McGraw Hill International Edition, 1987.

WEB RESOURCES

1. http://www.nptel.ac.in/courses/112101099/1#
2. https://www.toptal.com/robotics/programming-a-robot-an-introductory-tutorial#:~:text=Two%20main%20programming%20languages%20are,tests%20or%20proof%20of%20concepts.
3. https://www.plantautomation-technology.com/articles/different-types-of-robot-programming-languages

III Year II Semester
Open Elective-I
Soft skills and Interpersonal Communication

Course Category	Basic Sciences		Course Code	19HE6T02
Course Type	Theory		**L-T-P-C**	3 – 0 – 0 – 3
Prerequisites	Life skills for better life		**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OUTCOMES
Upon successful completion of the course, the student will be able to:

CO1	Understand the significance of soft skills and its importance towards his goal setting.
CO2	Develop interpersonal relations through effective communication and public speaking.
CO3	Build confidence exercising verbal and non-verbal techniques with analytical skills for his success.
CO4	Utilize various skills required to become a good leader and thorough professional.
CO5	Improve decision-making skills and problem solving skills with emotional intelligence.

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-
CO5	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-

	Syllabus
UNIT - I	1. <u>Soft Skills: An Introduction –</u> Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development. 2. <u>Self-Discovery:</u> Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue. 3. <u>Positivity and Motivation:</u> Developing Positive Thinking and

	Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.
UNIT-II	1. <u>Interpersonal Communication:</u> Interpersonal relations; communication models, process and barriers; team communication; developing interpersonal relationships through effective communication; listening skills; essential formal writing skills; corporate communication styles – assertion, persuasion, negotiation. 2. <u>Public Speaking:</u> Skills, Methods, Strategies and Essential tips for effective public speaking. 3. <u>Non-Verbal Communication:</u> Importance and Elements; Body Language.
UNIT-III	1. <u>Presentation Skills</u>: Types, Content, Audience Analysis, Essential Tips – Before, During and After, Overcoming Nervousness. 2. <u>Group Discussion:</u> Importance, Planning, Elements, Skills assessed; effectively disagreeing, Initiating, Summarizing and Attaining the Objective. 3. <u>Interview Skills</u>: Interviewer and Interviewee – in-depth perspectives. Before, During and After the Interview. Tips for Success. 4. <u>Teamwork and Leadership Skills:</u> Concept of Teams; Building effective teams; Concept of Leadership and honing Leadership skills
UNIT - IV	1. <u>Etiquette and Manners</u> – Social and Business. 2. <u>Time Management</u> – Concept, Essentials, Tips. 3. <u>Personality Development</u> – Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills. 4. <u>Leadership and Assertiveness Skills:</u> A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertiveness Skills.
UNIT- V	1. <u>Emotional Intelligence:</u> Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence 2. <u>Conflict Management:</u> Conflict - Definition, Nature, Types and Causes; Methods 3. <u>Decision-Making and Problem-Solving Skills:</u> Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills. 4. <u>Stress Management:</u> Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and Management of Stress.

Text books :	
1.	Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.
2.	English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010

WEB RESOURCES	
1.	https://nptel.ac.in/courses/109107121/
2.	https://www.goskills.com/Soft-Skills

III Year II Semester
Professional Elective-II
SOFTWARE TESTING

Course Category	Professional Elective		Course Code	19IT5T07
Course Type	Theory		**L-T-P-C**	3 – 0 – 0 – 3
Prerequisites			**Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES	
1	The need for testing, types of bugs and their consequences.
2	Path testing, system testing and Domain testing and its applications.
3	Paths of various flow graphs, their interpretations and applications.
4	Logic based testing and its implementation.
5	State graphs and transition testing, matrix of a graph and node reduction algorithms.

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	List out various factors affecting the software testing process.
CO2	Compare various Black Box Testing Techniques and perform White Box Testing.
CO3	Differentiate between Progressive and Regressive Testing.
CO4	Prioritize Test Cases and Apply Software quality metrics.
CO5	Enumerate the Tools for Test Automation.

K1 - Remember, K2 - Understand, K3 - Apply, K4 - Analyze, K5 - Evaluate, K6 - Create.

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
19IT5T07.1	-	2	1	1	1	-	-	-	-	-	1	-	-	2	1
19IT5T07.2	2	2	-	1	2	-	-	-	-	-	-	-	1	-	-
19IT5T07.3	2	1	-	1	2	-	-	-	-	-	-	-	1	-	-
19IT5T07.4	2	-	2	-	-	-	-	-	-	-	2	-	1	-	-
19IT5T07.5	2	-	-	1	3	-	-	-	-	-	1	-	1	-	-

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

COURSE CONTENT

UNIT I	**Software Testing:** Introduction, Model for testing, Effective Vs Exhaustive Software Testing,

	Software Testing Terminology, Software Testing Life Cycle, relating test life cycle to development life cycle, Software Testing Methodology. **Verification and Validation:** Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation.
UNIT II	**Dynamic Testing I: Black Box testing techniques:** Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing **Dynamic Testing II: White-Box Testing:** need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing. **Static Testing:** inspections, Structured Walkthroughs, Technical reviews
UNIT III	**Validation activities:** Unit testing, Integration Testing, Function testing, system testing, acceptance testing. **Regression testing:** Progressives Vs. regressive testing, Regression testability, Objectives of regression testing, Regression testing types, Regression testing techniques
UNIT IV	**Efficient Test Suite Management:** Test case design, Need for the growth of test suite, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques
UNIT V	**Automation and Testing Tools:** need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools. **Testing Web based Systems:** Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems

TEXT BOOKS

1.	Software Testing, Principles and Practices, Naresh Chauhan, Oxford
2.	Foundations of Software testing, Aditya P Mathur, 2ed, Pearson
3.	Software Testing- Yogesh Singh, Cambridge.

REFERENCE BOOKS

1.	Software Testing Techniques, Baris Beizer, International Thomson computer press, second edition.
2.	Software Testing, Principles, Techniques and Tools, M G Limaye, TMH.
3.	Effective Methods for Software Testing, Willian E Perry, 3ed, Wiley.

WEB LINKS

1.	http://www.softwaretestingclass.com/what-is-black-box-testing/
2.	http://www.softwaretestingclass.com/white-box-testing/
3.	https://onlinecourses.nptel.ac.in/noc16_cs16/
4.	http://www.testingtools.com/test-automation/

III Year II Semester
Professional Elective-II
DATA SCIENCE
(Common to CSE, IT)

Course Category	Professional Elective	Course Code	19CS6T21
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Python Programming	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To provide a comprehensive knowledge of data science using Python
2	To learn the essential concepts of data analytics and data visualization

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	List the features of Numpy libraryfor analyzing the data.	K1
CO2	Summarize the features of pandas libraryfor analyzing the data.	K2
CO3	Make use of various file formats in loading and storage of data.	K3
CO4	Apply data wrangling techniques to enrich the raw data into a desired format	K3
CO5	Visualize the results in an appropriate pictorial representation	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	0	1	0	0	0	0	0	0	0	1	2	0
CO2	3	2	2	0	1	0	0	0	0	0	0	0	1	2	0
CO3	3	2	2	0	1	0	0	0	0	0	0	0	1	2	0
CO4	3	2	2	0	1	0	0	0	0	0	0	0	1	2	0

CO 5	3	2	2	0	1	0	0	0	0	0	0	0	1	2	0

COURSE CONTENT	
UNIT I	**What is Data science?** Datafication, Exploratory Data Analysis, The Data science process, A data scientist role in this process. (Text Book 2) **NumPy Basics:**The NumPyndarray: A Multidimensional Array Object, Creating ndarrays ,Data Types for ndarrays,Operations between Arrays and Scalars, Basic Indexing and Slicing, Boolean Indexing, Fancy Indexing, Data Processing Using Arrays, Expressing Conditional Logic as Array Operations, Methods for Boolean Arrays , Sorting , Unique.(Text Book 1)
UNIT II	**Getting Started with pandas:** Introduction to pandas, Library Architecture,Features, Applications, Data Structures, Series,DataFrame, Index Objects, Essential Functionality Reindexing,Dropping entries from an axis, Indexing, selection, and filtering,Sorting and ranking, Summarizingand Computing Descriptive Statistics, Unique Values, Value Counts, Handling Missing Data, filtering out missing data.(Text Book 1)
UNIT III	**Data Loading, Storage, and File Formats :** Reading and Writing Data in Text Format, Reading TextFiles in Pieces, Writing Data Out to Text Format, Manually Working with Delimited Formats, JSONData XML and HTML: Web Scraping, Binary Data Formats,Using HDF5 Format, Reading Microsoft Excel Files, Interacting with Databases, Storing and Loading Data in MongoDB .(Text Book 1)
UNIT IV	**Data Wrangling:** Combining and Merging Data Sets, DatabasestyleDataFrame Merges, Merging on Index, Concatenating Along an Axis, Combining Data with Overlap , Reshaping and Pivoting, Reshaping with Hierarchical Indexing, Data Transformation, Removing Duplicates, Replacing Values.(Text Book 1)
UNIT V	**Plotting and Visualization**: A Brief matplotlib API Primer, Figures and Subplots,Colors, Markers, andLine Styles, Ticks, Labels, and Legends, Annotations and Drawing on a Subplot, Saving Plots to File,Plotting Functions in pandas, Line Plots, Bar Plots, Histograms and Density Plots, Scatter Plots.(Text Book 1)

TEXT BOOKS	
1.	Wes McKinney, "Python for Data Analysis",O'REILLY, ISBN:978-1-449-31979-3, 1st edition, October 2012.

2	RachelSchutt&O'neil, "Doing Data Science", O'REILLY, ISBN:978-1-449-35865-5, 1st edition, October 2013.

REFERENCE BOOKS	
1.	Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2015
2.	Matt Harrison, "Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization , O'Reilly, 2016.

WEB RESOURCES	
1.	https://nptel.ac.in/courses/106/106/106106212/
2.	https://nptel.ac.in/courses/106/106/106106179

III Year II Semester
Professional Elective-II
AdHoc & Sensor Networks

Course Category	Professional Elective	Course Code	19CS6T22
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Computer Networks	**InternalAssessment**	30
		Semester EndExamination	70
		Total Marks	100

COURSE OBJECTIVES	
1	Understand the design issues in ad hoc and sensor networks.
2	Learn the different types of MAC protocols.
3	Be familiar with different types of adhoc routing protocols.
4	Be expose to the TCP issues in adhoc networks.
5	Learn the architecture and protocols of wireless sensor networks.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO-1	Explain the concepts, network architectures and applications of ad hoc an wireless sensor networks	K2
CO-2	Analyze the protocol design issues of ad hoc and sensor networks	K4
CO-3	Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues	K3
CO-4	Evaluate the QoS related performance measurements of ad hoc and sensor networks	K3
CO-5	Discuss the WSN routing issues by considering QoS measurements	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO 11	PO 12	PS O1	PS O2	PS O3
CO 1	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
CO 2	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0

CO 3	2	1	0	2	0	0	0	0	0	0	0	0	0	0	0
CO 4	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0
CO 5	2	0	0	1	0	0	0	0	0	0	0	2	2	2	0

COURSE CONTENT	
UNIT I	**INTRODUCTION** Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs):concepts and architectures. Applications of Ad Hocand Sensor networks. Design Challenges in Ad hoc and Sensor Networks.
UNIT II	**MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS** Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11
UNIT III	**ROUTING PROTOCOLS** Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing **TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS** Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.
UNIT IV	**WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS** Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies - MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.
UNIT V	**WSN ROUTING, LOCALIZATION & QOS** Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

TEXT BOOKS	
1.	C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.

REFERENCE BOOKS	
1.	Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
2.	Feng Zhao and LeonidesGuibas, "Wireless Sensor Networks", Elsevier Publication – 2002.

3.	Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005
4.	Kazem Sohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007.
5.	Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

WEB RESOURCES	
1.	www.wirelessnetworksonline.com
2.	www.securityinwireless.com
3.	www.ida.liu.se/~petel71/SN/lecture-notes/sn.pdf

III Year II Semester
Professional Elective-II
Mobile Application Development
(Common to CSE, IT)

Course Category	Professional Elective	**Course Code**	19CS6T23
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Java Programming	**Internal Assessment Semester End Examination Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To demonstrate their understanding of the fundamentals of Android operating systems
2	To demonstrate their skills of using Android software development tools
3	To demonstrate their ability to develop software with reasonable complexity on mobile platform
4	To demonstrate their ability to deploy software to mobile devices
5	To demonstrate their ability to debug programs running on mobile devices

COURSE OUTCOMES Upon successful completion of the course, the student will be able to:	**Cognitive Level**
CO1	Identify various concepts of mobile programming that make it unique from programming for other platforms,	K2
CO2	Critique mobile applications on their design pros and cons	K2
CO3	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces	K3
CO4	Program mobile applications for the Android operating system that use basic and advanced phone features	K3
CO5	Deploy applications to the Android marketplace for distribution	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PS O3**
CO 1	2	2	2	1	1	0	0	0	0	0	0	0	0	1	0

CO2	3	2	2	1	1	0	0	0	0	0	0	0	0	1	0
CO3	2	3	2	2	1	0	0	0	0	0	0	0	0	1	0
CO4	3	2	2	1	1	0	0	0	0	0	0	0	0	1	0
CO5	2	2	3	2	1	0	0	0	0	0	0	0	0	1	0

COURSE CONTENT	
UNIT I	**Introduction to Android:** The Android Platform, Setting up Your Android Development Environment: Android SDK, Eclipse Installation, Android Installation, Writing, Testing and Building your First Android application, Mastering the Android Development Tools.
UNITII	**Android Application Basics:** Understanding the Anatomy of an Android application: Android terminologies, Application Context, Activities, Fragments, Intents, Defining Your Application using the Android Manifest File
UNITIII	**Managing Application Resources:** What are resources, Setting Simple Resource Values, Working with Different Types of Resources, Working with Layouts. **Android User Interface Design Essentials:** User Interface Screen elements, Designing User Interfaces with Layouts, Working with Fragments and Dialogs.
UNITIV	**Android Application Design Essentials:** Android Preferences, Working with Files and Directories, Content Providers, Designing Compatible Applications.
UNITV	**Testing Android Applications:** Best Practices in Testing Mobile Applications, Publishing Your Android Application: Choosing the Right Distribution Model, Packaging Your Application for Publication, Publishing on the Android Market.

TEXT BOOKS	
1.	Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)

REFERENCE BOOKS	
1.	Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
2.	Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
3	Android Application Development All in one for Dummies by Barry Burd, Edition: I

WEB RESOURCES	
1.	https://nptel.ac.in/courses/106/106/106106147/
2.	https://nptel.ac.in/courses/106/106/106106156/

III Year II Semester
Professional Elective-II
INFORMATION RETRIEVAL SYSTEMS
(Common to CSE & IT)

Course Category	Professional Elective		Course Code	19CS6T24
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites	Data Structures		**Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES	
1	To impart theoretical knowledge regarding Information retrieval systems and understand the various data structures used for efficient information retrieval.
2	To familiarize with the techniques used for improving the performance of Information retrieval systems.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Identify basic theories and analysis tools in information retrieval systems	K2
CO2	Demonstrate the Structures used in Inverted Files	K2
CO3	Compare vertical partitioning with horizontal partitioning and Understand the working mechanism of various ranking algorithms	K2
CO4	Analyze different information retrieval algorithms, and give an account of the difficulties of evaluation	K4
CO5	Apply IR principles to locate relevant information large collections of data	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	2	1	2	-	-	-	-	-	-	-	-	2	1	-
CO2	1	2	1	3	-	-	-	-	-	-	-	-	3	2	-
CO3	2	2	2	3	-	-	-	-	-	-	-	-	2	3	-

CO 4	2	2	2	1	-	-	-	-	-	-	-	-	2	2	-
CO 5	2	3	2	1	-	-	-	-	-	-	-	-	2	3	-

COURSE CONTENT	
UNIT I	**Introduction to Information Storage and Retrieval System:** Introduction, Domain Analysis of IRsystems and other types of Information Systems, IR System Evaluation. Introduction to DataStructures and Algorithms related to Information Retrieval: Basic Concepts, Data structures,Algorithms.
UNIT II	**Inverted files**: Introduction, Structures used in Inverted Files, Building Inverted files using a sorted array, Modifications to Basic Techniques
UNIT III	**Signature Files**: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning. **Ranking Algorithms:** Introduction, How Ranking is done, Ranking models and experiments with these models, Other Experiments involving Ranking, Data structures and Algorithms used for Ranking.
UNIT IV	**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 V	**Stemming Algorithms:** Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files

TEXT BOOKS	
1.	Information Retrieval Data Structures and Algorithms", Frakes, W.B., Ricardo Baeza-Yates,Prentice Hall, 1st Edition, 1992.
2.	"Modern Information Retrieval", Ricardo- Baeza- Yates Bertheir- Riberio –NetoYates Pearson Education, 1st Edition ,1999.
3	"Information Storage & Retrieval" by Robert Korfhage – John Wiley & Sons, Wiley, 1stEdition, 2010.
REFERENCE BOOKS	

1.	"Information Retrieval Systems: Theory and Implementation," Kowalski, Gerald, Mark T Maybury, Kluwer Academic Press, 2002.
2.	"Information retrieval Algorithms and Heuristics," David A. Grossman and OphirFrieder, Springer, 2ndedition, 2000.

WEB RESOURCES	
1.	http://cse.iitkgp.ac.in/~pabitra/course/ir06/ir06.html (PabitraMitra, iitkharagpur)
2.	https://www.coursera.org/learn/text-retrieval (ChengXiangZhai, University of Illinois at Urbana-Champaign)

III Year II Semester
AI Tools and Techniques Laboratory
Computer Science and Engineering

Course Category	Professional Core	Course Code	19CS6L07
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites	Python Programming	**Internal Assessment**	25
		Semester End Examination	50
		Total Marks	75

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Develop neural networks using Tensorflow	K3
CO2	Make use of Convolution Neural Networks for solving real world problems	K3
CO3	Solve various natural language processing problems	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
CO 1	1	2	2	3	1	-	-	-	-	-	-	-	1	2	3
CO 2	1	2	2	3	1	-	-	-	-	-	-	-	1	2	3
CO 3	1	2	2	3	2	-	-	-	-	-	-	-	1	2	3

COURSE CONTENT

1. Installation of Tensorflow Open source tool
2. Designing Artificial Neural Networks using Tensorflow
3. First Deep Learning Project in Python with Keras Step-By-Step
4. Implement multilayer perceptron algorithm for MNIST Hand written Digit Classification.
5. Build a Convolution Neural Network for MNIST Hand written Digit Classification.
6. Build a Convolution Neural Network for simple image (dogs and Cats) Classification

7. Use a pre-trained convolution neural network (VGG16) for image classification.

8. Implement one hot encoding of words or characters.

9. Implement word embeddings for IMDB dataset.

10. Implement a Recurrent Neural Network for IMDB movie review classification problem.

III Year II Semester
INTERNET OF THINGS LABORATORY

Course Category	Engineering Sciences	Course Code	19EC6L11
Course Type	Laboratory	L-T-P-C	3-0-0-3
Prerequisites	Embedded Systems	Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES	
1	The architecture details and GPIO of Arduino and Raspberry Pi
2	the fundamental applications of the sensors and motors
3	The communication through devices using UART

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand GPIO concepts of Arduino and Raspberry Pi	K2
CO2	Apply the applications of sensors and motors	K3
CO3	Understand the communication mechanism in devices through UART	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2		3								1	2
CO2	2	2	2		2								2	1
CO3	1	2	2		2								2	2

List of experiments:
1. Setting up of Arduino and Raspberry Pi and connect to a network
2. Familiarization with GPIO pins and control hardware through GPIO pins.
3. Blinking and fading of LED using Arduino and Raspberry Pi
4. Interface Buzzer with Arduino for specific time interval.
5. Measurement of temperature, humidity, light and distance using sensors
6. Speed Control of motors using PWM using Arduino.
7. Perform parallel and serial communication using Arduino UART

8. Connect IOT devices through cloud using IoT protocol such as MQTT.
9. Basic SQL queries from SQL database on Arduino.
10. Create Wireless network of sensors using Zigbee.
11. Interfacing Bluetooth with Arduino/ Raspberry Pi from Smartphone.

IV Year I Semester
CRYPTOGRAPHY AND NETWORK SECURITY

Course Category	Professional Core		Course Code	19IT6T08
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites			**Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES

1	Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues
2	Ability to identify information system requirements for both of them such as client and server
3	Ability to understand the current legal issues towards information security

COURSE OUTCOMES		Cognitive level
Upon successful completion of the course, the student will be able to:		
CO1	Classify the objectives of information security and describing the importance and application of each of confidentiality, integrity, authentication, and availability	K2
CO2	Understand various cryptographic algorithms and describe public-key cryptosystem	K2
CO3	Analyze Data Integrity, Digital Signature Schemes & Key Management	K4
CO4	Analyze network security models for ensuring security at Application layer and Transport layer	K4
CO5	Discuss Web security and Firewalls	K1

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
19IT6T08.1	3	2	3	1	2	-	-	-	-	-	-	-	-	2	2
19IT6T08.2	3	2	3	1	2	-	-	-	-	-	-	-	2	2	2
19IT6T08.3	3	2	3	3	3	-	-	-	-	-	-	-	2	2	2
19IT6T08.4	3	2	3	3	3	-	-	-	-	-	-	-	1	1	2
19IT6T08.5	3	2	3	3	3	-	-	-	-	-	-	-	1	1	2

COURSE CONTENT

UNIT I	**Security Concepts:** Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security **Cryptography Concepts and Techniques:** Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.
UNIT II	**Symmetric key Ciphers:** Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream Ciphers, RC4. **Asymmetric key Ciphers:** Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange.
UNIT III	**Message Authentication and Hash Function:** Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure Hash Algorithm (SHA-512),HMAC, CMAC, Digital signatures. **Authentication Applications:** Kerberos, X.509 Authentication Services, Public-Key Infrastructure, Biometric Authentication
UNIT IV	**Email Privacy:** Pretty Good Privacy (PGP) and S/MIME. **IP Security:** IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management
UNIT V	**Web Security:** Web Security Considerations, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). **Intruders, Viruses and Firewalls:** Intruders, Intrusion Detection, Password Management, Virus and related threats, Countermeasures, Firewall Design Principles, Types of Firewalls.

TEXT BOOKS	
1.	Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2.	Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS	
1.	Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2.	Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3.	Information Security, Principles, and Practice: Mark Stamp, Wiley India
4.	Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5.	Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6.	Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

WEB RESOURCES

1.	http://nptel.ac.in/courses/106105031(Prof. D. Mukhopadhyay, IIT, Kharagpur)
2.	http://williamstallings.com/Extras/Security-Notes/

IV Year I Semester
OBJECT ORIENTED ANALYSIS AND DESIGN USING UML
(Common to CSE & IT)

Course Category	Professional Core	Course Code	19CS7T25
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To understand how to solve complex problems
2	Analyze and design solutions to problems using object-oriented approach
3	Study the notations of Unified Modeling Language

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO-1	Summarize the importance of modeling techniques in UML	K2
CO-2	Design structural model using Class & Object diagrams.	K3
CO-3	Examine behavioral model using Use case, Interaction, Activity Diagrams.	K3
CO-4	Develop advanced behavioral model using state chart, state transition diagrams, threads and processes	K3
CO-5	Design real time application using Object Oriented Analysis & Design (OOAD) methodology	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	2	2	2	0	0	0	0	0	3	0	3	3	3
CO 2	3	3	2	2	2	0	0	0	0	0	3	0	3	3	3
CO	3	3	2	2	2	0	0	0	0	0	3	0	3	3	3

3															
CO 4	3	3	2	2	2	0	0	0	0	0	3	0	3	3	3
CO 5	3	3	2	2	2	0	0	0	0	0	3	0	3	3	3

COURSE CONTENT	
UNIT I	**Introduction to UML:** Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.
UNIT II	**Basic Structural Modeling:** Classes, Relationships, common Mechanisms, and diagrams. Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.
UNIT III	**Basic Behavioral Modeling-I:** Interactions, Interaction diagrams. **Basic Behavioral Modeling-II:** Use cases, Use case Diagrams, Activity Diagrams.
UNIT IV	**Advanced Behavioral Modeling:** Events and signals, state machines, processes and Threads, time and space, state chart diagrams.
UNIT V	**Architectural Modeling**: Component, Deployment, Component diagrams and Deployment diagrams. Case Study: The Unified Library application

TEXT BOOKS	
1.	Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education,1998
2.	Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd,2003.

REFERENCE BOOKS	
1.	Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2.	Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech India Pvt. Ltd.

WEB RESOURCES	
1.	https://www.geeksforgeeks.org/unified-modeling-language-uml-introduction/
2.	https://www.javatpoint.com/uml

IV Year I Semester
Open Elective-II
WASTE WATER MANAGEMENT

Course Category	Open Elective	Course Code	19CE6T24
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Basic Chemistry & Fluid Mechanics	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	Enables the student to distinguish between the quality of domestic and industrial water requirements and wastewater quantity generation.
2	To impart knowledge on selection of treatment methods for industrial waste water.
3	To know the common methods of treatment in different industries.
4	To acquire knowledge on operational problems of common effluent treatment plant
5	Enables the student to distinguish between the quality of domestic and industrial water requirements and wastewater quantity generation.

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Analyse the industrial waste quantity and quality requirements.
CO2	Identify the treatment methods for industrial wastewater
CO3	Know the basic theories of industrial waste water management.
CO4	Decide the need of common effluent treatment plant for the industrial area in their vicinity
CO5	Examine the effects and treatment methods of liquid waste from the manufacturing industries
K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.	

Contribution of Course Outcomes towards achievement of program														
Outcomes (1 - Low, 2- Medium, 3-High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	--	--	2	3	--	--	1	3	--	3	3	--	--	3	3
CO2	3	--	3	2	2	2	--	3	--	3	--	--	3	3	3
CO3	3	--	3	2	--	2	--	--	--	3	--	--	3	2	3
CO4	2	--	3	2	3	--	--	--	--	3	2	3	3	2	3

CO5	2	2	3	2	2	--	--	3	3	3	2	3	3	3	3

COURSE CONTENT	
UNIT-I	**INDUSTRIAL WATER QUANTITY AND QUALITY REQUIREMENTS:** Boiler and cooling waters–Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills.
UNIT-II	**MISCELLANEOUS TREATMENT**: Use of Municipal wastewater in Industries – Advanced water treatment - Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, elutriation, Removal of Iron and Manganese, Removal of Colour and Odour**.**
UNIT-III	**BASIC THEORIES OF INDUSTRIAL WASTEWATER MANAGEMENT:** Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis - Civil Engineering Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization – Equalization and proportioning- recycling, reuse and resources recovery.
UNIT-IV	**INDUSTRIAL WASTEWATER DISPOSAL MANAGEMENT:** discharges into Streams, Lakes and oceans and associated problems, Land treatment – Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method.
UNIT-V	**PROCESS AND TREATMENT OF SPECIFIC INDUSTRIES:** Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants.

TEXT BOOKS	
1.	Wastewater Treatment by M.N. Rao and A.K. Dutta, Oxford & IBH, New Delhi.
2	Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala, Shyam R Asolekar, Mc-Graw Hill, New Delhi; 3rd Edition.
REFERENCE BOOKS	
1.	Industrial Water Pollution Control by W. Wesley Eckenfelder, Mc- GrawHill, Third Edition.
2.	Wastewater Treatment- Concepts and Design Approach by G.L. Karia & R.A. Christian, Prentice Hall of India.

IV Year I Semester
Open Elective-II
Power Safety and Management

Course Category	Open Elective	Course Code	19EE7T36
Course Type	Theory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**NA**	**Internal Assessment**	**30**
		Semester End Examination	**70**
		Total	
		Marks	**100**

COURSE OBJECTIVES	
1	To Study the Indian electricity rules and their significance
2	To Study the safety standard in residential, commercial, and agricultural
3	To Study about electrical safety installation, testing and commission
4	To Study about flashovers and corona discharge
5	To Study about electrical safety in distribution system

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:	**Cognitive Level**	
CO1	Understand the Indian electricity rules and their significance	Understand	K2
CO2	Explain the safety standard in residential, commercial, and agricultural	Understand	K2
CO3	Learn about electrical safety installation, testing and commission	Understand	K2
CO4	Understand about flashovers and corona discharge	Understand	K2
CO5	Understand about electrical safety in distribution system	Understand	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program														
Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	P S O

														3
CO 1	1	2	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	1	2	2	-	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	2	-	2	-	-	-	-	-	-	-	-	-
CO 4	2	2	2	2	2	-	-	-	-	-	-	-	-	-
CO 5	1	2	2	2	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT	
UNIT 1	**Indian Electricity Rules and Acts and their Significance** Objective and scope – ground clearances and section clearances – standards on electrical safety - safe limits of current, voltage – earthing of system neutral – Rules regarding first aid and fire fighting facility.
UNIT 2	**Electrical Safety in Residential, Commercial and Agricultural Installations** Wiring and fitting – Domestic appliances – water tap giving shock – shock from wet wall – fan firing shock – multi-storied building – Temporary installations – Agricultural pump installation – Do's and Don'ts for safety in the use of domestic electrical appliances.
UNIT 3	**Safety During Installation, Testing and Commissioning, Operation and Maintenance** Preliminary preparations – safe sequence – risk of plant and equipment – safety documentation – field quality and safety - personal protective equipment – safety clearance notice – safety precautions – safeguards for operators – safety
UNIT 4	**Electrical Safety in Hazardous Areas** Hazardous zones – class 0,1 and 2 – spark, flashovers and corona discharge and functional requirements – Specifications of electrical plants, equipments for hazardous locations – Classification of equipment enclosure for various hazardous gases and vapours – classification of equipment/enclosure for hazardous locations.
UNIT 5	**Electrical Safety in Distribution System** Total quality control and management – Importance of high load factor – Disadvantages of low power factor – Causes of low P.F. – power factor improvement – equipments – Importance of P.F. improvement.

TEXT BOOKS	
1	Rao, S. and Saluja, H.L., "Electrical Safety, Fire Safety Engineering and Safety Management", Khanna Publishers, 1988
2	Pradeep Chaturvedi, "Energy Management Policy, Planning and Utilization", Concept Publishing Company, 1997.
REFERENCE BOOKS	
1	Nagrath, I.J. and Kothari, D.P., "Power System Engineering", Tata McGraw Hill, 1998.
2	Gupta, B.R., "Power System Analysis and Design", S.Chand and Sons, 2003.
3	Wadhwa, C.L., "Electric Power Systems", New Age International, 2004
WEB RESOURCES (Suggested)	
1	https://nptel.ac.in/courses/110/105/110105094/
2	https://nptel.ac.in/courses/108/106/108106159/

IV Year I Semester
Open Elective-II
EMBEDDED SYSTEMS

Course Category	Open Elective		Course Code	19EC7T31
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites	**Microprocessors and Microcontrollers**		**Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES	
1	The basic concepts of an embedded system are introduced. The various elements of embedded hardware and their design principles are explained.
2	Different steps involved in the design and development of firmware for embedded systems is elaborated.
3	Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design is discussed.
4	Fundamental issues in hardware software co-design were presented and explained. Familiarize with the different IDEs for firmware development for different family of processors/controllers and embedded operating systems.
5	Embedded system implementation and testing tools are introduced and discussed.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function.	K2
CO2	The hardware components required for an embedded system and the design approach of an embedded hardware	K2
CO3	The various embedded firmware design approaches on embedded environment.	K2
CO4	Understand how to integrate hardware and firmware of an embedded system using real time operating system	K2
CO5	Familiarize with the different IDEs for firmware development for different family of processors/controllers and testing tools are introduced and discussed.	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)													
PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2

CO 1	3												1	1
CO 2	3												1	1
CO 3	2												1	1
CO 4	2		1										1	1
CO 5	2				1								1	1

COURSE CONTENT	
UNIT I	Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system. Introduction to IoT, Introduction to robotics
UNIT II	Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.
UNIT III	Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler
UNIT IV	Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronization, Device Drivers. HARDWARE SOFTWARE CO-DESIGN: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade- offs, Integration of Hardware and Firmware,ICE
UNIT V	The integrated development environment, Types of files generated on cross- compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools The main software utility tool, CAD and the hardware, Translation tools-Pre- processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools

TEXT BOOKS

1.	Embedded Systems Architecture- By Tammy Noergaard, Elsevier Publications, 2013
2.	Embedded Systems-By Shibu.K.V-Tata McGraw Hill Education Private Limited, 2013.
REFERENCE BOOKS	
1.	Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications, 2013
2.	Embedded Systems-Lyla B.Das-Pearson Publications, 2013
WEB RESOURCES	
1.	http://nptel.ac.in/courses/117103063
2	www.satishkashayap.com/2013/03/video-lectures-on-electron-devices-by.html
3	http://www.smartzworld.com/notes/electronic-devices-and-circuits-edc/

IV Year I Semester
Open Elective-II
MECHATRONICS

Course Category	Open Elective		Course Code	19ME6T27
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites	NIL		**Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES	
1	To impart knowledge about mechatronic systems and their response.
2	To acquire knowledge about solid-state electronic devices and various actuating systems.
3	To learn mathematical modelling of physical systems.
4	To familiarize closed loop controllers and their modes.
5	To impart knowledge on programming of microprocessors and learn practical applications of mechatronic systems.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:	Cognitive Level
CO1	Explain various components and sensors related to mechatronics systems.	K2
CO2	Apply signal conditioning and identify the required actuating system.	K3
CO3	Develop basic mathematical models in mechatronic systems.	K3
CO4	Develop appropriate controller using different modes for a given mechatronic system.	K3
CO5	Make use of microprocessors and PLCs in the areas of Robotics, Automobiles etc.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	3	-	-	-	-	2	-	-	-	3	-
CO2	3	3	2	-	-	-	-	-	2	-	-	-	3	-
CO3	3	3	3	3	-	-	-	-	3	-	-	-	3	-
CO4	3	-	2	2	-	-	-	-	2	-	-	-	3	-
CO5	3	3	3	2	-	-	-	-	3	-	-	-	3	-

COURSE CONTENT

UNIT I

Introduction to Mechatronics systems**.**

Sensors and transducers: Introduction, performance terminology - Classification: displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors - Selection of sensors.

UNIT II

Solid state electronic devices - PN junction diode, BJT, FET, DIAC, TRIAC and LEDs.

Signal Conditioning: Introduction - Operational amplifiers: Inverting amplifier, summing amplifier, integrating amplifier, difference amplifier - Filtering process.

Hydraulic and pneumatic actuating systems - Hydraulic systems, and pneumatic systems, components, control valves. Mechanical and electrical actuating systems.

UNIT III

Basic system models: Mathematical models - mechanical, electrical and fluid system building blocks - Mechanical translational systems, Mechanical rotational systems, Electromechanical systems.

UNIT IV

Closed loop controllers: Continuous and discrete process - Control modes: Two step mode, Proportional mode, derivative control, integral control – PID Controllers, Digital Controllers – Velocity control, adaptive control.

UNIT V

Microprocessors: Microprocessor systems, micro controllers, applications

PLC: Introduction, basic structure - Input/output processing - Ladder programming - timers, internal relays and counters, selection of PLC.

Case studies of Mechatronic Systems: Pick and place robot, Digital camera, Automotive control.

TEXT BOOKS
1. Mechatronics- Electronic control systems in Mechanical and Electrical Engineering by W. Bolton, Pearson Education, 4th Edition.
2. Mechatronics- Integrated Mechanical Electronics Systems by K P Ramachandran, G K Vijaya Raghavan & M S Balasundaram, WILEY India Edition.

REFERENCE BOOKS
1. Introduction to Mechatronics by David and Alcaitore Michael B. Histand TMH, 4th Edition, 2006.
2. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai, 1st edition, 2003.
3. Mechatronics by N. Shanmugam, Anuradha Agencies Publishers.
4. Understanding Electro-Mechanical Engineering – An Introduction to Mechatronics by Lawrence J. Kamm, IEEE Press, 2nd Edition, 2000.

WEB RESOURCES

1. http://www.engr.sjsu.edu/sjlee/vendors.htm
2. www.cambridgemechatronics.com/contact/terms
3. www.pdf-free-download.com/mechatronics-labs.pdf
4. www.mechatronics.me.wisc.edu
5. https://www.electronicshub.org/different-types-sensors/
6. www.engr.colostate.edu/~dga/mechatronics/resources.html
7. www.NI.com
8. https://en.wikipedia.org/wiki/Solid-state_electronics
9. http://www.htl-worldwide.com/the-difference-between-pneumatic-hydraulicand-electrical-actuators/
10. https://www.worldscientific.com/worldscibooks/10.1142/10193

IV Year I Semester
Open Elective-II
Entrepreneurship
(Common to Civil, Mech, ECE, CSE and IT)

Course Category	Open Elective	Credits	3
Course Type	Theory	**Lecture-Tutorial-Practice**	3 -0 -0
Prerequisites		**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

Course Outcomes		Blooms Taxonomy Level
On successful completion of the course, the student will be able to		
CO 1	Understand different Entrepreneurial traits.	Understanding
CO 2	Identify the financial institutions supporting entrepreneurship.	Applying
CO 3	Understand the functioning and problems faced by MSMEs (Micro Small Medium Enterprises)	Understanding
CO 4	Identify Entrepreneurial opportunities for women.	Applying
CO 5	Analyze different market, technical factors and prepare a project report based on guidelines.	Analyzing

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program												
Outcomes: 1 – Low, 2 - Medium, 3 – High												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	0	0	0	0	1	0	1	2	1	3	3
CO2	0	0	0	0	0	1	0	0	0	2	3	1
CO3	0	0	0	0	0	1	1	2	1	1	0	3
CO4	0	0	0	0	0	1	0	3	1	1	0	3
CO5	0	1	1	0	0	1	2	1	1	3	3	3

Course Content :

Unit – I Introduction to Entrepreneurship

Introduction to Entrepreneurship: Definition of Entrepreneur Entrepreneurial Traits. Entrepreneur vs. Manager, Creating and Starting the venture: Sources of new ideas, methods of generating ideas, creative problem solving – Writing Business Plan, Evaluating Business Plans.

UNIT-II Institutional and financial support to Entrepreneurship

Institutional/financial support: Schemes and functions of Directorate of Industries, IFCI, District Industries Centers (DICs), Industrial Development Corporation (IDC), State Financial Corporation (SFCs), Small Scale Industries Development Corporations (SSIDCs). Khadi and Village Industries Commission (KVIC), Technical Consultancy Organization (TCO), Small Industries Service Institute (SISI), National Small Industries Corporation (NSIC), Small Industries Development Bank of India (SIDBI).(short answers only)

UNIT III Small and Micro Enterprises:

Importance, definitions – Policies and their support to MSMEs growth and growth strategies Sickness in small business and remedies – small entrepreneurs in International business.

Unit – IV Women Entrepreneurship

Role & importance, profile of women Entrepreneur, problems of women Entrepreneurs, women Entrepreneurship Development in India.

Unit-V: Project Formulation and Appraisal
Preparation of Project Report –Content; Guidelines for Report preparation – Project Appraisal techniques –economic – Steps Analysis; Financial Analysis; Market Analysis; Technical Feasibility.

Textbooks:

1. Robert Hisrich, & Michael Peters: Entrepreneurship, TMH, 2009.

2. Dollinger : Entrepreneurship, Pearson, 2009.

Reference Books :

1. Vasant Desai, Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House, 2009.

2. Harvard Business Review on Entrepreneurship, HBR Paper Back.

3. Robert J.Calvin: Entrepreneurial Management, TMH, 2009.

4. Gurmeet Naroola: The entrepreneurial Connection, TMH, 2009.

5. Bolton & Thompson: Entrepreneurs—Talent, Temperament and Techniques, Butterworth Heinemann, 2009.

6. Aruna Kaulgud: Entrepreneurship Management by, Vikas publishing house, 2009.

7. Essential of entrepreneurship and small business management by Thomas W.Zimmerer & Norman M.Searborough, PHI-2009.

Web Resources:

1. https://nptel.ac.in/courses/110105067/50

2. http://www.yourarticlelibrary.com/project-management/5-methods-of-project-appraisal-explained/40771

3. https://springhouse.in/government-schemes-every-entrepreneur/

IV Year I Semester
Professional Elective-III
<u>SOFTWARE PROJECT MANAGEMENT</u>
(Common to CSE & IT)

Course Category	Professional Elective	Course Code	19CS7T26
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Software Engineering	**Internal Assessment Semester End Examination Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2	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
3	To understand successful software projects that support organization's strategic goals

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Apply skills necessary to manage software project	K3
CO2	Enumerate Project Management skills and techniques	K2
CO3	Demonstrate theoretical and practical aspects of managing software projects	K2
CO4	Conduct project planning activities that accurately forecast project costs, timelines, and quality.	K2
CO5	Conduct project closure activities and obtain formal project acceptance.	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	3	-	-	1	2	2	3	2	2	2	3

CO 2	1	2	2	2	1	-	-	1	2	2	3	2	2	2	2
CO 3	1	1	2	1	2	-	-	1	2	2	3	2	1	2	3
CO 4	1	2	2	2	1	-	-	1	2	2	3	2	3	1	2
CO 5	1	2	1	2	3	-	-	1	2	2	3	2	3	2	3

COURSE CONTENT	
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. (Book 1)
UNIT II	Project Approach Life cycle models, Choosing Technology, Proto typing Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)
UNIT III	Effort estimation& activity Planning Estimation techniques, Function Point analysis, SLOC, COCOMO. (Book 1) Usecase-based estimation, Activity Identification Approaches, Network planning models, Critical path analysis (Book 1)
UNIT IV	Risk Management, Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach (Book 1)
UNIT V	Project Monitoring & Control, Resource Allocation, Creating a framework, Cost monitoring, Earned value Analysis, Types of Resources, Identifying resource requirements, Resource scheduling Software Quality: Defining Quality – ISO 9016, Product Quality & Process Quality Metrics, Control Capability Maturity Model (Book 1)

TEXT BOOKS	
1.	Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill Nov 1, 1968.

2.	Software Project Management, Walker Royce: Pearson Education, 2005.

REFERENCE BOOKS	
1.	Software Project Management, Joel Henry, Pearson Education.

WEB RESOURCES	
1.	https://nptel.ac.in/courses/106/105/106105218/

IV Year I Semester
Professional Elective-III
BIG DATA ANALYTICS
(Common to CSE & IT)

Course Category	Professional Elective	Course Code	19CS7T27
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Database Management Systems, Data Warehousing and Mining	**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	Optimize business decisions and create competitive advantage with Big Data analytics
2	Derive business benefit from unstructured data
3	Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
4	To introduce programming tools PIG & HIVE in Hadoop eco system.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Outline the challenges of Big Data using Hadoop.	K2
CO2	Interpret Hadoop's architecture and core components of Hadoop Distributed File System.	K2
CO3	Apply data modeling techniques to large data sets using map reduce paradigm.	K3
CO4	Make use of Apache Pig for processing large semi structured data.	K3
CO5	Make use of Apache Hive for processing large structured data.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CO 2	3	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO 3	3	2	2	1	2	-	-	-	-	-	-	-	1	2	1
CO 4	3	1	1	-	2	-	-	-	-	-	-	-	1	2	1
CO 5	3	1	1	-	2	-	-	-	-	-	-	-	1	2	1

COURSE CONTENT	
UNIT I	Introduction to Big Data. What is Big Data. Why Big Data is Important. Meet Hadoop. Data. Data Storage and Analysis. Comparison with other systems. Grid Computing. A brief history of Hadoop. Apache Hadoop and the Hadoop Ecosystem. **References: Hadoop**: The Definitive Guide by Tom White, 3rd Edition
UNIT II	**Working with Big Data:** Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Name node, Data node, Secondary Name node, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files. **References: Hadoop**: The Definitive Guide by Tom White, 3rd Edition, O'Reilly Hadoop in Action by Chuck Lam, MANNING Publ.
UNIT III	**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 **Reference:** Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'Reilly **Apache Spark:** Overview of Spark, Spark EcoSystem, Spark Architecture, RDD, Transformations and actions, DAG, Job Execution in Spark **Reference:** "Big Data Analytics", G. SUDHA SADASIVAM, R THIRUMAHAL.OXFORD Higher Education
UNIT IV	**Pig:** Hadoop Programming Made Easier 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 **Reference:** Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss

UNIT V	**Applying Structure to Hadoop Data with Hive:** Saying Hello to Hive, Seeing How the Hive is Put Together, 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 **Reference:** Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

TEXT BOOKS	
1.	"Hadoop: The Definitive Guide," Tom White, O'Reilly, 3rd Edition, 2012.
2.	"Hadoop in Action," Chuck Lam, MANNING Publ., 2016.
3.	"Hadoop for Dummies," Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss, 2014.
4.	"Big Data Analytics", G. SUDHA SADASIVAM, R THIRUMAHAL.OXFORD Higher Education
REFERENCE BOOKS	
1.	"Hadoop in Practice," Alex Holmes, MANNING Publ., 2014.
2.	"Hadoop MapReduce Cookbook,"SrinathPerera, ThilinaGunarathne, PACKT, 2013
WEB RESOURCES	
1.	Hadoop:http://hadoop.apache.org/
2.	Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3.	Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

IV Year I Semester
Professional Elective-III
CYBER SECURITY
(Common to CSE & IT)

Course Category	Professional Elective	Course Code	19CS7T26
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	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.
2	Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Summarize types of cyber crimes and cyber criminals	K2
CO2	Identify the crimes in mobile and wireless devices	K2
CO3	Choose the efficient tool for detection of malware	K3
CO4	Make use of cyber laws in ITA 2000 for legal recognition	K3
CO5	List various tools and techniques used for computer forensics investigation	K1

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	2	0	0	0	0	0	0	0	0	0	0	1
CO 2	3	2	2	2	0	0	0	0	0	0	0	0	0	0	1

CO 3	3	2	2	2	0	0	0	0	0	0	0	0	0	0	1
CO 4	3	2	2	2	0	0	0	0	0	0	0	0	0	0	1
CO 5	3	2	2	2	0	0	0	0	0	0	0	0	0	0	1

COURSE CONTENT	
UNIT I	**Introduction to Cybercrime:** Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? , Classifications of Cybercrimes. **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	**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/CellPhones.
UNIT III	**Tools and Methods Used in Cybercrime-I:** Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography. **Tools and Methods Used in Cybercrime-II:** DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).
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.
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, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Special Tools and Techniques, Forensics Auditing, Anti forensics.

TEXT BOOKS	
1.	"Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives," Nina Godbole, SunitBelapure, Wiley, 2011.

2.	"Principles of Information Security,"MichealE.Whitman and Herbert J.Mattord, CengageLearning, 2011.

REFERENCE BOOKS

1.	"Information Security," Mark Rhodes, Ousley, MGH, 2013.

WEB RESOURCES

1.	https://onlinecourses.nptel.ac.in/noc18_cs07 (Sourav Mukhopadhyay, National University of Singapore) .

IV Year I Semester
Professional Elective-III
CLIENT SIDE SCRIPTING LANGUAGES

Course Category	Professional Elective	Course Code	19CS7T29
Course Type	Theory	L-T-P-C	3 - 0 - 0-3
Prerequisites	Any programming Language	Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES	
1	To understand the concepts of scripting languages JavaScript
2	To understand the concepts of scripting languages VBScript,
3	To develop a dynamic webpage by the use of DHTML.
4	To develop web based application using jQuery
5	To develop web based application using AJAX

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Make use of Java Script Primer for web applications	K3
CO2	List the VB Script language programming constructs.	K3
CO3	Discuss Dynamic HTML and the DOM	K2
CO4	Discuss various types of jQuery events and Write application based on enlisted events.	K2
CO5	Create a Simple Ajax application and Develop a webpage using AJAX	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO	3	2	3	1	1	-	-	-	-	-	-	-	3	3	2

1														
CO 2	3	2	3	1	1	-	-	-	-	-	-	-	3	3	2
CO 3	3	2	3	1	1	-	-	-	-	-	-	-	3	3	2
CO 4	3	2	3	2	1	-	-	-	-	-	-	-	3	3	2
CO 5	3	2	3	2	1	-	-	-	-	-	-	-	3	3	2

COURSE CONTENT	
UNIT I	**Java Script Primer** – Defining Variables, Data types, Operators, Looping, Creating Functions, Variable Scope, Java Script Objects, Manipulating Strings, working with arrays, Adding Error Handling.
UNIT II	**VBScript:** What is VBScript, Syntax, Variables, Constants, Arrays, Objects, Dialog Boxes, Regular Expressions, Error Handling, VBScript-Linking VBScript with objects validity using forms New features in VBScript 5.
UNIT III	**Dynamic HTML:** From HTML to DHTML, Dynamic HTML, DHTML Scripts. **DOM:** Document Object Model, The Netscape DOM, The Microsoft DOM, The W3C DOM, The event model.
UNIT IV	**jQuery:** jQuery Events: Define events: Click, dblclick, hover, Keyboard Events: keypress, keydownKeyup,Keyrelease, Form Events: submit, Onload, Document/Window Events: load, resize, scroll, unload, bind() and Event Helper Method with Example.
UNIT V	**Ajax Basics:** The purpose of basic, The XML Http Web Application, Callback function, Traditional Application, Web page Application, Use of HTML and Xml in Ajax **Passing Data**: XML- Creating child function, Dynamic Table, Object Literals – Array, Object, Array in Objects, Objects in Array.

TEXT BOOKS	
1.	The World of Scripting Languages, David Barron, Wiley Publications, 2009.
2.	Head First jQuery, Ryan Benedetti and Ronan Cranley, O'Reilly Media.,2011.
3.	Learning jQuery, Jonathon chaffer and Karl Swedberg, O'Reilly Media,2017
REFERENCE BOOKS	
1.	Write Modern Web Apps with the MEAN Stack, Jeff Dicky, Peachpit Press, 2014.

2.	Full Stack Java Script Development, Eric Bush, Red Sky, 2016.
WEB RESOURCES	
1.	https://onlinecourses.nptel.ac.in/noc17_cs06/preview (Dr Gaurav Raina, IIT Madras, TanmaiGopal,CTO& co-founder of Hasura)
2.	https://www.w3schools.com/
3.	https://www.tcl.tk/man/tcl8.5/tutorial/tcltutorial.html
4.	https://thinkster.io/tutorials/mean-stack

IV Year I Semester
Professional Elective-III
COMPUTER VISION
(Common to CSE & IT)

Course Category	Professional Elective	**Course Code**	19
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To Recognize and describe both the theoretical and practical aspects of computing with images. Connect issues from Computer Vision to Human Vision
2	The concepts related edge detection, segmentation, morphology and image compression methods.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Describe both the theoretical and practical aspects of computing with images. Connect issues from Computer Vision to Human Vision	K2
CO2	Apply different image processing techniques	K3
CO3	Discuss about object detection and recognition Techniques	K2
CO4	Enumerate the concepts of Feature detection and Matching	K2
CO5	Apply alignment and stitching techniques on images	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	3	1	1	0	0	0	0	0	0	0	0	0	0	1	0
CO 2	3	1	1	0	0	0	0	0	0	0	0	0	0	1	0
CO	3	1	1	0	0	0	0	0	0	0	0	0	0	1	0

3															
CO 4	3	1	1	0	0	0	0	0	0	0	0	0	0	1	0
CO 5	3	1	1	0	0	0	0	0	0	0	0	0	0	1	0

COURSE CONTENT	
UNIT I	**Introduction**-What is computer vision, A Brief history, **Image formation**-Geometric Primitives and Transformations-2D,3D transformations,3D rotation, **Photometric image transformatio**n- Lighting, reflectance and shading, optics, **The digital camera**-Sampling and Aliasing, Color, Compression.
UNIT II	**Image processing** **Point operations**-Pixel transforms, color transforms, compositing and matting, Histogram Equilization, Linear filtering, Non linear filtering, Bilateral filtering, binary image processing, **Fourier Transforms**-Fourier transform pairs, Two dimensional Fourier transforms, Applications-Sharpening, blur, Noise removal, **Pyramids and Wavelets-**Interpolation, Decimation, Multi resolution representations, Wavelets, Application-image blending.
UNIT III	**Model Fitting and Optimization** **Scattered data interpolation**-radial basis functions, Overfitting and Underfitting, Robust data fitting, Markov Random fields **Recognition**-Instance recognition, Image classification-Feature based methods, Application-visual similarity search, face recognition, **Object detection**-Face detection, pedestrian detection, general object detection
UNIT IV	**Feature detection and matching** **Points and Patches**-Feature detectors, feature descriptors, Feature matching, Large scale matching and indexing, Feature tracking, Application-performance driven animation **Edges and Contours**-Edge detection, Contour detection, Application-edge editing and enhancement **Segmentation**-Graph based segmentation, mean shift, Normalized cuts.
UNIT V	**Image alignment and Stiching** **Pair wise alignment**-2D alignment using least squares, Iterative algorithms **Image Stiching**-Parametric motion models, Application-white board and document scanning, Rotational Panoramas, Gap closing

TEXT BOOKS	
1.	**<u>Computer Vision: Algorithms and Applications, by Richard Szeliski</u>**, Springer, 2010.
2.	Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclov Halvoc, Roger Boyle,

	Cengage Learning, 3ed, (Unit III, Unit IV, Unit V)

REFERENCE BOOKS

1.	Learning OpenCV, by Gary Bradski & Adrian Kaehler, O'Reilly Media, 2008.
2.	Multiple View Geometry in Computer Vision, 2nd Edition, by R. Hartley, and A. Zisserman, Cambridge University Press, 2004.
3	Computer Vision: A Modern Approach, by D.A. Forsyth and J. Ponce, Prentice Hall, 2002.
4	Pattern Classification (2nd Edition), by R.O. Duda, P.E. Hart, and D.G. Stork, Wiley-Interscience, 2000.

WEB RESOURCES

1.	https://analyticsindiamag.com/from-books-to-tutorial-check-out-the-top-7-resources-to-learn-computer-vision/
2.	https://tryolabs.com/resources/introductory-guide-computer-vision/
3.	https://onlinecourses.nptel.ac.in/noc19_cs58/preview

IV Year I Semester
Professional Elective-IV
<u>DESIGN PATTERNS</u>
(Common to CSE & IT)

Course Category:	Professional Elective	Course Code:	19CS7T31
Course Type:	Theory	L-T-P-C:	3-0-0-3
Prerequisites:	UML	Internal Evaluation: Semester End Evaluation: Total Marks:	30 70 100

COURSE OBJECTIVES	
1	To improve software design with design patterns.
2	To understand and implement design patterns providing solutions to real world software Design problems
3	Apply UML based software design into pattern based design using design patterns

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	List various Design patterns	K2
CO2	Enumerate the concepts of Creational Patterns	K2
CO3	Choose an appropriate design pattern to solve a problem.	K2
CO4	Summarize Structural Patterns	K2
CO5	Enumerate the concepts of Behavioral Patterns.	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	2	2	-	-	-	-	-	-	-	2	2	-
CO	2	1	1	-	2	-	-	-	-	-	1	-	2	2	-

2															
CO 3	3	2	2	2	2	-	-	-	-	-	-	-	2	2	-
CO 4	3	2	2	2	2	-	-	-	-	-	-	-	2	2	-
CO 5	3	2	2	2	2	-	-	-	-	-	-	-	2	2	-

COURSE CONTENT	
UNIT I	**Design Pattern:** Introduction, Design Patterns in Smalltalk MVC, Describing Design Patterns,The Catalog of Design Patterns, How Design Patterns Solve Design Problems.
UNIT II	**Creational Patterns:** Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discuss of Creational Patterns
UNIT III	Patterns & Pattern Description, organizing catalogs, Design pattern space, Role in solving design problems, how to select a design pattern, How to use a design pattern.
UNIT IV	**Structural Patterns:** Adapter, Bridge, Composite, Decorator, Façade, Flyweight, proxy, Discuss ofStructural Patterns.
UNIT V	**Behavioral Patterns**, Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor,Discuss of Behavioral Patterns

TEXT BOOKS	
1.	"Design Patterns," Erich Gamma, Pearson Education,1995
REFERENCE BOOKS	
1.	"Software Design," David Budgen, Pearson education, secondedition,2003.
2.	"Head First Design patterns," Eric Freeman & Elisabeth Freeman, O'REILLY,2007.
WEB RESOURCES	
1.	http://en.wikibooks.org/wiki/Introduction to Software Engineering/Architecture/DesignPatterns
2.	https://msdn.microsoft.com/en-us/library/ee658117.aspx

IV Year I Semester
Professional Elective-IV
SOCIAL NETWORK ANALYSIS
(Common to CSE & IT)

Course Category	Professional Elective	Course Code	19CS7T32
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Graph Theory	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To understand the concept of semantic web and related applications.
2	To learn knowledge representation using ontology.
3	To understand human behavior in social web and related communities.
4	To learn visualization of social networks.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO-1	Develop semantic web related applications.	K3
CO-2	Represent knowledge using ontology.	K3
CO-3	Summarize Mining Communities in Social Networks.	K2
CO-4	Predict human behaviour in social web and related communities.	K3
CO-5	Visualize social networks.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0
CO	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0

2														
CO 3	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
CO 4	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
CO 5	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0

COURSE CONTENT	
UNIT I	**INTRODUCTION:** Introduction to Semantic Web: Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Social Network analysis: Development of Social Network Analysis – Key concepts and measures in network analysis – Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web-based networks – Applications of Social Network Analysis.
UNIT II	**Modeling, Aggregating and Knowledge Representation** Ontology and their role in the Semantic Web: Ontology-based knowledge Representation – Ontology languages for the Semantic Web: Resource Description Framework – Web Ontology Language – Modeling and aggregating social network data: State-of-the-art in network data representation – Ontological representation of social individuals – Ontological representation of social relationships – Aggregating and reasoning with social network data – Advanced representations.
UNIT III	**Communities in Web Social Networks** Extracting evolution of Web Community from a Series of Web Archive – Detecting communities in social networks – Definition of community – Evaluating communities **Mining Communities in Web Social Networks** : Methods for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities – Decentralized online social networks – Multi-Relational characterization of dynamic social network communities.
UNIT IV	**Predicting Human Behaviour and Privacy Issues** Understanding and predicting human behaviour for social communities – User data management – Inference and Distribution – Enabling new human experiences – Reality mining – Context – Awareness – Privacy in online social networks – Trust in online environment – Trust models based on subjective logic – Trust network analysis – Trust transitivity analysis – Combining trust and reputation – Trust derivation based on trust comparisons – Attack spectrum and countermeasures.
UNIT V	**Visualization and Applications of Social Networks** Graph theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing social networks with matrix-based representations – Matrix and Node-Link Diagrams – Hybrid representations – Applications – Cover networks – Community welfare – Collaboration networks – Co-Citation networks.

TEXT BOOKS	
1.	Peter Mika, ―Social Networks and the Semantic Web, First Edition, Springer 2007.
2.	Borko Furht, ―Handbook of Social Network Technologies and Applications, 1st Edition, Springer, 2010.
REFERENCE BOOKS	
1.	Guandong Xu, Yanchun Zhang and Lin Li, Web Mining and Social Networking – Techniques and applications, First Edition, Springer, 2011.
2.	Dion Goh and Schubert Foo - Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively, IGI Global Snippet, 2008.
3.	Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling, IGI Global Snippet, 2009.
4.	John G. Breslin, Alexander Passant and Stefan Decker, -The Social Semantic Web, Springer, 2009.
WEB RESOURCES	
1.	http: // www.sciencedirect.com
2.	https://onlinecourses.nptel.ac.in/noc19_cs66/preview

IV Year I Semester
Professional Elective-IV
<u>Block Chain Technology</u>

Course Category	Professional Elective		Course Code	19IT7T13
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites			**Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES

1	Understand how block chain systems (mainly Bitcoin and Ethereum) work and to securely interact with them
2	Design, build, and deploy smart contracts and distributed applications,
3	Integrate ideas from block chain technology into their own projects.

COURSE OUTCOMES		Cognitive level
Upon successful completion of the course, the student will be able to:		
CO1	Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding	K2
CO2	Identify the risks involved in building Block chain applications	K2
CO3	Review of legal implications using smart contracts	K1
CO4	Choose the present landscape of Block chain implementations and understand Crypto currency markets	K2
CO5	Examine how to profit from trading crypto currencies	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
19IT7T13.1	2	2	1	1	-	-	-	-	-	-	-	-	2	2	1
19IT7T13.2	2	3	1	1	-	-	-	-	-	-	-	-	1	2	2
19IT7T13.3	2	3	1	1	-	-	-	-	-	-	-	-	1	2	2
19IT7T13.4	2	2	1	1	-	-	-	-	-	-	-	-	2	2	1

19IT7T13.5	2	3	1	1	-	-	-	-	-	-	-	-	1	2	2

COURSE CONTENT	
UNIT I	**Evolution of Blockchain:** Evolution of Computer Applications, Centralized Applications, Decentralized Applications, Stages in Blockchain Evolution, Consortia, Forks, Public Blockchain Environments. Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on blockchain, data storage on blockchain, wallets,
UNIT II	**BLOCKCHAIN CONCEPTS:** Coding on blockchain: smart contracts, peer-to-peer network, types of blockchain nodes, risk associated with blockchain solutions, life cycle of blockchain transaction.
UNIT III	**ARCHITECTING BLOCKCHAIN SOLUTIONS:** Introduction, Obstacles for Use of Blockchain, Blockchain Relevance Evaluation Framework, Blockchain Solutions Reference Architecture, Types of Blockchain Applications, Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Blockchain Solutions, Architecture Considerations, Architecture with Blockchain Platforms, Approach for Designing Blockchain Applications.
UNIT IV	**ETHEREUM BLOCKCHAIN IMPLEMENTATION:** Introduction, Tuna Fish Tracking Use Case, Ethereum Ecosystem, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, My Ether Wallet, Ethereum Networks/Environments, Infura, Ether scan, Ethereum Clients, Decentralized Application, Metamask
UNIT V	**HYPERLEDGER BLOCKCHAIN IMPLEMENTATION:** Introduction, Use Case – Car Ownership Tracking, Hyperledger Fabric, Hyperledger Fabric Transaction Flow, Fab Car Use Case Implementation, Invoking Chain code Functions Using Client Application.

TEXT BOOKS	
1.	"Blockchain for Enterprise Application Developers", Ambadas, Arshad SarfarzAriff, Sham - Wiley
2.	"Mastering Bitcoin: Programming the Open Blockchain", Andreas M. Antonpoulos, O'Reilly

REFERENCE BOOKS	
1.	Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill.
2.	Blockchain: Blueprint for a New Economy, Melanie Swan, O'Reilly

WEB RESOURCES	
1.	https://github.com/blockchainedindia/resources

IV Year I Semester
Professional Elective-IV
High Performance Computing

Course Category	Professional Elective		Course Code	19IT7T14
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites			**Internal Assessment**	**30**
			Semester End Examination	**70**
			Total Marks	**100**

COURSE OBJECTIVES	
1.	Provide systematic and comprehensive treatment of the hardware and the software high performance techniques involved in current day computing
2.	Introduce the learner to fundamental and advanced parallel algorithms through the GPU programming environments

COURSE OUTCOMES		Cognitive level
Upon successful completion of the course, the student will be able to:		
CO1	Parallel programming models	K2
CO2	Implement matrix multiplication using Pthreads	K3
CO3	Apply Open MP directives to solve problems	K3
CO4	Develop parallel sorting and searching algorithms using MPI primitives	K3
CO5	Implement matrix multiplication using CUDA	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
19IT7T14.1	2	3	3	3	3	1	-	-	-	-	-	-	2	1	1
19IT7T14.2	2	3	2	3	3	1	-	-	-	-	-	-	2	1	1
19IT7T14.3	2	3	3	3	3	1	-	-	-	-	-	-	1	1	1
19IT7T14.4	2	3	2	3	3	1	-	-	-	-	-	-	2	1	1
19IT7T14.5	2	3	3	3	3	1	-	-	-	-	-	-	2	1	1

COURSE CONTENT	
UNIT I	Introduction to Parallel hardware and software, need for high performance systems and Parallel Programming, SISD, SIMD, MISD, MIMD models, Performance issues, Processors, PThreads, Thread Creation, Passing arguments to Thread function, Simple matrix multiplication using Pthreads.
UNIT II	Critical sections, mutexes, semaphores, barriers and conditional variables, locks, thread safety, simple programming assignments.
UNIT III	OpenMP Programming: introduction, reduction clause, parallel for-loop scheduling, atomic directive, critical sections and locks, private directive, Programming assignments, n body solvers using OpenMP, Parallel sorting algorithms.
UNIT IV	Introduction to MPI programming: MPI primitives such as MPI_Send, MPI-Recv, MPI_Init, MPI Finalize, etc., Application of MPI to Trepizoidal rule, Collective Communication primitives in MPI, MPI derived datatypes, Performance evaluation of MPI programs, Tree search solved using MPI.
UNIT V	Introduction to GPU computing, Graphics pipelines, GPGPU, Data Parallelism and CUDA C Programming, CUDA Threads Organization, Simple Matrix multiplication using CUDA, CUDA memories.

TEXT BOOKS	
1.	An Introduction to Parallel Programming, Peter S Pacheco, Elsevier, 2011
2.	Programming Massively Parallel Processors, Kirk &Hwu, Elsevier, 2012

REFERENCE BOOKS	
1.	CUDA by example: An introduction to General Purpose GPU Programming, Jason, Sanders, Edward Kandrit, Perason, 2011
2.	CUDA Programming, Shame Cook, Elsevier
3.	High Performance Heterogeneous Computing, Jack Dongarra, Alexey &Lastovetsky , Wiley
4.	Parallel computing theory and practice, Michel J.Quinn, TMH

WEB RESOURCES	
1.	http://www.nptelvideos.in/2012/11/high-performance-computing.html
2.	https://www.netapp.com/data-storage/high-performance-computing/what-is-hpc/

IV Year I Semester
Professional Elective-IV
CLOUD COMPUTING
(Common to CSE & IT)

Course Category	Professional Elective	**Course Code**	19CS7T33
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern Cloud Environments
2	The student will be able to create a cloud account and develop and deploy small application on one of the public cloud offerings

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Differentiate among various cloud offerings, cloud environments, distributed and grid computing technologies	K2
CO2	Distinguish among various virtualization techniques	K2
CO3	Determine a cloud architecture for a given real world problem with respect to resource management and security management	K2
CO4	Design, develop and deploy a small application on commercial cloud platform like Amazon AWS, Microsoft Azure etc.	K3
CO5	Evaluate policies and mechanisms for resource management, performance, scheduling	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	3	1	3	0	0	0	0	0	0	0	0	1	1
CO 2	2	1	3	1	3	0	0	0	0	0	0	0	0	1	1

CO 3	2	1	3	1	3	0	0	0	0	0	0	0	0	1	1
CO 4	2	3	3	3	3	0	0	0	0	0	0	0	0	1	1
CO 5	2	1	3	3	3	0	0	0	0	0	0	0	0	1	1

COURSE CONTENT	
UNIT I	**Systems modeling, Clustering and virtualization:** 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.
UNIT II	**Virtual Machines and Virtualization of Clusters and Data Centers** : 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 Center Automation.
UNIT III	**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 :** Services and service oriented architecture, Message Oriented Middleware.
UNIT IV	**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.
UNIT V	**Cloud Resource Management and Scheduling:** Policies and Mechanisms for Resource Management, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time. **Storage Systems** : Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system.

TEXT BOOKS	
1.	"Distributed and Cloud Computing," Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier, 2012..
2.	"Cloud Computing, Theory and Practice," Dan C Marinescu, MK Elsevier, 2nd edition 2017.
3.	"Cloud Computing, A Hands-on approach,"ArshadeepBahga, Vijay Madisetti, University Press, 2014.

	REFERENCE BOOKS
1.	1. "Cloud Computing, A Practical Approach," Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH, 2010.
2.	"Mastering Cloud Computing, Foundations and Application Programming," Raj Kumar Buyya, Christen Vecctiola, S Tammaraiselvi, TMH, 2013.
	WEB RESOURCES
1.	https://docs.aws.amazon.com/gettingstarted/latest/deploy/overview.html
2.	https://www.techgig.com/webinar/Azure-Deploying-web-app-on-Azure-Web-Apps-and-management-1219
3.	https://www.codeproject.com/articles/880430/deploying-a-web-application-in-microsoft-azure

IV Year I Semester
Cryptography and Network Security Laboratory

Course Category	Professional Core		Course Code	19IT6L07
Course Type	Laboratory		L-T-P-C	0-0-3-1.5
Prerequisites			Internal Assessment	25
			Semester End Examination	50
			Total Marks	75

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		Cognitive level
Upon successful completion of the course, the student will be able to:		
CO1	Identify basic security attacks and services	K1
CO2	Use symmetric and asymmetric key algorithms for cryptography	K3
CO3	Make use of Authentication functions	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
19IT6L07.1	2	2	3	3									3		3
19IT6L07.2	2	2	3	3									3		3
19IT6L07.3	2	2	3	3									3		3

COURSE CONTENT	
1.	Write a C program that contains a string (char pointer) with a value \Hello World'. The program should XOR each character in this string with 0 and displays the result.
2.	Write a C program that contains a string (char pointer) with a value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the

	result.
3.	Write a Java program to perform encryption and decryption using the following algorithms: a) Ceaser Cipher b) Substitution Cipher c) Hill Cipher
4.	Write a Java program to implement the DES algorithm logic.
5.	Write a C/JAVA program to implement the BlowFish algorithm logic.
6.	Write a C/JAVA program to implement the Rijndael algorithm logic.
7.	Using Java Cryptography, encrypt the text "Hello world" using BlowFish. Create your own key using Java keytool.
8.	Write a Java program to implement RSA Algoithm.
9.	Calculate the message digest of a text using the SHA-1 algorithm in JAVA

IV Year I Semester
Object Oriented Analysis and Design using UML Laboratory
(Common to CSE & IT)

Course Category	Professional Core	Course Code	19CS7T25
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites		**Internal Assessment**	25
		Semester End Examination	50
		Total Marks	75

COURSE OBJECTIVES	
1	Identify Use Cases and develop the Use Case model.
2	Identity the conceptual classes and develop a domain model with UML Class diagram.
3	Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO-1	Demonstrate the installation of OOAD Software.	K3
CO-2	Implement the UML Diagrams for various Domains	K3
CO-3	Create UML designs for LMS, POS & OBS using the building blocks of UML.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	3	3	3	0	0	0	0	0	2	0	3	1	1
CO 2	3	3	3	3	3	0	0	0	0	0	2	0	3	1	1
CO 3	3	3	3	3	3	0	0	0	0	0	2	0	3	3	3

COURSE CONTENT	
1	Demonstration of Rational rose 98, ARGO UML and IBM RSA tools.
2	Draw class diagram and Use case diagram for Point of Sale System.
3	Draw class diagram and Use case diagram for Library Management system
4	Draw class diagram and Use case diagram for hospital management System
5	Draw class diagram and Use case diagram for Railway reservation System
6	Draw interaction diagrams for Point of Sale System
7	Draw interaction diagrams for Library Management system
8	Draw interaction diagrams for hospital management System
9	Draw interaction diagrams for Railway reservation System
10	Draw State chart diagram for Point of Sale System
11	Draw State chart diagram for Library Management system
12	Draw State chart diagram for hospital management System
13	Draw State chart diagram for Railway reservation System
14	Draw Component and Deployment diagrams for Point of Sale System
15	Draw Component and Deployment diagrams for Library Management system
16	Draw Component and Deployment diagrams for hospital management System
17	Draw Component and Deployment diagrams for Railway reservation System

IV Year II Semester
Management Science
(Common to Civil, EEE ,ECE, CSE and IT)

Course Category	Humanities including Management	Credits	3
Course Type	Theory	**Lecture-Tutorial-Practice**	3 -0 -0
Prerequisites		**Internal Assessment**	40
		Semester End Examination	60
		Total Marks	100

	Course Outcomes **On successful completion of the course, the student will be able to**	**Blooms Taxonomy Level**
CO 1	Understand management thoughts, motivational theories and types of organizations.	K1
CO 2	Apply the concepts of operations management, such as control charts, work study, materials management for smooth functioning of production units.	K3
CO 3	Understand the functional area of management.	K1
CO 4	Apply techniques of project management in controlling cost.	K3
CO 5	Classify the management practices with reference to current business scenario.	K1

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

					Contribution of Course Outcomes towards achievement of Program							
					Outcomes: 1 – Low, 2 - Medium, 3 – High							
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	0	0	0	0	0	2	0	0	2	1	1	0
CO2	0	2	0	1	0	0	0	1	0	0	0	1
CO3	0	1	0	0	0	1	0	1	3	0	0	1
CO4	0	3	0	0	0	0	0	0	0	0	3	0
CO5	0	0	0	0	1	0	0	0	1	1	1	2

Course Content:

Unit I

Introduction to Management: Concept –nature and importance of Management – Functions of Management – Evolution of Management thought- Theories of Motivation -Designing organization structure- Principles of organization - Types of organization structure (line, line and staff, functional, matrix, committee, boundary less and inverted pyramid organization structures)

Unit II

Operations Management: Production Management-functions– Work study- Statistical Quality Control- Control charts P-chart, R-chart, and C-chart (Simple problems)- Material Management: Need for Inventory control- EOQ (simple problems), ABC analysis and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

Unit III

Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager-Job Evaluation and Merit Rating, Balanced Score Card–Team Dynamics/Working in Teams

Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives, CSR Case studies

Unit IV

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems).

Unit V

Introduction to Contemporary Management Practices: Basic concepts of MIS, Just In

Time (JIT) system, Total Quality Management (TQM), Lean Six Sigma, People Capability Maturity Model, Supply Chain Management, Evolution of Enterprise Systems, Business Process Outsourcing (BPO), Business Process Re-Engineering.

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.
3. Dr. PG. Ramanujam, BVR Naidu, PV Rama Sastry : Management Science Himalaya Publishing House, 2013.

REFERENCES

1. Koontz & Weihrich: 'Essentials of Management' TMH 2011
2. Seth &Rastogi: Global Management Systems, Cengage Learning, Delhi, 2011.
3. Robbins: Organizational Behaviors, Pearson Publications, 2011
4. KanishkaBedi: Production & Operational Management, Oxford Publications, 2011.
5. Manjunath: Management Science, Pearson Publications, 2013.
6. Biswajit Patnaik: Human Resource Management, PHI, 2011.
7. Hitt and Vijaya Kumar: Strategic Management, Cengage Learning.
8. Management Shapers, Universities Press.
9. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications.
10.Principles of management and administration, D. Chandra Bose, Prentice Hall of India Pvt. Ltd. New Delhi.

Web Resources:
1.https://www.heflo.com/blog/business-management/small-business-organizational-structure-examples/
2.http://currentnursing.com/nursing_management/material_management_ABC_VED_HML_analysis.html
3.https://www.greycampus.com/blog/quality-management/a-brief-introduction-to-lean-and-six-sigma-and-lean-six-sigma

IV Year II Semester
Open Elective-III
REMOTE SENSING & GIS APPLICATIONS

Course Category	Open Elective	**Course Code**	19CE7T38
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	------	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	Introduce the basic principles of Remote Sensing and GIS techniques.
2	Learn various types of sensors and platforms.
3	Learn concepts of visual and digital image analyses.
4	Understand the principles of spatial analysis.
5	Appreciate application of RS and GIS to Civil engineering.

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Interpret the concepts of Photogrammetric and its applications such as determination of heights of objects on terrain.
CO2	Illustrate the Electromagnetic spectrum and utilize the energy interactions of EMR with atmosphere and earth surface features for GIS data generation
CO3	Analyze the methods of map projections and understand coordinate systems on GIS Software packages to produce high resolution thematic maps.
CO4	Apply the concepts of vector and raster data model for representation of topological earth features and its importance.
CO5	Apply the RS & GIS techniques for solving civil engineering applications

Contribution of Course Outcomes towards achievement of program														
Outcomes (1 - Low, 2- Medium, 3-High)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	2	2	-	1	-	-	2	-	2	-	1
CO2	2	1	1	1	2	2	-	1	-	-	2	-	2	-	1
CO3	2	2	-	2	2	2	-	1	-	-	2	-	2	-	1
CO4	2	2	1	2	2	2	-	1	-	-	2	-	2	-	1
CO5	2	3	1	3	2	3	-	1	-	-	2	-	2	-	1

COURSE CONTENT	
UNIT-I	**INTRODUCTION TO REMOTE SENSING:** Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems. **SENSORS AND PLATFORMS:** Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line
UNIT-II	**IMAGE ANALYSIS:** Introduction, elements of visual interpretations, digital image processing- image pre-processing, image enhancement, image classification, supervised classification, unsupervised classification.
UNIT-III	**GEOGRAPHIC INFORMATION SYSTEM (GIS):** Introduction, key components, application areas of GIS, map projections. Data entry and preparation: spatial data input, raster data models, vector data models.
UNIT-IV	**SPATIAL DATA ANALYSIS:** Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.
UNIT-V	**RS AND GIS APPLICATIONS GENERAL:** Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications **APPLICATION TO HYDROLOGY AND WATER RESOURCES:** Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management.

TEXT BOOKS	
1.	Bhatta B (2008), "Remote sensing and GIS", Oxford University Press.
2.	Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) "Remote Sensing and Image Interpretation", Wiley India Pvt. Ltd., NewDelhi
REFERENCE BOOKS	
1	Remote Sensing and its Applications" by Narayan LRA, Universities Press,2012.
3	Fundamentals of Remote Sensing" by George Joseph, Universities Press,2013.
4	Fundamentals of Geographic Information Systems" by Demers, M.N, Wiley India Pvt. Ltd,2013
5	Basics of Remote sensing & GIS" by Kumar S, Laxmi Publications, New Delhi, 2005.
6	Principals of Geographical Information Systems" by Burrough P A and R.A. McDonnell, Oxford University Press,1998.
WEB REFERENCES	
	www.nptel.ac.in/courses

IV Year II Semester

Open Elective-III
Power Electronics

Course Category	Open Elective	Course Code	19EE8T12
Course Type	Theory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**N A**	**Internal Assessment**	**30**
		Semester End Examination	**70**
		Total	
		Marks	**100**

COURSE OBJECTIVES	
1	Study the characteristics of various power semiconductor devices and designing the firing circuits for SCR.
2	Understand the operation of single phase half and fully controlled converters.
3	Study the operation of three phase fully controlled converters and semi converters
4	Analyze the operation of high frequency DC–DC converters.
5	Understand the working of inverters and application of PWM techniques for voltage control.
6	Study the operation of AC – AC converters.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:	**Cognitive Level**	
CO1	Interpret the characteristics of various power semiconductor and design firing circuits for SCR.	Understand	K2
CO2	Distinguish the operation of single phase half, fully controlled converters and dual converter.	Analysis	K4
CO3	Relate the operation of three phase fully converters.	Knowledge	K1
CO4	State the operation of dc–dc converters.	Understand	K2
CO5	Analyze the working of inverters and application of PWM techniques for voltage control.	Analysis	K4
CO6	Describe the operation of AC-AC converters.	Understand	K 2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3
Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
CO 1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 2	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	-	-	2	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	-	2	2	-	-	-	-	-	-	-	-	-	-
CO 5	1	2	-	2	-	-	-	-	-	-	-	-	-	-	-

COURSE CONTENT	
UNIT 1	**Introduction** Basic Theory of Operation - Static Characteristics-Two Transistors analogy -Turn on and Turn off Methods - Methods of SCR Triggering – Static, Dynamic & Gate Characteristics of SCR –Series and Parallel Operation ,Snubber circuit - Characteristics of Power MOSFET and IGBT.
UNIT 2	**Single Phase AC-DC Converters** Single Phase half wave controlled rectifiers - R load and RL load with and without freewheeling diode - Single Phase fully controlled bridge converter with R load, RL load and RLE load - Continuous and Discontinuous conduction - Effect of source inductance in 1-phase fully controlled bridge rectifier with continuous conduction, Expression for output voltages – Single Phase semi Converter with R load, RL load and RLE load – Continuous and Discontinuous conduction – Input power factor- Single Phase Dual Converters - Numerical Problems
UNIT 3	**Three Phase AC-DC Converters & AC – AC Converters** Three Phase half wave Rectifier with R and RL load -Three Phase fully controlled rectifier with R and RL load - Three Phase semi converter with R and RL load - Expression for Output Voltage - Three Phase Dual Converters - Numerical Problems. AC-AC power control by phase angle control with R and RL loads - Three phase AC voltage regulator with R load, Single phase step down Cyclo-converter -

	Numerical Problems.
UNIT 4	**DC–DC Converters** Operation of Basic Chopper - Classification - Control Techniques - Analysis of Buck, Boost and Buck-Boost converters in Continuous Conduction Mode (CCM) and Discontinuous Conduction Modes (DCM) , Output voltage equations using volt-sec balance in CCM & DCM – Expressions for output voltage ripple and inductor current ripple- Numerical Problems.
UNIT 5	**DC–AC Converters** Introduction - Classification - Single Phase half bridge and full bridge inverters with R and RL loads –square wave output- Quasi-square wave pulse width modulation- Sinusoidal Pulse Width Modulation - Unipolar & Bipolar Switching - Three Phase inverters - 120^0 conduction and 180^0 conduction modes of operation – Sinusoidal PWM - Numerical Problems.

TEXT BOOKS	
1	Power Electronics: Converters, Applications and Design by Ned Mohan, Tore M Undeland, William P Robbins, John Wiley & Sons.
2	Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
3	Power Electronics: Essentials & Applications by L.Umanand, Wiley, Pvt. Limited, India, 2009.
REFERENCE BOOKS	
1	Elements of Power Electronics–Philip T.Krein.oxford.
2	Power Electronics – by P.S.Bhimbra, Khanna Publishers.
3	Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
4	Power Electronics: by Daniel W.Hart, Mc Graw Hill.
WEB RESOURCES (Suggested)	
1	https://nptel.ac.in/courses/108/102/108102145/
2	https://nptel.ac.in/courses/108/101/108101038/

IV Year II Semester
Open Elective-III
Biomedical Instrumentation

Course Category	Open Elective	Course Code	19EC8T33
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Basic knowledge on physics, chemistry, and mathematics	**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To study bioelectrodes, bioamplifier, and measurement of physiological parameters.
2	To study the communication mechanics in a biomedical system with few examples.
3	Analyze the function of heart
4	To study EEG and EMG machines, recordings and interpretations.
5	To understand therapeutic and cardic instrumentation

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	**Cognitive Level**
CO1	The concept of biomedical instrumentation.	K2
CO2	Ability to understand the philosophy of the heart, lung, blood circulation and respiration system.	K2
CO3	Analyse ECG recordings for disorder identification	K3,k4
CO4	Analyse EEG and EMG recordings for disorder identification	K3,k4
CO5	Ability to understand the analysis systems of various organ types	K2,k3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	1	0	0	0	0	0	0	0	0	0	1	0
CO2	2	3	1	0	0	0	0	0	0	0	0	0	1	0
CO3	1	1	3	0	0	0	0	0	0	0	0	0	0	1
CO4	0	1	2	3	0	0	0	0	0	0	0	0	0	1
CO5	0	0	1	1	2	0	0	0	0	0	0	0	1	0

COURSE CONTENT	
UNIT I	**Components of Medical Instrumentation & System:** Bio Electrodes: Bio-potential Electrodes-External electrodes, Internal Electrodes. Biochemical Electrodes. Bio-amplifier. Static and dynamic characteristics of medical instruments.
UNIT II	**Organization of cell**: Nernst equation for membrane Resting Potential Generation and Propagation of Action Potential, Conduction through nerve to neuromuscular junction. Bio-signals and characteristics. Problems encountered with measurements from human beings.
UNIT III	**Mechanical function**: Electrical Conduction system of the heart. Cardiac cycle. Relation between electrical and mechanical activities of the heart. **Cardiac Instrumentation**: Blood pressure and Blood flow measurement. Specification of ECG machine. Einthoven triangle, Standard 12-lead configurations, Interpretation of ECG waveform with respect to electro mechanical activity of the heart**.**
UNIT IV	**Neuro-Muscular Instrumentation**: Specification of EEG and EMG machines. Electrode placement for EEG and EMG recording. Interpretation of EEG and EMG.
UNIT V	**Therapeutic equipment**: Pacemaker, Defibrillator, Shortwave diathermy. Haemodialysis machine**. Respiratory Instrumentation:** Mechanism of respiration, Spirometry, Pnemuotachograph Ventilators.

TEXT BOOKS	
1.	Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, New Delhi,2nd edition, 2003.
2.	John G. Webster, Medical Instrumentation, Application and Design, John Wiley.
REFERENCE BOOKS	
1.	L.A. Geoddes and L.E. Baker, Principles of Applied Biomedical Instrumentation, John Wiley
2.	Carr & Brown, Biomedical Equipment Technology, Pearson.
WEB RESOURCES	
1.	http://www.digimat.in/nptel/courses/video/108105101/L28.html

IV Year II Semester
Open Elective-III
SUPPLY CHAIN MANAGEMENT
(Mechanical Engineering)

Course Category	Open Elective	Course Code	19ME6T29
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Nil	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To understand importance of Supply chain management frame work in business management
2	To learn Supply Chain Drivers and Metrics
3	To impart knowledge on Designing Supply Chain Network
4	To understand forecasting and risk management
5	To understand aggregate planning and inventory

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Explain the importance of Supply chain management frame work in business management	K2
CO2	Illustrate Supply Chain Drivers and Metrics to determine the supply chain's performance in terms of responsiveness and efficiency	K2
CO3	Apply supply chain network aspects for various manufacturing sectors	K3
CO4	Explain the role of forecasting in supply chain management	K2
CO5	Apply the concept of aggregate planning and inventory decisions in supply chain	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)x

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	--	--	--	--	--	1	--	--	1	--	--	--	--	--	--
CO 2	--	--	--	--	--	2	--	--	2	--	1	--	1	--	--
CO 3	--	1	--	--	--	1	--	--	2	--	1	2	1	--	--
CO 4	--	--	--	--	--	2	--	--	1	--	2	2	2	--	--
CO 5	--	1	2	--		2	--	--	1	--	2	2	2	--	--

COURSE CONTENT

UNIT I
Strategic Framework: Introduction to Supply Chain Management, Decision phases in a supply chain, Process views of a supply chain: push/pull and cycle views, Achieving Strategic fit, Expanding strategic scope.

UNIT II
Supply Chain Drivers and Metrics: Drivers of supply chain performance, Framework for structuring Drivers, Obstacles to achieving strategic fit.

UNIT III
Designing Supply Chain Network: Factors influencing Distribution Network Design, Design options for a Distribution network, E-Business and Distribution network, Framework for Network Design Decisions, Models for Facility Location and Capacity Allocation.

UNIT IV
Forecasting in SC: Role of forecasting in a supply chain, Components of a forecast and forecasting methods, Risk management in forecasting.

UNIT V
Aggregate Planning and Inventories in SC: Aggregate planning problem in SC, Aggregate Planning Strategies, Planning Supply and Demand in a SC, Managing uncertainty in a SC: Safety Inventory. Coordination in SC: Modes of Transportation and their performance characteristics, Supply Chain IT framework, Coordination in a SC and Bullwhip Effect.

TEXT BOOKS
1. Sunil Chopra and Peter Meindl, Supply Chain Management - Strategy, Planning and Operation,4th Edition, Pearson Education Asia, 2010.
2. David Simchi-Levi, PhilpKamintry and Edith Simchy Levy, Designing and Managing the Supply Chain - Concepts Strategies and Case Studies, 2nd Edition, Tata-McGraw Hill, 2000.

REFERENCE BOOKS
1. Supply Chain Management: A Logistics Perspective, Hardcover Book, Coyle, John J. (Author),
2. Strategic Supply Chain Management: The Five Core Disciplines for Top Performance, Second Edition, McGraw-Hill, Cohen, Shoshanah (Author)

WEB RESOURCES
1. https://www.youtube.com/watch?v=raqi4gjMLm8
2. https://www.youtube.com/watch?v=Nrl0CtS1m8Y

IV Year II Semester
Open Elective-III
Marketing Management
(Common to Mech, CSE and IT)

Course	Open Elective	Credits	3
Course Type	Theory	**Lecture-Tutorial-Practice**	3 -0 -0
Prerequisites		**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

Course Outcomes		Blooms Taxonomy Level
On successful completion of the course, the student will be able to		
CO 1	Understand the concepts of Marketing and Marketing Environment.	Understanding
CO 2	Analyze the consumer behavior and market segmentation in order to maintain better consumer relations and product positioning respectively.	Analyzing
CO 3	Make use of strategies and make decisions based on product life cycle and product mix concepts.	Application
CO 4	Understand the pricing effects and select a better distribution channel to reach the consumer.	Understanding
CO 5	Understand the promotional methods and importance.	Understanding

Contribution of Course Outcomes towards achievement of Program												
Outcomes: 1 – Low, 2 - Medium, 3 – High												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	0	2	0	0	1	1	1	0	1	1	0
CO2	0	0	1	0	0	1	0	2	1	0	1	0
CO3	1	0	1	2	1	2	1	1	0	0	1	1
CO4	0	0	1	0	0	1	0	1	0	0	1	0
CO5	0	0	0	0	0	1	1	1	1	1	1	1

Course Content :

Unit -I
Introduction to Marketing: Market and Marketing, Functions, importance and problems of marketing – Marketing Environment, Approaches to the study of marketing; systems approach to marketing.

Unit -II
Consumer Behavior and CRM
Meaning and features and Factors influencing Consumer Behavior – Theories of Buying Behavior (Economic theories – Marshallion model, psychological theories, psycho-analytic theories, socio-cultural theories) – buying decision process - Customer Relationship Management.
Market Segmentation
Market Segmentation – Bases of Segmenting Consumer Market and Industrial
Market – Target Marketing – Product differentiation – Product Positioning.

Unit -III
Product decision: New product development – Product mix – management of product life cycle – product strategies – product additions and deletions .

Branding, packaging and labeling – product differentiation – planned obsolescence.

Unit –IV Pricing and Channels of distribution:
Pricing: Pricing objectives – Pricing methods – Pricing strategies.
Channels of Distribution: Nature and types of marketing channels – wholesale distribution-retail distribution – direct marketing – selection of channels, Logistics, Third Party Service providers.

Unit –V Promotion : Nature and Importance of promotion – promotional methods of personal selling : objectives and function, Advertising objectives – Message content – media selection – Advertising agency – Advertising Budgets – Measuring Advertising effectiveness; Sales promotion Techniques – Social Media Promotion

Textbooks:

1. Marketing Management by Dr. K. Karunakaran – Himalaya Publishing House.
2. Marketing Management by S. A. Sherlekar – Himalaya Publishing House.

Reference Books :
1. Marketing Management by Philip Kotler.
2. Marketing Management by Priyanka Goel.
3. Marketing Management by Philip Kotler and Lane Keller
4. Marketing by L.Natarajan

Web Resources:
1. https://www.tutorialspoint.com/marketing_management/marketing_management_functions
2. https://keydifferences.com/difference-between-branding-and-packaging.html
3. https://smallbusiness.chron.com/product-mix-639.html

IV Year II Semester
Professional Elective-V
<u>**AGILE METHODOLOGIES AND DEVOPS**</u>

Course Category	Professional Elective	**Course Code**	19CS8T34
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Software Engineering	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To provide students with a theoretical as well as practical understanding of agile software.
2	To learn the key concepts and principles of DevOps along with the business benefits of DevOps and continuous delivery.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Apply a thorough understanding of Agile principles and specific practices	K3
CO2	Apply the fundamental principles and practices associated with each of the agile development method	K3
CO3	Summarize the best practices of a generation of industry luminaries through the use of innovative management techniques.	K2
CO4	Enumerate the basic concepts of DevOps and how it utilizes Lean and Agile methodologies to drive product-focused development.	K2
CO5	Apply the knowledge of DevOps as a practice, methodology and process for fast collaboration, integration and communication between Development and operations team.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	3	3	2	1	0	0	0	0	0	0	0	2	3	2
CO2	3	3	3	2	1	0	0	0	0	0	0	0	2	3	2
CO3	3	3	3	2	2	0	0	0	0	0	0	0	2	3	3
CO4	3	3	3	3	3	0	0	0	0	0	0	0	2	3	3

CO5	3	3	3	3	3	0	0	0	0	0	0	0	2	3	3

COURSE CONTENT

UNIT I	Agile Methodology: Theories for Agile Management, Agile Software Production Metrics, Agile Project Management, Agile Project Planning, Agile Development Management
UNIT II	An Agile Maturity Model, Setting the Governing Rules, Staffing Decisions, Operations Review, Agile Management in the IT Department.
UNIT III	Production Metrics in FDD,Project Management with FDD,FDD Process Elements Explained Production Metrics in Extreme Programming,XP Process Elements Explained.
UNIT IV	The Big Picture,What is DevOps,A History of DevOps,Foundational Terminology and Concepts, DevOps Misconceptions and Anti-Patterns,The Four Pillars of Effective DevOps
UNIT V	Tools: Ecosystem Overview,Tools: Accelerators of Culture,Tools: Misconceptions and Troubleshooting,Scaling: Inflection Points,Scaling: Misconceptions and Troubleshooting, Building Bridges with the Four Pillars of Effective Devops

TEXT BOOKS	
1.	David J. Anderson and Eli Schragenheim, "Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results", Prentice Hall, 2003.
2.	Hazza and Dubinsky, "Agile Software Engineering, Series: Undergraduate Topics in Computer Science", Springer,2009.
3.	Jennifer Davis and Ryn Daniels, Effective DevOps: Building a Culture of Collaboration, Affinity, and Tooling at Scale (1 ed.), O'Reilly Media, 2016. ISBN 978-9352133765.

REFERENCE BOOKS	
1.	Craig Larman, "Agile and Iterative Development: A Manager's Guide", Addison-Wesley,2004.
2.	Joseph Joyner, DevOps for Beginners: DevOps Software Development Method Guide for Software Developers and IT Profes (1 ed.), Mihails Konoplovs, 2015. ISBN 978-1682122105.

WEB RESOURCES	
1.	http://agilemanifesto.org/
2.	http://davidfrico.com/rico08b.pdf
3.	http://www.goodagile.com/index.html
4.	http://www.mountaingoatsoftware.com/topics/scrum
5.	http://www.scrumalliance.org/
6.	https://www.guru99.com/devops-tutorial.html
7.	https://www.javatpoint.com/devops

IV Year II Semester
Professional Elective-V
<u>Machine Learning</u>

Course Category	Professional Elective		**Course Code**	19IT7T12
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites			**Internal Assessment**	30
			Semester End Examination	70
			Total Marks	100

COURSE OBJECTIVES	
1	Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues
2	Ability to identify information system requirements for both of them such as client and server
3	Ability to understand the current legal issues towards information security

COURSE OUTCOMES		**Cognitive level**
Upon successful completion of the course, the student will be able to:		
CO1	Explain the definition and usage of the term 'the internet of things' in different contexts	K2
CO2	Demonstrate on various network protocols used in IoT	K2
CO3	Analyze on various key wireless technologies used in IoT systems, such as WiFi, 6LoWPAN, Bluetooth and ZigBee	K4
CO4	Illustrate on the role of big data, cloud computing and data analytics in IoT system	K2
CO5	Design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
19IT7T12.1	2	1	2	1	1	-	-	-	-	-	-	-	2	1	2
19IT7T12.2	2	2	2	1	1	-	-	-	-	-	-	-	2	1	2
19IT7T12.3	3	2	2	2	1	-	-	-	-	-	-	-	2	1	2
19IT7T12.4	3	2	2	1	-	-	-	-	-	-	-	-	2	1	2
19IT7T12.5	2	1	2	1	1	-	-	-	-	-	-	-	2	1	2

COURSE CONTENT	
UNIT I	**Statistical Learning-** Machine Learning and Inferential Statistical Analysis, Descriptive Statistics in learning techniques, Bayesian Reasoning: A probabilistic approach to inference, K-Nearest Neighbor Classifier. Discriminant functions and regression functions, Linear Regression with Least Square Error Criterion, Logistic Regression for Classification Tasks, Fisher's Linear Discriminant and Thresholding for Classification, Minimum Description Length Principle.
UNIT II	**Supervised Learning-** Rationale and Basics: Learning from Observations, Bias and Why Learning Works: Computational Learning Theory, Occam's Razor Principle and Overfitting Avoidance Heuristic Search in inductive Learning, Estimating Generalization Errors, Metrics for assessing regression, Metris for assessing classification.
UNIT III	**Decision Tree Learning:** Introduction, Example of classification decision tree, measures of impurity for evaluating splits in decision trees, ID3, C4.5, and CART decision trees, pruning the tree, strengths and weakness of decision tree approach, Random Forest
UNIT IV	**Support Vector Machines (SVM) -** Introduction, Linear Discriminant Functions for Binary Classification, Perceptron Algorithm, Large Margin Classifier for linearly seperable data, Linear Soft Margin Classifier for Overlapping Classes, Kernel Induced Feature Spaces, Nonlinear Classifier, Regression by Support vector Machines.
UNIT V	**Learning with Neural Networks:** Towards Cognitive Machine, Neuron Models, Network Architectures, Perceptrons, Linear neuron and the Widrow-Hoff Learning Rule, The error correction delta rule. **Multilayer Perceptron** Networks and error back propagation algorithm, Radial Basis Functions Networks.

TEXT BOOKS	
1.	Applied Machine Learning, M.Gopal, McGraw Hill Education, 2019.
2.	Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009

REFERENCE BOOKS	
1.	Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press,2012
2.	Tom Michel, Machine Learning, McGraw Hill, 1997
3.	Christopher Bishop, Pattern Recognition and Machine Learning, Springer,2007.

WEB RESOURCES	
1.	https://nptel.ac.in/courses/106/106/106106139/

IV Year II Semester
Professional Elective-V
Digital Forensics
(Common to CSE & IT)

Course Category	Professional Elective	Course Code	19CS8T35
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Cyber Security	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	Analyze and conduct a computer forensics examination and report the findings that will lead to the incarceration of the perpetrators and Learn different aspects of digital evidence
2	Acquire Knowledge on Network Forensics, Advanced Computer Forensics that protects information assets from potential intrusion, damage, or theft.

COURSE OUTCOMES		BTL
Upon successful completion of the course, the student will be able to:		
CO1	Enumerate computer forensics services, computer forensics tools and techniques.	K2
CO2	Analyze types of forensic systems for investigations.	K4
CO3	Make use of computer forensic services and data recovery techniques	K3
CO4	Identify potential sources of electronic evidence for maintaining the integrity of digital evidence using computer-based applications and utilities.	K2
CO5	Analyze network-based applications and Advanced Computer Forensics.	K4

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	3	2	3	0	0	0	0	0	0	3	3	3	0
CO 2	3	2	3	3	3	0	0	0	0	0	0	3	2	3	0
CO 3	3	3	3	3	2	0	0	0	0	0	0	0	3	2	0

CO 4	3	3	2	3	2	0	0	0	0	0	0	0	3	2	0
CO 5	3	3	3	3	2	0	0	0	0	0	0	3	3	2	0

COURSE CONTENT	
UNIT I	**Computer Forensics Fundamentals:** What is Computer Forensics? Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists. Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic Technology — Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find it.
UNIT II	**Types of Computer Forensics System:** Internet Security Systems, Intrusion Detection Systems, Firewall Security Systems, Storage Area Network Security Systems, Network Disaster Recovery Systems, Public Key Infrastructure Systems, Wireless Network Security Systems, Satellite Encryption Security Systems, Instant Messaging (IM) Security Systems, Net Privacy Systems, Identity Management Security Systems, Identity Theft, Computer Forensics
UNIT III	**Computer Forensics Services:** Occurrence of Cyber Crime, Cyber Detectives, Cyber Crime with Risk Management Techniques, Computer Forensics Investigative Services, Forensics Process Improvement. **Data Recovery:** Data Recovery Defined, Data backup and recovery, Role of Backup in Data Recovery, Data Recovery Solution, Hiding and Recovering Hidden Data. Evidence Collection and Data Seizure: Why Collect Evidence? Collection Options — Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure
UNIT IV	**Duplication and Preservation of Digital Evidence** - Preserving the Digital Crime Scene — Computer Evidence Processing Steps — Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication — Practical Consideration —Practical Implementation. **Computer Forensics Analysis:** Discovery of Electronic Evidence, Identification of Data, Reconstructing of Past Events.
UNIT V	**Network Forensics:** Network Forensics Scenario, A Technical Approach, Destruction of Email, Damaging of Computer Evidence, Tools needed for intrusion response to the destruction of data, System testing. Advanced Computer Forensics – Advanced Encryption, Advanced Hacking, Advanced Trackers hackers, The Problems of the Present.
TEXT BOOKS	
1.	"Computer Forensics, Computer Crime Investigation," John R. Vacca, Firewall Media, New Delhi, 2010.
2.	"Computer Forensics and Investigations," Nelson, Phillips Enfinger, Steuart, CENGAGE Learning, 2014.
REFERENCE BOOKS	

1.	"Real Digital Forensics," Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison- Wesley Pearson Education, 2006.
2.	"Forensic Compiling, A Tractitioneris Guide," Tony Sammes and Brian Jenkinson, Springer International edition, 2005.
3.	"Computer Evidence Collection & Presentation," Christopher L.T. Brown, Firewall Media, MA, 2nd edition, 2006.
WEB RESOURCES	
1.	https://www.cs.nmt.edu/~df/lectures.html
2.	https://www.lynda.com/Developer-tutorials/Computer-Forensics-Essential-Training/170337-2.html

IV Year II Semester
Professional Elective-V
SERVER SIDE SCRIPTING LANGUAGES
(Common to CSE and IT)

Course Category	Professional Elective	**Course Code**	19CS8T36
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Basics of Programming Languages	**Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web.
2	This course will help the student to learn and develop interface with client side technologies.

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	List the concepts of scripting languages	K2
CO2	Summarize the concepts of PHP scripting language.	K2
CO3	Build web applications using PHP & MySQL database	K3
CO4	Develop PERL scripts for web applications.	K3
CO5	Design applications using Ruby on Rails framework.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO 1	3	3	3	2	2	-	-	-	-	-	-	-	1	2	3
CO 2	3	2	3	2	3	-	-	-	-	-	-	-	3	2	3
CO 3	3	3	3	2	3	-	-	-	-	-	-	-	3	2	3
CO 4	3	3	2	2	3	-	-	-	-	-	-	-	3	2	3
CO	3	3	3	2	3	-	-	-	-	-	-	-	3	2	3

5												

COURSE CONTENT	
UNIT I	**Introduction to Scripting** :Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages.
UNIT II	**PHP Scripting Language** PHP Programming: Introducing PHP: Creating PHP script, Running PHP script, working with variables and constants: Using variables, Using constants, Datatypes, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions
UNIT III	**Interacting with Database** Introduction, Understand MySQL, Simple SQL Retrieval , PHP Database Functions **Advanced PHP Programming** Php and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration,
UNIT IV	**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.
UNIT V	**Introduction to Ruby**, Variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching. Overview of Rails.

TEXT BOOKS	
1.	The World of Scripting Languages, David Barron, Wiley Publications,2000.
2.	Programming the World Wide Web, Robet W Sebesta, Pearson, 7th edition, 2005
3.	"Learning PHP,MySQL,and Javascript" by Robin Nixon, O' Reilly,2009.
REFERENCE BOOKS	
1.	Ruby on Rails Up and Running, Lightning fast Web development," Bruce Tate, Curt Hibbs,O'Reilly, 2006.
2.	. "Programming Perl," Tom Christiansen, Jonathan Orwant, O' Reilly, 4th edition, 2012.
3.	Web Technologies,"Uttam K Roy, Oxford, 2010.
4.	"The Web Warrior Guide to Web Programming," Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage, 2003.
WEB RESOURCES	
1.	**www.w3schools.com/**
2.	**http://ruby-for-beginners.rubymonstas.org**

IV Year II Semester
Professional Elective-V
HUMAN COMPUTER INTERACTION
(Common to CSE & IT)

Course Category	Professional Elective		**Course Code**	19CS8T37
Course Type	Theory		**L-T-P-C**	3-0-0-3
Prerequisites	Computer Organization	**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100	

COURSE OBJECTIVES	
1	The main objective of this course is for the students to achieve basic knowledge of user interface Importance of human characteristics
2	The students can Learn the screen designing

COURSE OUTCOMES		**BTL**
Upon successful completion of the course, the student will be able to:		
CO1	Explain the capabilities of both humans and computers from the viewpoint of human information processing..	K2
CO2	Analyze human characteristics, human interaction speeds.	K4
CO3	Apply better screen design techniques.	K3
CO4	Enumerate the concepts of windows and components.	K2
CO5	Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0
CO2	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0
CO3	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0
CO4	3	1	0	0	2	0	0	0	0	0	0	0	0	0	0
CO5	3	1	0	0	3	0	0	0	0	0	0	0	0	0	0

COURSE CONTENT	
UNIT I	**Introduction:** Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession Managing Design Processes: Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issue
UNIT II	**Design process:** Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions
UNIT III	**Screen Designing:** Design goals, Screen planning and purpose, organizing screen elements, ordering of screen data and content **Screen navigatio**n: flow, Visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web.
UNIT IV	**Information Search:** Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces Information **Visualization:** Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization
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.

TEXT BOOKS	
1.	Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson, 2010.
2.	The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech, 2007..
REFERENCE BOOKS	
1.	Designing the user interface. 4/e, Ben Shneidermann , PEA.
2.	User Interface Design, Soren Lauesen , PEA.
WEB RESOURCES	
1.	https://www.interaction-design.org/literature/topics/human-computer-interaction
2.	https://www.youtube.com/watch?v=m1zk4r6NWBc