

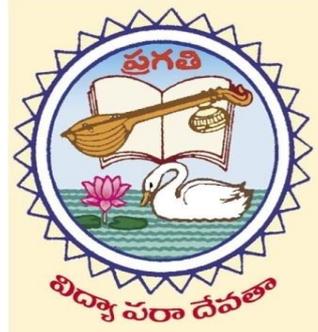
**ACADEMIC REGULATIONS  
COURSE STRUCTURE & SYLLABUS**

For

**B.Tech**

**COMPUTER SCIENCE AND ENGINEERING**

*(Applicable for batches admitted from 2016-17)*



**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	<b>Engineering knowledge</b> : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
PO2	<b>Problem analysis:</b> Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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	<b>Environment and sustainability:</b> 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	<b>Ethics:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Individual and team work:</b> 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	<b>Communication:</b> 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	<b>Project management and finance:</b> 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	<b>Life-long learning:</b> 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.

**ACADEMIC REGULATIONS FOR B.TECH (REGULAR)**

Applicable for the students of B.Tech (Regular) Admitted from the academic year 2016-2017.

**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 four and for not more than eight academic years.

1.2 The candidate shall register for 180 credits and secure all the 180 credits.

**2. COURSES OF STUDY**

The following courses of study are offered at present as specializations for the B.Tech course with English as medium of instruction.

<i>S. No.</i>	<i>Branch / Course</i>
01.	Civil Engineering (CE)
02.	Electrical and Electronics Engineering (EEE)
03.	Mechanical Engineering (ME)
04.	Electronics and Communications Engineering (ECE)
05.	Computer Science and Engineering (CSE)
06.	Information Technology (IT)

**3. MINIMUM INSTRUCTIONS DAYS.**

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

**4. PROGRAMME/ COURSE CREDITS**

4.1. Each discipline / course of the four year B.Tech programme is designed to have a total of 180 credits. Depending upon the nature of each subject and the number of periods of instruction whether it is theory, laboratory, drawing etc., weightages are given in terms of number of credits. See course structure for details.

**5. ATTENDANCE REQUIREMENTS :**

5.1. A student is eligible to appear for the End semester examinations only if he puts in a minimum of 75% of attendance in aggregate of all the subjects.

5.2. Condonation of shortage of attendance in the aggregate upto 10% (65% and above and below 75%) in each semester may be granted by a committee appointed for this purpose, after getting satisfied that the absence is due to genuine reasons.

- 5.3. Shortage of attendance below 65% in aggregate shall not be condoned.
- 5.4. A student who has shortage of attendance in a semester may seek readmission in to the course when offered next.
- 5.5. A fee stipulated by the college shall be paid along with the application for the condonation of shortage of attendance.
- 5.6. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations and the registration shall stand cancelled.

## 6. DISTRIBUTION AND WEIGHTAGE OF MARKS

The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks. 40 marks for internal evaluation and 60 marks for the end examination have been earmarked. The Project Work shall be evaluated for 200 marks. The mini project/Term Paper/Seminar has a weightage of 50 marks and evaluated internally.

Depending upon the nature of the subject, the distribution and weightages for internal and external assessment are as detailed below:

### 6.1. Theory Subjects

#### **i. Internal assessment : 40 marks**

- a) For the Mid examinations there shall be two tests, one conducted in the middle and the other at the end of each semester. The duration of each test is two hours. The question paper contains **Part-A** and **Part-B**. Part-A consists of three questions. Out of three questions two questions carry seven marks and one question carry six marks. Part-B consists of twenty objective type questions each carry half mark. Answering all questions is compulsory.
- b) Students shall submit assignments at the end of each unit in the syllabus and the marks allotted for the assignments is 10.
- c) The formula for finding the total marks of internal assessment (40 marks) =  $0.80 \times$  higher marks scored between the two internal tests +  $0.20 \times$  marks scored in the other test + marks for the assignments.

#### **ii. External assessment :**

- a) The end semester examination is of 3 hours duration and contains Part A and Part B. It covers all the topics in all the 6 units and the weightage is 60 marks.

- b) Part A consists of 6 short questions each carrying 2 marks (6 x 2 = 12 marks). These 6 questions are compulsory and cover all the 6 units in the syllabus.
- c) Part B consists of 6 essay type / numerical questions, One question is set from each unit in the syllabus. Some questions may have sub sections. The student has to answer 4 out of 6 questions, each question with a weightage of 12 marks (4 x 12) = 48 marks.

**6.2. Laboratory Courses**

- i. Internal assessment : 40 marks

There shall be continuous evaluation during the semester for 40 marks as shown below:

Day-to-Day work and laboratory record	-	25 marks
One internal test at the end of the semester	-	15 marks
		-----
<b>Total</b>	-	<b>40 Marks</b>
		-----

- ii. External Assessment :

At the end of the semester an examination for 3 hours duration shall be conducted for 60 marks by the concerned teacher and an external examiner.

**6.3. Subjects such as Engineering Graphics, Engineering Drawing, Machine Drawing, Design and Drawing of R.C. Structures, Steel structures, Irrigation structures, Estimation cost and valuation, Building Planning and Drawing etc.**

- i. Internal assessment : 40 marks

a) There shall be continuous evaluation with a weightage of 40 marks as shown below :

Day-to-Day work	-	20 marks
b) 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

<b>Total</b>	-	<b>40 Marks</b>
		-----

- ii. External assessment :

Same as for theory subjects given in 6.1.ii.

**6.4. Mini Project /Term paper**

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

### 6.5. Project

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.

### 6.6. Seminar

For the Seminar, Each student has to be evaluated based on the presentation of any latest topic with a report of 10-15 pages and a power point presentation of minimum 10 slides. The student shall collect the information on a specialized topic and prepare a technical report, showing his understanding of the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

## 7. MINIMUM ACADEMIC REQUIREMENTS

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned under rule 5.

**7.1.** A Student is deemed to have satisfied the minimum academic requirements if he has **earned the credits allotted to each theory / practical design / drawing subject 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.**

**7.2.** A Student is deemed to have satisfied the minimum academic requirements if he has **earned the credits allotted to each laboratory / project by securing not less than 40% of marks in the end semester exam, and minimum 50% of marks in the sum total of the internal marks and end semester examination marks.**

**7.3.** A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to mini project/term paper and seminar by securing not less than 50% of Marks.

**7.4.** A student shall register and put in minimum attendance in all 180 credits and earn all 180 credits.

## 8. COURSE PATTERN

**8.1.** The entire course of study is for four academic years, all the years are on semester pattern.

8.2. 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.

8.3. When a student is detained due 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.

## 9. PROMOTION TO NEXT HIGHER CLASS

9.1. A Student shall be promoted from 1<sup>st</sup> year to II year if he fulfills the minimum attendance requirement under rule 5.

9.2. A Student shall be promoted from II year to III year, if he fulfills the academic requirement of 50% of the credits upto 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.

9.3. A student shall be promoted from III year to IV year if he fulfills the academic requirements of 50% of the credits upto 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.

## 10. CUMULATIVE GRADE POINT AVERAGE (CGPA)

Theory/Design/ Drawing (%)	Laboratory/Mini Project/Term Paper/ Project/ Seminar (%)	Letter Grade	Level	Grade Point
≥ 90	≥ 90	O	Outstanding	10
≥ 80 to < 90	≥ 80 to < 90	S	Excellent	9
≥ 70 to < 80	≥ 70 to < 80	A	Very Good	8
≥ 60 to < 70	≥ 60 to < 70	B	Good	7
≥ 50 to < 60	≥ 50 to < 60	C	Fair	6
≥ 40 to < 50	--	D	Satisfactory	5
<40	<50	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.

$$\text{SGPA (Si)} = \frac{\sum (C_i \times G_i)}{\sum C_i}$$

Where  $C_i$  is the number of credits of the  $i^{\text{th}}$  course and  $G_i$  is the grade point scored by the student in the  $i^{\text{th}}$  course.

### **Computation of CGPA**

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

$$\text{CGPA} = \frac{\sum (C_i \times S_i)}{\sum C_i}$$

- Where  $S_i$  is the SGPA of the  $i^{\text{th}}$  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 =  $(\text{CGPA} - 0.75) \times 10$

## **11. 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.

<b>Class Awarded</b>	<b>CGPA to be secured</b>	<b>From the CGPA secured from 180 credits</b>
First Class with Distinction	$\geq 7.75$ ( Without any Supplementary Appearance)	
First Class	$\geq 6.75$ to $< 7.75$	
Second Class	$\geq 5.75$ to $< 6.75$	
Pass Class	$\geq 4.75$ to $< 5.75$	

## **12. WITHHOLDING OF RESULTS :**

If the students has not paid the dues, if any, to the college or if any case of indiscipline or malpractice is pending against him, the examination results of the student will be withheld.

## **13. TRANSITORY REGULATIONS:**

### **13.1. For Re-admitted Candidates:**

- A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of first year shall join the autonomous batch of first year first semester. Such students shall study all the courses prescribed for the batch in which the

student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

- ii) A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of first year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the Programme prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree.
- iii) However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects will be offered in place of them as decided by the Board of Studies.
- iv) The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.
- v) In case the students who do not have option of acquiring required credits with the existing courses offered as per the curriculum under autonomy, credit balance can be achieved by clearing the additional courses offered. The additional courses that are offered can be of theory or laboratory courses.

### **13.2. Transfer candidates (from non-autonomous college affiliated to JNTUK):**

- i) A student who is following JNTUK curriculum, transferred from other college to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the Programme prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree.
- ii) However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies.
- iii) The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

**D) In case the students who do not have option of acquiring required credits with the existing courses offered as per the curriculum under autonomy, credit balance can be achieved by clearing the additional courses offered. The additional courses that are offered can be of theory or laboratory courses.**

**13.3. Transfer candidates (from an autonomous college affiliated to JNTUK):**

- i) A student who has secured the required credits upto previous semesters as per the regulations of other autonomous institutions shall also be permitted to be transferred to this college.
- ii) A student who is transferred from the other autonomous colleges to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the Programme prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree.
- iii) However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester as per the regulations of the college from which he is transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.
- iv) In case the students who do not have option of acquiring required credits with the existing courses offered as per the curriculum under autonomy, credit balance can be achieved by clearing the additional courses offered. The additional courses that are offered can be of theory or laboratory courses.

**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 2017-18.

**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 132 credits and secure all the 132 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 II year to III year, if he fulfills the minimum attendance requirement under rule 5 of B.Tech (Regular).
- 3.2. A student shall be promoted from III year to IV year if he fulfills the academic requirements of 50% of the credits upto 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.

<b>Class Awarded</b>	<b>CGPA to be secured</b>	<b>From the CGPA secured from 132 credits</b>
First Class with Distinction	$\geq 7.75$ (Without any Supplementary Appearance )	
First Class	$\geq 6.75$ to $< 7.75$	
Second Class	$\geq 5.75$ to $< 6.75$	
Pass Class	$\geq 4.75$ 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.

**GENERAL :**

- i) Whenever the words “he”, “him”, “his” secure in the regulations, they include “she”, “her”, “hers”.

- ii) The academic rules and regulations should be read as a whole for the purpose of interpretation.
- iii) In case of any doubt or ambiguity in the interpretation of rules, the decision of the Principal of the college is final.
- iv) 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.

## MALPRACTICES RULES

## DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	<b>Nature of Mlpractices/Improper conduct</b>	<b>Punishment</b>
	<i>If the candidate:</i>	
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 and sent to the University.

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 University 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 University 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 the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.

<p>6.</p>	<p>Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or 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.</p>	<p>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 is registered against them.</p>
<p>7.</p>	<p>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</p>	<p>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 University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</p>
<p>8.</p>	<p>Possess any lethal weapon or firearm in the examination hall.</p>	<p>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.</p>

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 colleges 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 University for further action to award suitable punishment.	

*Malpractices identified by squad or special invigilators*

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
  - (i) A show cause notice shall be issued to the college.
  - (ii) Impose a suitable fine on the college.
  - (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

# 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	+	<b>Rs. 1,000/-</b>
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	<b>Rs. 2,000/-</b>
Wrongfully restraining or confining or causing hurt	 2 Years	+	<b>Rs. 5,000/-</b>
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	<b>Rs. 10,000/-</b>
Causing death or abetting suicide	 10 Months	+	<b>Rs. 50,000/-</b>

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 StructureI Year - I Semester

	<b>I-I SEMESTER</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1-HS	<b>16BH1T01</b>	English – I	4	-	-	3
2-BS	<b>16BH1T03</b>	Mathematics – I	4	-	-	3
3-BS	<b>16BH1T04</b>	Mathematics – II (Mathematical Methods)	4	-	-	3
4-BS	<b>16BH1T10</b>	Applied Physics	4	-	-	3
5	<b>16CS1T01</b>	Computer Programming using C	4	-	-	3
6-ES	<b>16ME1T02</b>	Engineering Drawing	4	-	-	3
7-HS	<b>16BH1L01</b>	English - Communication Skills Lab – 1	-	-	3	2
8-BS	<b>16BH1L03</b>	Applied / Engineering Physics Lab	-	-	3	2
9-ES	<b>16BH1L04</b>	Applied / Engineering Physics – Virtual Labs Assignments	-	-	2	-
10	<b>16CS1L01</b>	C-Programming Lab	-	-	3	2
<b>Total Credits</b>						<b>24</b>

I Year - II Semester

	<b>I-II SEMESTER</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1-HS	<b>16BH2T02</b>	English – II	4	-	-	3
2-BS	<b>16BH2T06</b>	Mathematics – III	4	-	-	3
3-BS	<b>16BH2T12</b>	Applied Chemistry	4	-	-	3
4	<b>16IT2T01</b>	Object Oriented Programming through C++	4	-	-	3
5-HS	<b>16BH2T13</b>	Environmental Studies	4	-	-	3
6-ES	<b>16ME2T01</b>	Engineering Mechanics	4	-	-	3
7-BS	<b>16BH2L05</b>	Applied / Engineering Chemistry Laboratory	-	-	3	2
8-HS	<b>16BH2L02</b>	English - Communication Skills Lab – 2	-	-	3	2
9	<b>16IT2L01</b>	Object Oriented Programming Lab	-	-	3	2
<b>Total Credits</b>						<b>24</b>

**II Year - I Semester**

<b>II- I SEMESTER</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1-BS	<b>16BH3T07</b>	Statistics with R Programming	4	-	-	3
2	<b>16CS3T02</b>	Mathematical Foundations of Computer Science	4	-	-	3
3	<b>16EC3T08</b>	Digital Logic Design	4	-	-	3
4	<b>16IT3T02</b>	Python Programming	4	-	-	3
5	<b>16CS3T03</b>	Data Structures through C++	4	-	-	3
6	<b>16BH3T14</b>	Managerial Economics and Financial Analysis	4	-	-	3
7	<b>16CS3L02</b>	Data Structures through C++Lab	-	-	3	2
8	<b>16IT3L02</b>	Python Programming Lab	-	-	3	2
<b>Total Credits</b>						<b>22</b>

**II Year - II Semester**

<b>II- II SEMESTER</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	<b>16CS4T04</b>	Software Engineering	4	-	-	3
2	<b>16IT4T06</b>	Java Programming	4	-	-	3
3	<b>16CS4T05</b>	Advanced Data Structures	4	-	-	3
4	<b>16CS4T06</b>	Computer Organization	4	-	-	3
5	<b>16CS4T07</b>	Formal Languages and Automata Theory	4	-	-	3
6	<b>16CS4T08</b>	Computer Graphics	4	-	-	3
7	<b>16CS4L03</b>	Advanced Data Structures Lab	-	-	3	2
8	<b>16IT4L04</b>	Java Programming Lab	-	-	3	2
<b>Total Credits</b>						<b>22</b>

**III Year - I Semester**

<b>III- I SEMESTER</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	<b>16CS5T09</b>	Compiler Design	4	-	-	3
2	<b>16EC5T18</b>	Microprocessors & Interfacing	4	-	-	3
3	<b>16CS5T10</b>	Software Testing Methodologies	4	-	-	3
4	<b>16CS5T11</b>	Database Management Systems	4	-	-	3
5	<b>16CS5T13</b>	Operating Systems	4	-	-	3
6	<b>16EC5L07</b>	Microprocessors & Interfacing Lab	-	-	3	2
7	<b>16CS5L04</b>	Operating System & Linux Programming Lab	-	-	3	2
8	<b>16CS5L05</b>	Database Management Systems Lab	-	-	3	2
9-MC	<b>16BH5T17</b>	Professional Ethics & Human Values	-	3	-	-
10	<b>16CS5M01</b>	MOOCs	-	-	-	-
<b>Total Credits</b>						<b>21</b>

**III Year - II Semester**

<b>III- II SEMESTER</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	<b>16CS6T15</b>	Computer Networks	4	-	-	3
2	<b>16CS6T16</b>	Data Warehousing and Mining	4	-	-	3
3	<b>16CS6T17</b>	Design and Analysis of Algorithms	4	-	-	3
4	<b>16CS6T18</b>	Object Oriented Analysis and Design using UML	4	-	-	3
5	<b>i. 16IT6E01</b> <b>ii. 16CS6E01</b> <b>iii. 16CS6E02</b> <b>iv. 16EC6E01</b> <b>v. 16EC6E04</b> <b>vi. 16ME6E01</b>	Open Elective: i. Artificial Intelligence ii. Internet of Things iii. Cyber Security iv. Digital Signal Processing v. Embedded Systems vi. Robotics	4	-	-	3
6	<b>16CS6L07</b>	Network Programming & UML Lab	-	-	3	2
7	<b>16CS6L08</b>	Data Warehousing and Mining Lab	-	-	3	2
8	<b>16BH6T16</b>	Intellectual Property Rights and Patents	-	2	-	-
9	<b>16CS6P01</b>	Mini Project / Term paper	-	-	3	2
<b>Total Credits</b>						<b>21</b>

**IV Year - I Semester**

	<b>IV- I SEMESTER</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	<b>16CS7T19</b>	Cryptography and Network Security	4	-	-	3
2	<b>16CS7T20</b>	Cloud Computing	4	-	-	3
3	<b>16CS7T21</b>	Web Technologies	4	-	-	3
4- HS	<b>16BH7T15</b>	Management Science	4	-	-	3
5	i. <b>16CS7D01</b> ii. <b>16CS7D02</b> iii. <b>16CS7D03</b>	<b>Elective-I</b> i. Big Data Analytics ii. Artificial Neural Networks iii. Software Architecture & Design Patterns	4	-	-	3
6	i. <b>16CS7D04</b> ii. <b>16CS7D05</b> iii. <b>16CS7D06</b>	<b>Elective-II</b> i. Mobile Computing ii. Digital Forensics iii. Scripting Languages	4	-	-	3
7	<b>16CS7L09</b>	Cloud & Big Data Lab	-	-	3	2
8	<b>16CS7L11</b>	Web Technologies Lab	-	-	3	2
	<b>Total Credits</b>					<b>22</b>

IV Year - II Semester

	<b>IV- II SEMESTER</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	<b>16CS8T22</b>	Distributed Systems	4	-	-	3
2	<b>16CS8T23</b>	Information Retrieval Systems	4	-	-	3
3	<b>16CS8T24</b>	Machine Learning	4	-	-	3
4	<b>i. 16IT8D18</b> <b>ii. 16ME8D11</b> <b>iii. 16CS8D07</b>	<b>Elective-III</b> i. Concurrent and Parallel Programming ii. Operations Research iii. Software Project Management	4	-	-	3
5	<b>16CS8S01</b>	Seminar	-	3	-	2
6	<b>16CS8P02</b>	Project Work	-	-	-	10
	<b>Total Credits</b>					<b>24</b>

<b>I Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH1T01</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>ENGLISH – I</b>								
<b>SYLLABUS</b>								

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Enables the learners to acquire knowledge in different fields besides the acquisition of Reading and Writing skills to apply in their real-life situations.	Applying
CO-2	Explains the learners about transport and road safety methods to make use of them in that phenomenon and extends their reading and writing skills.	Understanding
CO-3	Creates awareness on importance of mass production in the survival of mankind and strengthens them in reading and writing aspects.	Understanding
CO-4	Helps the learners to identify the required sources of energy for rural India and practice their reading and writing skills.	Analyzing
CO-5	Creates awareness in the readers on ecological system and supports the learners in improving reading and writing skills.	Creating
CO-6	Prepares the learners to have an industrial etiquette and training and promotes their reading and writing skills.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1 } is:

	PO1	PO2	PO3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO1	1	-	-	1	-	-	-	-	-	-	1	-	-	-	-
CO2	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	1	-	-	-	1	1	-	-	-	-	-	-	-
CO6	1	-	-	-	-	-	-	1	1	1	-	-	-	-	-

**Introduction:**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students have 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 should be 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 of ideas.

**Objectives:**

To improve the language proficiency of the students in English with emphasis on LSRW skills.

1. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
2. To develop the communication skills of the students in both formal and informal situations.

**LISTENING SKILLS:****Objectives:**

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

**SPEAKING SKILLS:****Objectives:**

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

**READING SKILLS:****Objectives:**

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

**WRITING SKILLS:****Objectives:**

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

**Methodology:**

1. The classes are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
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 completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.

5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

**DETAILED TEXTBOOKS:**

ENGLISH FOR ENGINEERS AND TECHNOLOGISTS, Published by Orient Blackswan Pvt Ltd  
THE COP AND THE ANTHEM BY O. HENRY PUBLISHED BY PERFECTION LEARNING

**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 I:**

1. *'Human Resources' from English for Engineers and Technologists.*

Objective:

To develop human resources to serve the society in different ways.

Outcome:

The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.

2. *'An Ideal Family' from Panorama: A Course on Reading*

Objective:

To develop extensive reading skill and comprehension for pleasure and profit.

Outcome:

Acquisition of writing skills

**UNIT 2:**

1. *'Transport: Problems and Solutions' from English for Engineers and Technologists.*

Objective:

To highlight road safety measures whatever be the mode of transport.

Outcome:

The lesson motivates the public to adopt road safety measures.

2. *'War' from 'Panorama : A Course on Reading'*

Objective:

To develop extensive reading skill and comprehension for pleasure and profit.

Outcome:

Acquisition of writing skills

**UNIT 3:**

Unit 3 has two sections: Unit 3(A ) and 3(B )

**3(A):**

1. *'Evaluating Technology' from English for Engineers and Technologists.*

Objective:

To highlight the advantages and disadvantages of technology.

Outcome:

The lesson creates an awareness in the readers that mass production is ultimately survival.

2. *'The Verger' from 'Panorama : A Course on Reading'*

Objective:

To develop extensive reading skill and comprehension for pleasure and profit.

Outcome:

Acquisition of writing skills

*Unit 3(B )*

- 1. *THE COP AND THE ANTHEM BY O.HENRY*

Objective:

To enable students to develop interest in reading and appreciating short stories of different genres.

Outcome:

This lesson motivates students to respond and express the ideas and feelings in the story through oral, written and performative means.

#### UNIT 4:

1. *'Alternative Sources of Energy' from English for Engineers and Technologists.*

Objective: To bring into focus different sources of energy as alternatives to the depleting sources.

Outcome:

The lesson helps to choose a source of energy suitable for rural India.

2. *'The Scarecrow' from Panorama : A Course on Reading*

Objective:

To develop extensive reading skill and comprehension for pleasure and profit.

Outcome: Acquisition of writing skills.

#### UNIT 5:

1. *'Our Living Environment' from English for Engineers and Technologists.*

Objective:

To highlight the fact that animals must be preserved because animal life is precious.

Outcome:

The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. *'A Village Host to Nation' from Panorama : A Course on Reading*

Objective:

To develop extensive reading skill and comprehension for pleasure and profit.

Outcome:

Acquisition of writing skills

#### UNIT 6:

1. *'Safety and Training' from English for Engineers and Technologists.*

Objective:

To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

Outcome:

The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

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 writing skills

#### NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

**OVERALL COURSE OUTCOME:**

1. Using English languages, both written and spoken, competently and correctly.
2. Improving comprehension and fluency of speech.
3. Gaining confidence in using English in verbal situations.

<b>I Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH1T03</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>MATHEMATICS – I</b>								
<b>SYLLABUS</b>								

**Subject Code:****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 from a necessary base to develop analytic and design concepts.

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Solve the linear system of equations by using different methods.	Applying
CO-2	Find the Eigen values and Eigen vectors and also finding inverse and power of a matrix by using Cayley - Hamilton theorem.	Applying
CO-3	Find rank, index, signature and nature of a Quadratic form.	Applying
CO-4	Solve first order differential equations and able to apply physical problems.	Applying
CO-5	Solve higher order linear differential equations with constant coefficients.	Analyzing
CO-6	Find partial derivate of different orders, finding maxima and minima of a function of two variable, three variables and functional dependence.	Understanding

The Mapping of CO and PO on 3 point scale {high-3, Medium-2, Low-1} is:

	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	PSO-3
CO1	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO6	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-

**UNIT I: Linear systems of equations**

Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination – Gauss Jordan-Gauss Jacobi and Gauss Seidel methods.

**Applications:** Finding the current in electrical circuits.

**UNIT II: Eigen values - Eigen vectors**

Eigen values - Eigen vectors – Properties – Cayley-Hamilton theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Diagonalization.

**Applications:** Free vibration of a two-mass system.

**UNIT III–Quadratic forms**

Quadratic forms, Reduction of quadratic form to canonical form – Rank - Positive, negative and semi definite- Index – Signature.

**UNIT IV: 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- Electrical circuits- Chemical reactions.

**UNIT V: 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  $x$ ,  $e^{ax}V(x)$ ,  $xV(x)$  – Method of Variation of parameters.

**Applications:** LCR circuit, Simple Harmonic motion.

**UNIT VI: Partial differentiation**

Introduction- Homogeneous function-Euler’s theorem-Total derivative-Chain rule Generalized Mean value theorem for single variable (without proof)-Taylor’s and McLaurin’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:**

1. **B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
3. **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, SubodhC.Bhunja**, Engineering Mathematics, Oxford UniversityPress.
5. **Dass H.K., Rajnish Verma. Er**, Higher Engineering Mathematics, S. Chand Co.Pvt. Ltd, Delhi.

<b>I Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH1T04</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>MATHEMATICS – II (METHAMETICAL METHODS)</b>								
<b>SYLLABUS</b>								

**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 from a necessary base to develop analytic and design concepts.

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Solve the algebraic and transcendental Equation by using numerical method.	Applying
CO-2	Finding the required functional volume using interpolation formulae with equal and unequal intervals.	Understanding
CO-3	Evaluate the given integral using numerical methods by different formulae	Applying
CO-4	Express the given function into Fourier series in the given interval. Find range of sine and cosine series in the given interval.	Applying
CO-5	Find the Fourier integral and transforms of a given function and Fourier sine and cosine transform of a given function.	Applying
CO-6	Find the partial derivative by elimination of arbitrary function and arbitrary constant. Solve the liner and non-liner PDEs.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO-3	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO-4	3	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO-5	3	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO-6	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-

**UNIT I: Solution of Algebraic and Transcendental Equations**

Introduction- Bisection method – Method of false position – Iteration method–Newton-Raphson method (One variable and simultaneous Equations).

**UNIT II: 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 – Interpolation with unequal intervals - Lagrange's interpolation formula.

### **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: Fourier Series**

Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet's conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

### **UNIT V: Fourier Transforms**

Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

### **UNIT VI: 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. Classification of second order partial differential equations.

**Applications:** Method of separation of Variables- Solution of One dimensional Wave, Heat and two dimensional Laplace equations.

### **Text Books:**

1. **B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
3. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.

### **Reference Books:**

1. **Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
2. **V. Ravindranath** and **P.Vijayalakshmi**, Mathematical Methods, Himalaya Publishing House.
3. **David Kincaid**, **Ward Cheney**, Numerical Analysis-Mathematics of Scientific Computing, 3rd Edition, Universities Press.
4. **Srimanta Pal**, **SubodhC.Bhunia**, Engineering Mathematics, Oxford University Press.
5. **Dass H.K.**, **RajnishVerma. Er.**, Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

<b>I Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH1T10</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>APPLIED PHYSICS</b>								
<b>SYLLABUS</b>								

**COURSE OBJECTIVES:**

Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses. That serves as a transit to understand the branch specific advanced topics. The courses are designed to:

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

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	The students will recognize, associate to apply the concepts of interference to undergo analysis of optical effects and contribute to engineering applications.	Understanding
CO-2	The students will relate to studies on diffraction pattern of light to utilize in the analysis of the materials and their properties.	Applying
CO-3	The students will understand concepts of polarization phenomenon, Lasers and their practical role play in engineering applications.	Understanding
CO-4	The students will learn to study diffraction pattern of light to utilize in the analysis of the materials and their properties & to analyze the applications of the Optical fibers in the field of communication.	Applying
CO-5	The students will learn the phenomenon of electrical & thermal conductivities related to sub-microscopic particles.	Analyzing
CO-6	The students will be empowered to apply the basics of electronics in engineering applications	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	2	-	1	2	-	-	-	-	-	-	1	-	-	-
CO-2	2	2	1	1	2	1	-	-	-	-	-	1	-	-	-
CO-3	1	-	2	1	-	2	-	-	-	-	-	1	-	-	-
CO-4	2	1	-	-	2	1	-	-	-	-	-	1	-	-	-
CO-5	2	1	-	-	1	-	-	-	-	-	-	1	-	-	-
CO-6	2	1	-	-	2	-	-	-	-	-	-	2	-	-	-

**UNIT-I**

Objective: To impart knowledge on interference phenomenon and utilizing it to design of instruments in Engineering applications.

Outcome: The students will learn to apply the concepts of interference undergo analysis of optical effects and contribute to engineering applications.

**INTERFERENCE:** Introduction-Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry)- Interference in wedge shaped films – Newton's rings –working principle of Interferometer, applications

**UNIT-II**

Objective: To impart knowledge on diffraction phenomenon to design optical instruments for Engineering applications.

Outcome: The students will learn to study diffraction pattern of light to utilize in the analysis of the materials and their properties.

**DIFFRACTION:** Introduction -Fraunhoffer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes- applications.

**UNIT-III**

Objective:

- To impart knowledge on types of polarization, types of polarizing materials and their effects to study and design of optical instruments.
- To impart knowledge on the lasers & their working principle

Outcome: The students will learn polarization phenomenon, Lasers and their practical implications in engineering applications.

**POLARIZATION:** Introduction -Types of Polarization – Methods of production – double refraction-Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polari meter (Sacharimeter)-applications.

**LASERS:** Introduction- Characteristics– Stimulated emission – Einstein's Transition Probabilities-Pumping schemes - Ruby laser – Helium Neon laser-applications of lasers

**UNIT-IV**

Objective:

- An overview of the Maxwell's Electromagnetic Field Equations & study the concepts regarding the response of materials to EM fields.
- To impart knowledge on the Optical Fibers and transmission of signals through it.

Outcomes:

- The students will learn to study diffraction pattern of light to utilize in the analysis of the materials and their properties.
- The students will learn to analyze the applications of the Optical fibers in the field of communication.

**ELECTROMAGNETIC FIELDS:** Introduction-Scalar and Vector Fields – Electric Potential-Gradient, Divergence of fields – Gauss and Stokes theorems-Propagation of EM waves through dielectric medium-Applications.

**FIBER OPTICS:** Introduction, Principle of Optical Fiber – Total Internal Reflection, Working principle of an Optical fiber, Numerical Aperture and Acceptance Angle-classification of Optical fibers-Applications.

**UNIT-V**

## Objective:

- To impart knowledge on the discrepancy of classical mechanics & role of quantum mechanics in explaining phenomenon related to sub-microscopic particles.

## Outcomes:

- The students will learn the phenomenon of electrical & thermal conductivities related to sub-microscopic particles.

**QUANTUM MECHANICS:** Introduction - Matter waves – Schrödinger Time Independent and Time Dependent wave equations – Particle in a box.

**FREE ELECTRON THEORY:** Introduction-Defects of Classical free electron theory –resistance of Conductor-Quantum Free electron theory - concept of Fermi Energy-Fermi Energy level of Conductors-Density of States.

**UNIT-VI**

## Objective:

- To impart knowledge on the physics of semiconductors and their working principle for their utility in electronics.

## Outcomes:

- The students will be empowered to apply the basics of electronics in engineering applications.

**BAND THEORY OF SOLIDS:** Introduction -Bloch's theorem (qualitative) – Kronig – Penney model – energy bands in crystalline solids – classification of crystalline solids– effective mass of electron & concept of hole.

**SEMICONDUCTOR PHYSICS:** Introduction-Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors- Conductivity and Carrier concentration – Drift & Diffusion – relevance of Einstein's equation- Hall effect and its applications.

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

**Text Books:**

1. A Text book of Engineering Physics – by Dr. M.N.Avadhanulu and Dr.P.G.Kshirasagar, S.Chand& Company Ltd., (2014)
2. 'Solid State Physics' by A.J.Dekker, Mc Millan Publishers (2011)

**Reference Books :**

1. Physics by Resnick, Halliday&Krane , Volume I&II , John Wiley&sons(2002)
2. Engineering Physics by D.K.Bhattacharya and Poonam Tandon , Oxford press (2015)
3. Applied Physics by P.K.Palanisamy , Scitech publications (2014)
4. Lasers and Non-Linear optics by B.B.Laud , Newage international publishers (2008)

<b>I Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS1T01</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>COMPUTER PROGRAMMING USING C</b>								
<b>SYLLABUS</b>								

**Learning objectives:**

Formulating algorithmic solutions to problems and implementing algorithms in C.

- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Differentiate Procedural and Object-oriented languages.	Understanding
CO-2	Use different data types, learn programming styles, and assignment variations in a C program.	Applying
CO-3	Choose the loops and decision making statements to solve the problem.	Applying
CO-4	Demonstrate the use of functions to solve the given problem.	Understanding
CO-5	Implement different operations on arrays and use string functions.	Applying
CO-6	Make use of pointers, structures and unions and also implement file operations in C programming for a given application.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-
CO-2	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-
CO-3	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-
CO-4	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-
CO-5	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-
CO-6	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-

**UNIT-I:**

**History and Hardware** - Computer Hardware, Bits and Bytes, Components, Programming Languages - Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software, The Development of C Algorithms The Software Development Process.

**UNIT-II:**

**Introduction to C Programming-** Identifiers, The main () Function, The printf () Function  
**Programming Style** - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.

**Assignment** - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

**UNIT -III:****Control Flow-Relational Expressions - Logical Operators:**

**Selection:** if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

**Repetition:** Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, while Statement, for Statement, Nested Loops, do-while Statement.

**UNIT-IV**

**Modular Programming:** Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function. **Case Study:** Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

**UNIT-V:****Arrays & Strings**

**Arrays:** One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays- Matrices.

**Strings:** String Fundamentals, String Input and Output, String Processing, Library Functions

**UNIT-VI:****Pointers, Structures, Files**

**Pointers:** Concept of a Pointer, Initialization of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments. **Structures:** Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields.

**Data Files:** Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

**Text Books:**

1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
2. Programming in C, B. L. Juneja, Anita Seth, Cengage Delmar Learning India Pvt.
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

**Reference Books:**

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, R S Bichkar, University Press, 2012.
3. Programming in C, ReemaThareja, Oxford.
4. C by Example, Noel Kalicharan, Cambridge University Press.

**URLs**

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/>

<b>I Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16ME1T02</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>ENGINEERING DRAWING</b>								
<b>SYLLABUS</b>								

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

### Course Outcomes:

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Construct polygons, curves and scales.	Applying
CO-2	Identify the position of points and lines.	Applying
CO-3	Identify the position of lines when inclined to both the planes.	Applying
CO-4	Analyze the location and position of plane figures.	Analyzing
CO-5	Analyze the location and position of solid bodies.	Analyzing
CO-6	Develop an Isometric view and orthographic views.	Creating

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	1	1	-	-	-	-	-	-	-	-	3	-	1
CO-2	3	3	1	-	-	-	-	-	-	-	-	-	3	-	1
CO-3	3	3	1	-	-	-	-	-	-	-	-	-	3	-	-
CO-4	3	3	1	3	2	-	-	-	1	-	-	-	3	-	1
CO-5	3	3	1	3	2	-	-	-	1	-	-	-	3	-	1
CO-6	3	3	3	3	3	-	-	-	3	-	3	-	3	-	3

### UNIT I

**Objective:** To introduce the students to use drawing instruments and to draw polygons, Engineering Curves. Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

### UNIT II

**Objective:** To introduce the students to use scales and orthographic projections, projections of points & simple lines.

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

### UNIT III

**Objective:** The objective is to make the students draw the projections of simple lines inclined to both the planes.

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

#### UNIT IV

**Objective:** The objective is to make the students draw the projections of the plane inclined to both the planes.

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

#### UNIT V

**Objective:** The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

#### UNIT VI

**Objective:** The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa. Conversion of isometric views to orthographic views, Conversion of orthographic views to isometric views.

#### TEXT BOOKS:

1. Engineering Drawing by N.D. Bhatt, Chariot Publications
2. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age International

#### REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
5. <http://nptel.ac.in/courses/112103019/>
6. <http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html>
7. <http://www.engineeringdrawing.org>

<b>I Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH1L01</b>				<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	
<b>ENGLISH - COMMUNICATION SKILLS LAB- I</b>								
<b>SYLLABUS</b>								

**PRESCRIBED LAB MANUAL FOR SEMESTER I:**

'INTERACT: English Lab Manual for Undergraduate Students', Published by Orient Black swan Pvt Ltd.

**Objectives:**

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Distinguish spoken language & use it appropriately with clarity and confidence by choosing the right expressions according to social and professional contexts.	Analyzing
CO-2	Interpret and responding appropriately in various day to day contexts and to demonstrate the need of learning speech sounds.	Evaluating
CO-3	Identify the sounds of English and improve their pronunciation and to utilize the stress and intonation in their pronunciation according to the context which in turn reduces the mother tongue influence.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	-	-	2	1	-	-	-	-	2	3	-	-	-	-	-
CO-2	-	-	1	1	-	-	-	-	1	3	-	-	-	-	-
CO-3	-	-	1	-	-	-	-	-	1	2	-	-	-	-	-

**UNIT 1:**

1. WHY study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks -- Practice work.

**UNIT 2:**

1. Responding to Requests and asking for Directions -- Practice work.

**UNIT 3:**

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing -- Practice work.

**UNIT 4:**

1. Letters and Sounds -- Practice work.

**UNIT 5:**

1. The Sounds of English -- Practice work.

**UNIT 6:**

1. Pronunciation
2. Stress and Intonation -- Practice wor

**Reference Books:**

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shaliniverma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, ArunaKoneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education

I Year I Semester				L	T	P	C	
Subject Code: 16BH1L03				0	0	3	2	
<b>APPLIED / ENGINEERING PHYSICS LAB ( Common to ECE,CSE&amp; IT) (only 10 out of 14 Experiments prescribed)</b>								
<b>SYLLABUS</b>								

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Students will learn to utilize the basics of Interference, Diffraction in Physics through experimentation	Understanding
CO-2	Students will be able to interpret and analyse concepts of Waves and Oscillations through experimentation	Understanding
CO-3	Students will be able to apply the basics of Current and Electricity, Semiconductors in engineering projects	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	-	-	-	1	-	-	-	2	-	-	-	-	-	-
CO-2	2	-	-	-	1	-	-	-	2	-	-	-	-	-	-
CO-3	2	-	2	-	1	-	-	-	2	-	-	-	-	-	-

- To verify the Laws of Transverse vibrations of a stretched string using sonometer
- To determine the Rigidity Modulus of a given wire using Torsional Pendulum
- To determine the velocity of sound in air using Volume Resonator Method
- To determine the acceleration due to gravity using Compound Pendulum
- To determine the frequency of an electric tuning fork using Melde's Apparatus
- To Study the V-I Characteristics and determine the breakdown voltage of a Zener Diode
- To determine the wavelength of a given source using diffraction Grating in Normal Incidence Method
- To determine the energy Band Gap of a Semiconductor using P-N Junction diode
- To Study the variation of the Magnetic field along the axis of a current carrying circular coil using Stewart and Gee's Apparatus
- To study the R-I Characteristics of a Thermistor
- To determine the refractive index of the medium of the film using the formation of Newton's Rings.
- To determine the thickness of a paper using the formation of parallel fringes
- To Determine Planck's constant using photoconductor
- To determine the refractive index of the Prism using spectrometer

**Reference:**

- Engineering Physics Lab Manual by Dr.Y.Aparna & Dr.K.Venkatesswara Rao.(V.G.S. Book Links)
- Physics Manual cum Observation book (College Designed Manual).

<b>I Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH1L04</b>				<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	
<b>APPLIED / ENGINEERING PHYSICS - VIRTUAL LABS ASSIGNMENTS</b> (Constitutes 5 marks of 40 marks of Internal-component)								
<b>SYLLABUS</b>								

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Students will be able to have hands on experience on Computer simulations process.	Understanding
CO-2	Students will be able to develop logical thinking to analyze critical reading/Data	Analyzing
CO-3	Students will be able to handle & use other costly Equipment in a virtual environment in other streams	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	1	1	-	-	1	-	-	-	1	-	-	2	-	-	-
CO-2	1	-	-	2	1	-	-	-	1	-	-	1	-	-	-
CO-3	1	1	-	-	1	-	-	-	1	-	-	1	-	-	-

## List of Experiments

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster's angle
5. Numerical Aperture of Optical fiber
6. Photoelectric Effect
7. Simple Harmonic Motion
8. LASER – Beam Divergence and Spot size
9. B-H curve
10. Michelson's interferometer

URL : [www.vlab.co.in](http://www.vlab.co.in)

<b>I Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS1L01</b>				<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	
<b>C-PROGRAMMING LAB</b>								
<b>SYLLABUS</b>								

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Development of conditional and iterative statements	Applying
CO-2	Design of programs with homogeneous sequences and code reusability features	Applying
CO-3	Implement programs with heterogeneous sequences, static & dynamic memory management and file handling	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	3	3	2	-	-	-	-	-	-	-	2	3	-
CO-2	3	3	3	3	2	-	-	-	-	-	-	-	2	3	-
CO-3	3	3	3	3	2	-	-	-	-	-	-	-	2	3	-

**OBJECTIVES:**

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

**Programming****Exercise - 1**

- a) System Assembling, Disassembling and identification of Parts / Peripherals. b) Operating System Installation-Install Operating Systems like Windows, Linux along with necessary Device Drivers.

**Exercise - 2**

- a) MS-Office / Open Office
  - i) Word - Formatting, Page Borders, Reviewing, Equations, symbols.
  - ii) Spread Sheet - organize data, usage of formula, graphs, charts.
  - iii) Powerpoint - features of power point, guidelines for preparing an effective presentation.
- b) Network Configuration & Software Installation-Configuring TCP/IP, Proxy, and firewall settings. Installing application software, system software & tools.

**Exercise - 3 Basics**

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

**Exercise - 4 Basic Math**

- a) Write a C Program to Simulate 3 Laws at Motion
- b) Write a C Program to convert Celsius to Fahrenheit and vice versa

**Exercise - 5 Control Flow - I**

- a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
- b) Write a C Program to Add Digits & Multiplication of a number

**Exercise – 6 Control Flow - II**

- a) Write a C Program to Find Whether the Given Number is
  - i) Prime Number
  - ii) Armstrong Number
- b) Write a C program to print Floyd Triangle
- c) Write a C Program to print Pascal Triangle

**Exercise – 7 Functions**

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

**Exercise – 8 Control Flow - III**

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

**Exercise – 9 Functions - Continued**

Write a C Program to compute the values of  $\sin x$  and  $\cos x$  and  $e^x$  values using Series expansion. (use factorial function)

**Exercise – 10 Arrays**

Demonstration of arrays

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

**Exercises - 11 Structures**

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

**Exercise – 12 Arrays and Pointers**

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

**Exercise – 13 Dynamic Memory Allocations**

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

**Exercise – 14 Strings**

- a) Implementation of string manipulation operations **with** library function.

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

**Exercise -15** Files

- a) Write a C programming code to open a file and to print its contents on screen.
- b) Write a C program to copy files

**Exercise – 16** Files Continued

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

**Note:**

- a) **All the Programs must be executed in the Linux Environment. (Mandatory)**
- b) **The Lab record must be a print of the LATEX (.tex) Format.**

<b>I Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH2T02</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>ENGLISH-II</b>								
<b>SYLLABUS</b>								

**Introduction:**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students have 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 should be 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 of ideas.

**Objectives:**

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

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Emphasizes that the ultimate aim of education is to enhance wisdom and inspires the readers to serve their nation with their self enrichment.	Understanding
CO-2	Enables the learners to promote peaceful co-existence and universal harmony in the society and empowers the learners to have initiation in innovation.	Applying
CO-3	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 their nation.	Evaluating
CO-4	Projects the needs of society to examine its outdated traditions and motivates the readers to strengthen their nation with their contribution to science and technology.	Creating
CO-5	Outlines the necessity to protect environment for the sustainability of the future generation and influence the readers to face challenges in the extensive services to society.	Evaluating
CO-6	Inspires the learners at the advancement of software by the eminent personalities and motivates the readers to think and tap their innate talent.	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1 }is:

	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	PSO-3
CO-1	2	-	-	-	-	-	-	2	1	-	-	3	-	-	-
CO-2	-	-	-	1	-	2	2	1	1	-	-	-	-	-	-
CO-3	-	-	1	-	-	2	-	-	1	-	-	1	-	-	-
CO-4	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-
CO-5	-	-	1	-	-	-	2	-	1	-	-	-	-	-	-
CO-6	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-

### LISTENING SKILLS

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

### SPEAKING SKILLS

Objectives:

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

### READING SKILLS

Objectives:

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

### WRITING SKILLS

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

**Methodology:**

1. The classes are to be learner-centred where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
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 completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

The following text books are recommended for study in I B.Tech II Semester (Common for all branches) of Pragati Engineering College, Surampalem from the academic year 2016-17 (R-16 Regulations)

**DETAILED TEXTBOOK:**

- *ENGLISH ENCOUNTERS* Published by Maruthi Publishers.
- A BETTER INDIA, A BETTER WORLD by N.R. Narayana Murthy, Published by: Penguin Books India Pvt. Ltd.

**DETAILED NON-DETAIL:**

- *THE GREAT INDIAN SCIENTISTS*, Published by Cengage learning

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

**UNIT 1:**

1. '*The Greatest Resource- Education*' from *English Encounters*

Objective:

Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.

Outcome:

The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. '*A P J Abdul Kalam*' from *The Great Indian Scientists*.

Objective:

The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

Outcome:

Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

**UNIT 2:**

1. '*A Dilemma*' from *English Encounters*

Objective:

The lesson centres on the pros and cons of the development of science and technology.

Outcome:

The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. '*C V Raman*' from *The Great Indian Scientists*.

Objective:

The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

Outcome:

The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

### UNIT 3:

#### Unit 3 has two sections: Unit 3(A) and 3(B)

##### 3 (A)

1. *'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.*

Objective:

The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences

Outcome:

The lesson imparts the students to manage different cultural shocks due to globalization.

2. *'Homi Jehangir Bhabha' from The Great Indian Scientists.*

Objective:

The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear program as architect.

Outcome:

The seminal contributions of Homi Jehangir Bhabha to Indian nuclear program provide an aspiration to the readers to serve the nation and strengthen it.

##### Unit 3 (B)

1. 'What can we learn from West?' from A Better India, A Better World

Objective:

To enable students to appreciate the differences in cultural perspectives.

Outcome:

This lesson motivates students to develop a multicultural outlook and appreciate the diverse cultures.

### UNIT 4:

1. *'The Lottery' from English Encounters.*

Objective:

The lesson highlights insightful commentary on cultural traditions.

Outcome:

The theme projects society's need to re examine its traditions when they are outdated.

2. *'Jagadish Chandra Bose' from The Great Indian Scientists.*

Objective:

The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

Outcome:

The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.

### UNIT 5:

1. *'The Health Threats of Climate Change' from English Encounters.*

Objective:

The essay presents several health disorders that spring out due to environmental changes

Outcome:

The lesson offers several inputs to protect environment for the sustainability of the future generations.

2. *'Prafulla Chandra Ray' from The Great Indian Scientists.*

Objective:

The lesson given is an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

Outcome:

Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

**UNIT 6:**

1. '*The Chief Software Architect*' from *English Encounters*

Objective:

The lesson 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. '*Srinivasa Ramanujan*' from *The Great Indian Scientists*.

Objective:

The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

Outcome:

The lesson provides inspiration to the readers to think and tap their innate Talen

<b>I Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH2T06</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>MATHEMATICS – III</b>								
<b>SYLLABUS</b>								

**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 from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Find the Laplace transform of functions and evaluation of integrals.	Understanding
CO-2	Find the inverse Laplace transform of different functions and solve the differential equations using Laplace transform.	Applying
CO-3	Tracing the curve for the given equation evaluate the double and triple integrals by direct method change of order of integration and change of variables.	Applying
CO-4	Evaluate the given integrals by using Beta and Gamma functions.	Applying
CO-5	Find the gradient of a scalar field, divergence and curl of vector field and vector identities.	Applying
CO-6	Evaluate the line, surface and volume integrals. Solve the problems using vector integral theorems.	Applying

The Mapping of CO and PO on 3 point scale {high-3, Medium-2, Low-1} is:

	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	PSO-3
CO-1	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO-3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO-4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO-5	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO-6	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-

**UNIT I: Laplace transforms**

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals  
– Unit step function –Dirac’s delta function.

**UNIT II: Inverse Laplace transforms**

Inverse Laplace transforms – Shifting Theorems - Transforms of derivatives and integrals -

Convolution theorem (without proof). **Applications:** Solving ordinary differential equations (initial value problems) using Laplace transforms.

### UNIT III: Multiple integrals

Curve tracing: Cartesian, Polar and Parametric forms. Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration. **Applications:** Finding Areas and Volumes.

### UNIT IV: Special functions

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions -Evaluation of improper integrals.

**Applications:** Evaluation of integrals.

### UNIT V: Vector Differentiation

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.

**Applications:** Equation of continuity, potential surfaces

### UNIT VI: 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. **Applications:** Work done, Force.

#### Text Books:

1. **B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
3. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.

#### Reference Books:

1. **Greenberg**, Advanced Engineering Mathematics, 2nd edition, Pearson edn
2. **Peter O'Neil**, Advanced Engineering Mathematics, 7th edition, Cengage Learning.
3. **D.W. Jordan and T.Smith**, Mathematical Techniques, Oxford University Press.
4. **Srimanta Pal, Subodh C. Bhunia**, Engineering Mathematics, Oxford University Press.
5. **Dass H.K., Rajnish Verma. Er.**, Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

<b>I Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH2T12</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>APPLIED CHEMISTRY</b>								
<b>SYLLABUS</b>								

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

### Course Outcomes:

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	To have an understanding on the plastic materials and their suitable design for engineering applications.	Applying
CO-2	To learn about various fuels and their calorific values for use in various industrial applications.	Analyzing
CO-3	Create awareness on corrosion and its impacts and the causes and control of corrosion.	Creating
CO-4	To create knowledge on nano materials, liquid crystals and super conductors and their applications to learn green chemistry and to identify the green technologies to be implemented in industry.	Understanding
CO-5	To acquire knowledge on crystal structure, semiconductors, insulators for their effective applications.	Applying
CO-6	To create awareness on non- conventional energy sources for effective utilization to minimize in the national wealth and environmental impacts.	Understanding

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	-	2	-	-	3	-	2	-	-	-	-	-	-	-	-
CO-2	-	3	-	-	-	-	1	-	-	-	-	-	-	-	-
CO-3	-	-	-	-	3	-	3	-	-	-	-	-	-	-	-
CO-4	-	3	3	-	-	2	-	-	-	-	-	-	-	-	-
CO-5	1	-	-	2	1	-	3	-	-	-	-	-	-	-	-
CO-6	-	-	1	-	3	2	2	-	-	-	-	-	-	-	-

### UNIT I: HIGH POLYMERS AND PLASTICS

Polymerisation:- Definition- Types of Polymers - Mechanism of polymerization- Stereo regular polymers- Methods of polymerization(emulsion and suspension)-Physical and Mechanical properties. Plastics as engineering materials: advantages and limitations- Thermoplastics and

Thermosetting plastics Compounding and fabrication (Compression, Injection, Extrusion and Blown Techniques )- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon, Poly Methyl Methacrylate( PMMA) and polycarbonates

Elastomers :- Natural rubber- Disadvantages- Mastication - compounding and vulcanization - Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes - Applications of elastomers. Composite materials & Fiber reinforced plastics - Biodegradable polymers - Conducting polymers.

Learning Objectives: Plastics are nowadays used in household appliances; They are also used as composites (FRP) in aerospace and automotive industries.

Outcomes: The advantages and limitations of plastic materials and their use in design would be understood.

## UNIT II: FUEL TECHNOLOGY

Fuels – Definition –Classification - Characteristics of a good fuel - Calorific value - HCV and LCV - Dulong's formula - Bomb calorimeter – Numerical problems - Coal -- Proximate and Ultimate analysis and their Significance - Liquid fuels - Petroleum- Origin and Refining - Cracking - Synthetic petrol -Petrol knocking - Diesel knocking - Octane and Cetane ratings - Anti-knock agents - Power alcohol – Bio diesel, Gaseous fuels: - Natural gas, LPG and CNG, Combustion - Calculation of air for the combustion of a fuel, Flue gas analysis – Orsat's apparatus - Numerical problems on combustion

Explosives:- Rocket fuels Learning Objectives: Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence are introduced to create awareness on the topics.

Outcomes: Fuels which are used commonly and their economics, advantages and limitations can be understood by the students and create awareness on the topics.

## UNIT III: ELECTROCHEMICAL CELLS AND CORROSION

Galvanic cells - Reversible and irreversible cells - Single electrode potential - Electro chemical series and uses of this series- Standard electrodes (Hydrogen, Calomel and **Glass electrode**) - Concentration Cells - Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc - air cells.

Fuel cells:- Introduction - cell representation,  $H_2-O_2$  fuel cell: Design and working, advantages and limitations. Types of fuel cells: Alkaline fuel cell - methanol-oxygen - phosphoric acid fuel cells - molten carbonate fuel cells.

Corrosion :- Definition - Theories of Corrosion (chemical & electrochemical) - Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion - Passivity of metals -Pitting corrosion – Corrosion under insulation -Galvanic series - Factors which influence the rate of corrosion –Protection from corrosion -Design and material selection - Cathodic protection - Protective coatings: - Surface preparation - Metallic (galvanizing and tinning) coatings - Methods of application on metals ( Electroplating, Electroless plating).

Learning Objectives: The basics for the construction of galvanic cells are introduced to have understanding on the concepts. Understanding on the concept of Corrosion and Mechanism of Corrosion with Theories like Electrochemical theory. .

Outcomes: Corrosion – its theories and controlling methods can create Understanding and awareness on the topic.

## UNIT IV: CHEMISTRY OF ADVANCED MATERIALS

Nano materials:- Introduction - Sol-gel method & chemical reduction method of preparation- Characterization by Brauner Emmett Teller (BET )method, Transmission Electron Microscope (TEM) and Scanning Electron Microscope (SEM) methods - Carbon nano tubes : Types, preparation(Laser ablation and Chemical vapour deposition method), properties and applications, Fullerenes.

Liquid crystals:- Introduction - Types - Applications

Super conductors:-Type -I, Type II - Characteristics and applications

Green synthesis:- Principles of Green Chemistry - Methods of synthesis (Aqueous Phase Method, Super

Critical Fluid Extraction and Phase Transfer Catalysis) with examples - R<sub>4</sub>M<sub>4</sub> principles

Learning Objectives : With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced in Unit – IV.

Outcomes: The students will have awareness on now aware of materials like nano materials and fullerenes and their applications. Study on liquid crystals and superconductors can create Understanding for their applications in various fields. The importance of green synthesis create better Understanding for application and also can create better Understanding compared to conventional methods is also explained

**UNIT V: SOLID STATE CHEMISTRY**Types of solids - close packing of atoms and ions - BCC , FCC, structures of rock salt cesium chloride- spinel - normal and inverse spinels,Non-elemental semiconducting Materials:- Stoichiometric, controlled valency & Chalcogen photo/semiconductors, Preparation of Semiconductors - Semiconductor Devices:- p-njunction diode as rectifier - junction transistor.Insulators (electrical and electronic applications)

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

Learning Objectives: Understanding of crystal structures will help to understand the conductivity, semiconductors and superconductors. Magnetic properties are also studied to have better Understanding.

Outcomes: Conductance phenomenon can be better understood

**UNIT VI: NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES**

Solar Energy: - Introduction, application of solar energy, conversion of solar energy (Thermal conversion & photo conversion) - photovoltaic cell: design, working and its importance

Non-conventional energy sources

(i)Hydropower include setup a hydropower plant (schematic diagram)

(ii ) Geothermal energy: Introduction-schematic diagram of a geothermal power plant

(iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.

(iv) Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.

(v) Biomass and biofuels

Learning Objectives: With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced and the study can create a better understanding on the Non –Conventional Energy Sources and Storage Devices.

Outcomes: The students are exposed to some of the alternative fuels and their advantages and imitations.

### Text Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publishing Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

### Reference Books:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P.Shankar and others, University Press, IIM

<b>I Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16IT2T01</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>OBJECT ORIENTED PROGRAMMING THROUGH C++</b>								
<b>SYLLABUS</b>								

**OBJECTIVES:**

- This course is designed to provide a comprehensive study of the C programming language. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable and portable code. The nature of C language is emphasized in the wide variety of examples and applications. To learn and acquire art of computer programming. To know about some popular programming languages and how to choose
- Programming language for solving a problem.

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Enumerate the Key Concepts of Object Oriented Programming	Understanding
CO-2	Use of Object oriented technology to experiment special class operations	Applying
CO-3	Implement the concept of polymorphism through operator overloading that enhances reusability	Applying
CO-4	Analyze binding, polymorphism and virtual functions.	Analyzing
CO-5	Apply Exception Handling Techniques for resolving run-time errors and use of templates to provide generic programming	Applying
CO-6	Demonstrate the concept of template library and Containers, Associative Containers, Algorithms, Iterators, Vectors, Lists, Maps	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-
CO-2	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-
CO-3	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-
CO-4	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-
CO-5	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-
CO-6	3	2	3	2	-	-	-	-	-	-	-	-	2	3	-

**UNIT-I: Introduction to C++**

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

**UNIT-II: Classes and Objects & Constructors and Destructor**

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

**UNIT-III: Operator Overloading and Type Conversion & Inheritance**

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

**UNIT-IV: Pointers & Binding Polymorphisms and Virtual Functions**

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

**UNIT-V: Generic Programming with Templates & Exception Handling**

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

**UNIT-VI: Overview of Standard Template Library**

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

**OUTCOMES:**

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language. Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference

**Text Books:**

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

**Reference Books:**

1. The C++ Programming Language, Bjarne Stroustrup, 4<sup>th</sup> Edition.
2. Object oriented Programming in C++, Robert Lafore, 4<sup>th</sup> Edition.
3. Object Oriented Programming C++, Joyce Farrell, Cengage.

4. C++ Programming: From problem analysis to program design, DS Malik, Cengage Learning

**URL:**

1. <http://www.doc.ic.ac.uk/~wjk/c++Intro/>
2. [http://www.tutorialspoint.com/cplusplus/cpp\\_object\\_oriented.htm](http://www.tutorialspoint.com/cplusplus/cpp_object_oriented.htm)
3. <http://www.cis.upenn.edu/~cis190/fall2014/lectures.html>
4. <http://www.oualline.com/books.free/teach/intro.html>

**Reference (Advanced) Material**

1. Effective C++: 55 Specific Ways to Improve Your Programs and Designs (Third Edition) by Scott Meyers, 2005
2. More Effective C++ by Scott Meyers, 2002
3. Modern C++ Design by Andrei Alexandrescu, 2004
4. Exceptional C++: 47 Engineering Puzzles, Programming Problems, and Solutions by Herb Sutter, 1999
5. C++ Templates: The Complete Guide by David Vandevoorde and Nicolai M. Josuttis, 2002
6. The C++ Standard Library: A Tutorial and Reference by Nicolai M. Josuttis, 2012
7. Effective STL: 50 Specific Ways to Improve Your Use of the Standard Template Library

<b>I Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH2T13</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>ENVIRONMENTAL STUDIES</b>								
<b>SYLLABUS</b>								

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Create awareness on global environment problems including the ecosystem and its production and its challenges	Creating
CO-2	Learn importance of natural resources and their conservations for sustenance	Analyzing
CO-3	Identify the threats to biodiversity and its conservation for different strategies	Applying
CO-4	Focus on the origins, pathways and consequences of anthropogenic activities in the environment as well as the approaches to control pollution and its remediation	Remembering
CO-5	Understand the important environmental problems and environmental legislations for sustainable development	Applying
CO-6	Applications of environmental management systems to an industry for sustenance	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	1	3	1	2	1	3	1	1	-	-	-	-	-	-
CO-2	-	1	1	-	-	-	2	2	2	-	-	-	-	-	-
CO-3	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-
CO-4	2	1	3	2	-	1	1	-	2	-	-	3	-	-	-
CO-5	1	1	2	1	-	3	3	2	1	-	-	-	-	-	-
CO-6	2	3	3	3	3	2	2	1	-	2	1	-	-	-	-

**UNIT – I**

Course Learning Objectives: Basic understanding of the environment, global problems and ecosystems. Course Outcomes: The importance of environment and global environmental problems.

The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.

**Multidisciplinary nature of Environment and Ecology:** Definition, Scope and Importance, *Introduction to Brief works of noted Environmentalists & Naturalists (Wangari Mathai, Salim Ali and Sunderlal Bahuguna)*, Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. Classification of ecosystems-characteristic features, structure

and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems: Estuaries and Mangroves

## UNIT – II

Course Learning Objectives: Overall understanding of the natural resources Course Outcomes: The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.

**Natural Resources:** Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Laterite, Coal, Sea and River sands. Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction. Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

## UNIT – III

Course Learning Objectives: Basic understanding of Biodiversity.

Course Outcomes: The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity

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

## UNIT – IV

Course Learning Objectives: Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities Course Outcomes: Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Waterpollution, *Heavy Metal pollution*, Soil pollution, Noise pollution, Radioactive pollution: Sources and risks. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Style, Impact of Fire Crackers on Man and his well being.

**Solid Waste Management:** Sources, Classification, effects and control measures of urban and industrial solidwastes. Consumerism and waste products, Biomedical, Hazardous and e - waste management.

## UNIT – V

Course Learning Objectives: Awareness on the social issues, environmental legislation and global treaties Course Outcomes: Social issues both rural and urban environment and the possible means to combat the challenges. The environmental legislations of India and the first global initiatives towards sustainable development.

**Social Issues and the Environment:** Urban problems related to energy -Water conservation-*Coastal Regulatory zone management*, rainwater harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air(Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

**UNIT – VI**

Course Learning Objectives: An understanding of the environmental impact of developmental activities Course Outcomes: About environmental assessment and the stages involved in EIA and the environmental audit. Self Sustaining Green Campus with Environment Friendly aspect of – Energy, Water and Wastewater reuse Plantation, Rain water Harvesting, Parking & Curriculum.

**Environmental Management:** Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. *Environmental Modeling: Definition (Box Model and Gaussian Plume Modeling)*, Ecotourism, Green Campus – Green business, Green politics and *Green Building*. The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

**TEXT BOOKS:**

1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
2. Environmental Studies, R. Rajagopalan, 2<sup>nd</sup> Edition, 2011, Oxford University Press.
3. Environmental Studies, P.N. Palanisamy, P. Manikandan, A. Geetha, and K.Manjula Rani; Pearson Education, Chennai

**REFERENCE:**

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014
5. Environmental pollution, Monitoring and Control by Khopkar.S.M, New Age Publishers.
6. *A Text Book of Fundamentals of Ecology, E.P.Odam, Philadelphia: W.B. Saunders Company.*

<b>I Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16ME2T01</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>ENGINEERING MECHANICS</b>								
<b>SYLLABUS</b>								

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

### Course Outcomes:

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Demonstrate the forces and friction applications	Understanding
CO-2	Analyze the Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, and Spatial Systems	Analyzing
CO-3	Distinguish Centroid and Center of gravity of Composite Figures	Analyzing
CO-4	Evaluate the Area moments of Inertia and Mass Moment of Inertia of Composite Figures	Evaluating
CO-5	Determine the paths of velocity and acceleration computation	Evaluating
CO-6	Adapt the concepts of work, energy and particle motion for engineering applications	Creating

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	3	-	-	-	-	-	-	-	-	-	2	-	3
CO-2	3	3	3	-	-	-	-	-	-	-	-	-	1	-	3
CO-3	3	3	3	-	3	3	-	-	-	-	3	-	-	-	3
CO-4	3	3	3	-	3	3	-	-	-	-	3	-	-	-	3
CO-5	3	3	3	-	-	-	-	-	-	-	-	-	1	-	3
CO-6	3	3	3	-	-	3	-	-	-	-	3	-	1	-	3

### UNIT – I

**Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.** Introduction to Engg. Mechanics – Basic Concepts.

**Systems of Forces:** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

**Friction:** Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction, Problems on wedges.

### UNIT II

**Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.**

**Equilibrium of Systems of Forces:** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. LamisTheorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium, analysis of plane trusses.

### UNIT – III

**Objectives :** The students are to be exposed to concepts of centre of gravity.

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

### UNIT IV

**Objective:** The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications. **Area moments of Inertia:**

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

### UNIT – V

**Objectives:** The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion. **Kinematics:**

Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies, Principle of virtual work.

### UNIT – VI

**Objectives:** The students are to be exposed to concepts of work, energy and particle motion

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

### TEXT BOOKS :

1. Engg. Mechanics - S.Timoshenko&D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engg. Mechanics - [S. S. Bhavikatti](#), [New](#) Age International.

### REFERENCES :

1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
2. Engineering Mechanics, statics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
3. Engineering Mechanics, statics and dynamics – I.H.Shames, – Pearson Publ.
4. Mechanics For Engineers, statics - F.P.Beer&E.R.Johnston – 5th Edn Mc Graw Hill Publ.
5. Mechanics For Engineers, dynamics - F.P.Beer&E.R.Johnston –5th Edn Mc Graw Hill Publ.
6. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best& W.G. McLean, 5th Edn – Schaum’s outline series - Mc Graw Hill Publ.
7. Singer's Engineering Mechanics: Statics And Dynamics, K. Vijay Kumar Reddy, J. Suresh Kumar, Bs Publications
8. Engineering Mechanics, Fedinand . L. Singer, Harper – Collins.
9. Engineering Mechanics statics and dynamics , A Nelson , Mc Graw Hill publications
10. [http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/engg\\_mechanics/ui/Course\\_home\\_3.htm](http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/engg_mechanics/ui/Course_home_3.htm)
11. <http://nptel.ac.in/courses/122104015/>
12. <https://www.youtube.com/watch?v=LG0YzGeAFxk>

<b>I Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH2L05</b>				<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	
<b>APPLIED / ENGINEERING CHEMISTRY LABORATORY</b>								
<b>SYLLABUS</b>								

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Students are able to estimate the impurities in water.	Evaluating
CO-2	Ability to know the strength of an acid present in secondary batteries.	Understanding
CO-3	Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results.	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	-	3	-	3	-	-	-	-	2	3	2	-	-	3	-
CO-2	-	3	-	-	-	-	-	-	1	2	-	-	-	1	-
CO-3	1	2	-	1	-	-	1	-	-	-	-	-	-	-	-

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCl using standard Na<sub>2</sub>CO<sub>3</sub> solutions
3. Estimation of KMnO<sub>4</sub> using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution
5. Estimation of Copper using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.
6. Estimation of Total Hardness water using standard EDTA solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimation of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

**STANDARD BOOKS :**

1. Dr.JyotsnaCherukuis(2012)Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
2. Chemistry Practical Manual, Lorven Publications
3. K. Mukkanti (2009) Practical Engineering Chemistry, B.S.Publication

<b>I Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH2L02</b>				<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	
<b>ENGLISH - COMMUNICATION SKILLS LAB - 2</b>								
<b>SYLLABUS</b>								

PRESCRIBED LAB MANUAL FOR SEMESTER II:

*'INTERACT: English Lab Manual for Undergraduate Students'* Published by Orient Blackswan Pvt Ltd.

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

### Course Outcomes:

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Make use of argumentative and critical thinking skills by elaborating ideas relevantly and improve team working skills.	Creating
CO-2	Select and adopt appropriate non-verbal communication and other presentation required skills to deliver effective presentation with clarity and impact. And to develop fluency in communication and present themselves in interviews confidently.	Remembering
CO-3	Analyze and compose the unique qualities of professional writing styles to meet the needs and demands in both academics and professions to demonstrate the harmony of language and avoiding mistakes.	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	-	-	-	-	-	-	1	-	3	3	-	-	-	-	-
CO-2	-	-	-	-	-	-	1	-	2	3	-	-	-	-	-
CO-3	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-

UNIT-1:

1. Debating- Practice work

UNIT-2:

1. Group Discussion- Practice work

UNIT-3:

1. Presentation Skills- Practice work

UNIT-4:

1. Interview Skills- Practice work

UNIT-5:

1. Email

2. Curriculum Vitae- Practice work

UNIT-6:

1. Idiomatic Expressions
2. Common Errors in English- Practice work

Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shaliniverma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, ArunaKoneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education

<b>I Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16IT2L01</b>				<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	
<b>OBJECT-ORIENTED PROGRAMMING LAB</b>								
<b>SYLLABUS</b>								

**OBJECTIVE:**

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

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Development of object oriented programming	Applying
CO-2	Design of programs using data encapsulation, abstraction, Inheritance, Polymorphism and Exceptions Handling.	Applying
CO-3	Demonstration of Templates	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	3	3	2	-	-	-	-	-	-	-	2	3	-
CO-2	3	3	3	3	2	-	-	-	-	-	-	-	2	3	-
CO-3	3	3	3	3	2	-	-	-	-	-	-	-	2	3	-

**Programming:****Exercise – 1 (Basics)**

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

- Convert any two programs that are written in C into C++
- Write a description of using g++ (150 Words)

**Exercise – 2 (Expressions Control Flow)**

- Write a Program that computes the simple interest and compound interest payable on Principle amount(in Rs.) of loan borrowed by the customer from a bank for a given period of time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest.
- Write a Program to calculate the fare for the passengers traveling in a bus. When a Passenger enters the bus, the conductor asks “What distance will you travel?” On knowing distance from passenger(as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.

**Exercise – 3 (Variables, Scope, Allocation)**

- Write a program to implement call by value and call by reference using reference variable.
- Write a program to illustrate scope resolution, new and delete Operators. (Dynamic MemoryAllocation)

- c) Write a program to illustrate Storage classes
- d) Write a program to illustrate Enumerations

**Exercises –4 (Functions)**

Write a program illustrating Inline Functions

- a) Write a program illustrate function overloading. Write 2 overloading functions for power.
- b) Write a program illustrate the use of default arguments for simple interest function.

**Exercise -5 (Functions –Exercise Continued)**

- a) Write a program to illustrate function overloading. Write 2 overloading functions for adding two numbers
- b) Write a program illustrate function template for power of a number.
- c) Write a program to illustrate function template for swapping of two numbers.

**Exercise -6 (Classes Objects)**

Create a Distance class with:

- feet and inches as data members
  - member function to input distance
  - member function to output distance
  - member function to add two distance objects
- a). Write a main function to create objects of DISTANCE class. Input two distances and output the sum.
  - b). Write a C++ Program to illustrate the use of Constructors and Destructors (use the above program.)
  - c) Write a program for illustrating function overloading in adding the distance between objects (use the above problem)
  - d). Write a C++ program demonstrating a Bank Account with necessary methods and variables

**Exercise – 7 (Access)**

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

- a) Write a program implementing Friend Function
- b) Write a program to illustrate this pointer
- c) Write a Program to illustrate pointer to a class

**Exercise -8 (Operator Overloading)**

- a). Write a program to Overload Unary, and Binary Operators as Member Function, and Non Member Function.
  - i. Unary operator as member function
  - ii. Binary operator as nonmember function
- b). Write a c ++ program to implement the overloading assignment = operator
- c). Write a case study on Overloading Operators and Overloading Functions (150 Words)

**Exercise -9 (Inheritance)**

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

**Exercise-10 (Inheritance –Continued)**

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

**Exercise -11** (Polymorphism)

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

**Exercise -12**(Templates)

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

**Exercise -13** (Exception Handling)

- a).Write a Program for Exception Handling Divide by zero
- b). Write a Program to re-throw an Exception

**Exercise -14** (STL)

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

**Exercise -15** (STLContinued)

- a) Write a Program to implement Dequeue and Dequeue Operations
- b) Write a Program to implement Map and Map Operations

**OUTCOMES:**

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

II Year I Semester				L	T	P	C	
Subject Code: 16BH3T07				4	0	0	3	
<b>STATISTICS WITH R PROGRAMMING</b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. The course is designed to equip the students with the necessary statistical skills and techniques that are essential part of R programming.
2. The skills derived from the course will help the student how to write the R program and interpret the statistics to analyze and make decision to the data.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Find different discrete distributions and installation of R software and basic commands and execution using R software.	Understanding
CO-2	Classify continuous random variable, normal distribution and how to interpret in R	Understanding
CO-3	Test of hypothesis and construction of confidence interval in R.	Analysing
CO-4	Classify different types of tests like Z-test, t-test, F-test and Chi-square test and interpret with R software.	Analysing
CO-5	Analyze the Analysis of variance for one way and two-way classification and interpret using R software.	Analysing
CO-6	Find correlation and regression of the given data and interpret using R.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	1	2	-	3	-	-	-	-	-	-	-	3	-	-
CO-2	3	3	2	2	3	-	-	-	-	-	-	-	3	-	-
CO-3	3	3	2	3	3	-	-	-	-	-	-	-	3	-	-
CO-4	3	3	2	3	3	-	-	-	-	-	-	-	3	-	-
CO-5	3	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO-6	3	3	3	3	3	-	-	-	-	-	-	-	3	-	-

**UNIT I:****Discrete probability distributions and Introduction to R**

Descriptive Statistics – Random variables – Discrete random variable – Expectation – Binomial, Poisson distributions. Introduction to R software – Vectors – Matrices – Arrays – Lists – Data frames – Basic arithmetic operations in R – Importing and exporting files in R.

**UNIT II:****Continuous Probability distribution and Computing with R**

Continuous random variable – Normal distribution – Properties – Gamma distribution – Weibul distribution. R commands for computing probability distributions.

**UNIT III:****Sampling Theory and Test of Hypothesis**

Sampling – Central limit theorem (without proof) – Sampling distribution of means – point estimation – interval estimation

Construction of confidence intervals using R.

**UNIT IV:****Test of Significance**

Introduction to test of Hypothesis – Type-I Error – Type-II Error – One tail and Two tail tests concerning single mean and two means – single proportion – two proportions.

R programming for Z-test, t-test and F-test and Chi square test.

**UNIT V:****Analysis of Variance**

ANOVA for one way classification – ANOVA for two way classification.

R programming – ANOVA for one way classification – ANOVA for two way classification.

**UNIT VI:****Correlation and regression**

Simple correlation and regression – Regression by the method of least squares – Rank correlation – Multiple linear regression

R programming for correlation and regression.

**Text Books:**

1. **Miller and John E. Freund**, Probability and Statistics for Engineers, Prentice Hall of India.
2. **G. Jay Kerns**, Introduction to Probability and Statistics Using R, First Edition ISBN: 978-0-557-24979-4. (Free e-book from R software website)

**Reference Books:**

1. **Robert I. Kabacoff**, R in Action, Second Edition, Data analysis and graphics with R ISBN: 9781617291388, Printed in the United States of America.
2. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India
3. **T.K.V. Iyengar et al.**, Probability and Statistics, S Chand Publications.
4. **Jay L. Devore**, Probability and Statistics for Engineering and Sciences, 8th Edition, Cengage Learning. ISBN 13: 978-81-315-1839-7.



**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, Lattices, Hasse diagram.

**Functions:** Inverse Function Composition of functions, recursive Functions, Lattice and its Properties

**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 principles and its application.

**UNIT - VI****Recurrence Relations:**

Generating Function of Sequences, Partial Fractions, Calculating coefficient of Generating Functions recurrence relations. Formulation as Recurrence relations, solving linear recurrence relations, methods of Characteristics roots, solutions of Inhomogeneous recurrence relations

**Text Books**

1. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e Mott, Kandel, Baker, PHI.
2. Trembly J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30th Re-print (2007).
3. Kenneth H.Rosen, "Discrete Mathematics and its Applications", 6th Edition, Special Indian edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, (2007).

**Reference Books**

1. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fourth Edition, Pearson Education Asia, Delhi, (2002).

2. Thomas Koshy, "Discrete Mathematics with Applications", Elsevier Publications, (2006).
3. Seymour Lipschutz and Mark Lipson, "Discrete Mathematics", Schaum's Outlines, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2007, Second edition, Fifth reprint.

**URLs**

1. [https://www.cs.cmu.edu/~emc/15414-f12/lecture/propositional\\_logic.pdf](https://www.cs.cmu.edu/~emc/15414-f12/lecture/propositional_logic.pdf).
2. [https://www.tutorialspoint.com/discrete\\_mathematics/discrete\\_mathematics\\_propositional\\_logic.htm](https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_propositional_logic.htm)
3. [https://www.tutorialspoint.com/discrete\\_mathematics/discrete\\_mathematics\\_functions.htm](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				L	T	P	C	
Subject Code: 16EC3T08				4	0	0	3	
<b>DIGITAL LOGIC DESIGN</b>								
<b>SYLLABUS</b>								

**Learning 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.
3. To optimize logic gates for digital circuits using various techniques.
4. Boolean function simplification using Karnaugh maps and Quine-McCluskey methods.
5. To understand concepts of combinational circuits.
6. To develop advanced sequential circuits.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Classify different number systems and apply to generate various codes.	Applying
CO-2	Use the concept of Boolean algebra in minimization of switching functions.	Analyzing
CO-3	Design different types of combinations logic circuits.	Creating
CO-4	Apply knowledge of flip-flops in designing of Registers and Counters	Understanding
CO-5	The operation and design methodology for synchronous sequential circuits	Creating
CO-6	Produce innovative designs by modifying the traditional design techniques.	Creating

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO-3	1	2	-	1	2	-	-	-	-	-	-	-	-	-	-
CO-4	-	-	1	2	-	1	-	-	-	-	-	-	-	-	-
CO-5	-	2	-	-	2	-	-	-	-	-	-	-	-	-	-
CO-6	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-

**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

**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

**Gate Level Minimization:** Karnaugh Map Method (K-Map): Minimization of Boolean Functions maximum upto Four Variables, POS and SOP, Simplifications With Don't Care Conditions Using K-Map.

**UNIT III**

**Combinational Logic Circuits:** Design of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Ripple Adders and Subtractors, Ripple Adder/Subtractor Using Ones and Twos Complement Method. Design of Decoders, Encoders, Multiplexers, Demultiplexers, Higher Order Demultiplexers and Multiplexers, Priority Encoder, Code Converters, Magnitude Comparator.

**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, Conversion of Flip Flops. Flip Flops With Asynchronous Inputs (Preset and Clear).

**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.

**UNIT VI**

**Introduction to Programmable Logic Devices (PLDs):** PLA, PAL, PROM. Realization of Switching Functions Using PROM, PAL and PLA. Comparison of PLA, PAL and PROM.

**TEXT BOOKS :**

1. Digital Design ,4/e, M.Morris Mano, Michael D Ciletti, PEA
2. Switching and Finite Automata Theory, 3/e, Kohavi, Jha, Cambridge.

**REFERENCE BOOKS:**

1. Fundamentals of Logic Design, 5/e, Roth, Cengage
2. Digital Logic Design, Leach, Malvino, Saha, TMH
3. Modern Digital Electronics, R.P. Jain, TMH

**Web Links :**

1. <https://www.youtube.com/watch?v=CeD2L6KbtVM>
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.youtube.com/watch?v=K73N9ES\\_8nI](https://www.youtube.com/watch?v=K73N9ES_8nI)
4. <https://www.youtube.com/watch?v=62WxkICo2Bc>

II Year I Semester				L	T	P	C	
Subject Code: 16IT3T02				4	0	0	3	
<b>PYTHON PROGRAMMING</b> (Common to CSE, IT)								
<b>SYLLABUS</b>								

**Learning objectives:**

- 1.To make the students understand the fundamentals of python programming.
2. To expose the students to object oriented concepts.
3. To make the students to develop applications using python.
4. To make students to use python for automation.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Enumerate various data types ,operators in python	Understanding
CO-2	Elaborate file handling in python.	Analyzing
CO-3	Comparing mutable and immutable objects.	Applying
CO-4	Build applications using list and dictionary.	Applying
CO-5	Design functions oriented programming in python.	Applying
CO-6	Develop object oriented principles in python.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1 } is:

	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	PSO-3
CO-1	3	2	3	2	1	-	-	-	-	-	-	-	2	3	2
CO-2	3	2	3	2	1	-	-	-	-	-	-	-	2	3	2
CO-3	3	2	3	2	1	-	-	-	-	-	-	-	2	3	2
CO-4	3	2	3	2	1	-	-	-	-	-	-	-	2	3	2
CO-5	3	2	3	2	1	-	-	-	-	-	-	-	2	3	2
CO-6	3	2	3	2	1	-	-	-	-	-	-	-	2	3	2

**UNIT – I****Introduction to Python, Installing Python:**

Basic syntax, interactive shell, editing, saving, and running a script. The concept of data types variables, assignments immutable variables numerical types; arithmetic operators and expressions comments in the program understanding error messages

**UNIT – II****Conditions, Boolean logic, logical operators; ranges:**

**Control statements:** If-else, loops (for, while) short-circuit (lazy) evaluation, Strings and text files manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file creating and reading a formatted file (csv or tab-separated).

### UNIT – III

**String manipulations:** Subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers, Lists, tuples, and dictionaries.

### UNIT – IV

Basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.

### UNIT – V

**Design with functions:** Hiding redundancy, complexity; arguments and return values; formal vs. Actual arguments, named arguments, Program structure and design, Recursive functions.

### UNIT VI

**Classes and OOP:** Classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects, inheritance, polymorphism, operator overloading (eq\_, \_str\_, etc) abstract classes; exception handling, try block, Multithreading, Automation using Python.

### Text Books:

1. Think Python, How to Think Like a Computer Scientist, Version 2.0.17, Allen Downey, Green Tea Press.

### Reference Books:

1. Python Essential Reference, David M. Beazley , Pearson Education, Inc.
2. Fluent Python, Luciano Ramalho by O'Reilly Media
3. Python Cookbook, David Beazley and Brian K. Jones, O'Reilly Atlas.3e
4. Fundamentals of Python: First Programs, Kenneth Lambert, Course Technology, Cengage Learning, 2012. ISBN-13: 978-1-111-82270-5.

### URLs

1. Think Python: How to Think Like a Computer Scientist by Allen B. Downey  
<http://www.greenteapress.com/thinkpython/thinkpython.html>
2. Dive into Python by Mark Pilgrim- <http://www.diveintopython.net>  
<http://staff.washington.edu/jon/python-course/>
3. <https://wiki.python.org/moin/PythonBooks>

II Year I Semester				L	T	P	C	
Subject Code: 16CS3T03				4	0	0	3	
<b>DATA STRUCTURES THROUGH C++</b> (Common to CSE, IT)								
<b>SYLLABUS</b>								

**Learning objectives:**

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

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Represent linear data structures using the concept of ADT	Understanding
CO-2	Implement Stacks and Queues ADT using templates in C++ language	Applying
CO-3	Analyze various applications of linked list and its variants	Analyzing
CO-4	Implement non-linear data structures such as binary trees and binary search trees	Applying
CO-5	List the applications of Graph Abstract Data Type	Understanding
CO-6	Implement various sorting techniques.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO-2	3	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO-3	3	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO-4	3	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO-5	3	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO-6	3	2	2	-	-	-	-	-	-	-	-	-	1	2	-

**UNIT-I: ARRAYS**

Abstract Data Types and the C++ Class, An Introduction to C++ Class- Data Abstraction and Encapsulation in C++- Declaring Class Objects and Invoking Member Functions- Special Class Operations- Miscellaneous Topics- ADTs and C++ Classes, The Array as an Abstract Data Type, The Polynomial Abstract Data type - Polynomial Representation - Polynomial Addition. Spares Matrices, Introduction - Sparse Matrix Representation - Transposing a Matrix - Matrix Multiplication, Representation of Arrays.

**UNIT-II: STACKS AND QUEUES**

Templates in C++, Template Functions- Using Templates to Represent Container Classes, The Stack Abstract Data Type, The Queue Abstract Data Type, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

**UNIT-III: LINKED LISTS**

Single Linked List and Chains, Representing Chains in C++, Defining a Node in C++- Designing a Chain Class in C++ - Pointer manipulation in C++- Chain Manipulation Operations, The Template Class Chain, Implementing Chains with Templates- Chain Iterators- Chain Operations- Reusing a Class, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Polynomial Representation- Adding Polynomials- Circular List Representation of Polynomials, Equivalence Classes, Sparse Matrices, Sparse Matrix Representation- Sparse Matrix Input- Deleting a Sparse Matrix, Doubly Linked Lists,

**UNIT-IV: TREES**

Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Trees, Binary Tree Representations, Binary Tree Traversal and Tree Iterators, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree, , Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.

**UNIT-V: GRAPHS**

The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search,

**UNIT-VI: SORTING**

Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort.

**TEXT BOOKS:**

1. Fundamentals of Data structures in C++, E. Horowitz, S.Sahni, Dinesh Mehta, Galgotia Publications, 2006
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

**REFERENCE BOOKS:**

1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

**URLs**

1. [https://www.tutorialspoint.com/cplusplus/cpp\\_data\\_structures.htm](https://www.tutorialspoint.com/cplusplus/cpp_data_structures.htm)
2. <http://people.cs.vt.edu/~shaffer/Book/C++3elatest.pdf>
3. <http://cds.iisc.ac.in/courses/ds286/>
4. <http://www.geeksforgeeks.org/data-structures>

<b>II Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH3T14</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS</b> (Common to all branches of Engineering)								
<b>SYLLABUS</b>								

**Learning objectives:**

1. To understand the concept and nature of Managerial Economics and its relationship with other disciplines, Concept of Demand and Demand forecasting.
2. To understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis.
3. To understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods.
4. To know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles.
5. To understand the different Accounting Systems preparation of Financial Statements.
6. To understand the concept of Capital, Capitalization, and Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods and uses of different tools for performance evaluation.

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Make use of the concepts of managerial economics and demand in managerial decision making and predicting demand for goods and services	Applying
CO-2	Assess the functional relation among production, cost of production, cost concepts and Break Even Analysis	Evaluating
CO-3	Classify market structures as perfect and imperfect markets for price and output decisions	Analyzing
CO-4	Appraise the forms of business organizations and trade cycles in economic growth	Evaluating
CO-5	Apply accounting principles in recording transactions for the purpose of preparing financial statements	Applying
CO-6	Adapt capital budgeting techniques to take capital budgeting decisions.	Evaluating

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	-	3	-	-	-	-	-	-	-	-	3	-	-	-	-
CO-3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-4	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO-5	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO-6	-	3	-	-	-	-	-	-	-	-	3	-	-	-	-

**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-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement- Law of Supply -Demand forecasting and it's Methods.

**Unit – II****Production and Cost Analyses:**

Production function-Isoquants and Isocosts-Law of Variable proportions- 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, Theories of the Firm & Pricing Policies:**

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – 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 Cycle.

**Unit – V****Introduction to Accounting:**

Introduction to Double Entry Systems-Journal-Ledger- Trail Balance - Preparation of Financial Statements - Analysis and Interpretation of Financial Statements-Ratio Analysis – liquidity ratios, profitability ratios, solvency ratios, turnover ratios  
– Preparation of the Funds flow Statement (Simple Problems)

**Unit – VI**

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Sources of Finance (with special reference to Shares and Debentures)-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

**TEXT BOOKS:**

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

**REFERENCES:**

1. V. Maheswari: Managerial Economics, Sultan Chand.
2. Suma Damodaran: Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
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

<b>II Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS3L02</b>				<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	
<b>DATA STRUCTURES THROUGH C++ LAB</b>								
<b>(Common to CSE, IT)</b>								
<b>SYLLABUS</b>								

**Learning objectives:**

This course is aimed to provide hands on experience to implement basic linear and nonlinear data structures. This course covers implementation of stack, queue, list, sorting techniques, binary search trees, and balanced search trees.

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Design and analyze the time and space efficiency of the data structure	Applying
CO-2	Selection and application of appropriate data structure for the given problem	Applying
CO-3	Develop applications using linear and non linear data structures	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	3	-	-	-	-	-	-	-	-	-	1	2	3
CO-2	3	2	3	-	-	-	-	-	-	-	-	-	1	2	3
CO-3	3	2	3	-	-	-	-	-	-	-	-	-	1	2	3

**List of Experiments**

1. a) Write a Program to implement linear search algorithm.  
b) Write a Program to implement binary search algorithm.
2. Write a Program to Sort the set of elements by using  
i) Quick Sort. ii) Merge Sort.
3. a) Write a Program to Implement Stack Operations by using Array.  
b) Write a Program to implement the operations of Queue using array.
4. a) Write a program that uses stack operations to convert a given infix expression into its postfix.  
b) Write a program that uses stack operations to evaluate given postfix expression.
5. Write a Program to Implement Singly Linked List and its operations.

6. a) Write a Program to Implement Stack Operations by using Linked List.  
b) Write a Program to implement the operations of Queue using linked list.
7. Write a Program to Implement Circular Queue Operations by using Array.
8. Write a Program to Implement the Binary Search Tree Operations.
9. Write a Program to Perform the Tree Traversal Techniques by using Iterative Method
10. Write a Program to Perform the Tree Traversal Techniques by using recursion.
11. Write a program for implementing the Depth First Search graph traversal algorithm.
12. Write a program for implementing the Breadth First Search graph traversal algorithm.

**Note: Use Classes and Objects to implement the above programs**

II Year I Semester				L	T	P	C	
Subject Code: 16IT3L02				0	0	3	2	
<b>PYTHON PROGRAMMING LAB</b> (Common to CSE& IT)								
<b>SYLLABUS</b>								

**Learning objectives:**

- 1.To practice the students understand the fundamentals of python programming.
2. To expose the students to object oriented concepts.
3. To practice the students to develop applications using python.
4. To practice students to use python for automation.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Development of procedure oriented programming using python.	Applying
CO-2	Design of data encapsulation, hiding and abstraction principles by using python.	Applying
CO-3	Development of multi threading and packages	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	3	2	1	-	-	-	-	-	-	-	2	3	2
CO-2	3	2	3	2	1	-	-	-	-	-	-	-	2	3	2
CO-3	3	2	3	2	1	-	-	-	-	-	-	-	2	3	2

**Exercise 1 - Basics**

- a)Running instructions in Interactive interpreter and a Python Script
- b) Write a program to purposefully raise Indentation Error and Correct it

**Exercise 2 - Operations**

- a)Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)
- b) Write a program to convert a given decimal number to other base systems

**Exercise - 3 Control Flow**

- a) Write a program to calculate the Income Tax as per the rules of Indian Government.
- b) Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:  
1, 2, 3, 5, 8, 13, 21, 34, 55, 89  
By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

**Exercise - 4 - DS**

- a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure
- b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

**Exercise - 5 Files**

- a) Write a program encrypts the message in a given file and write the encrypted message in an output file. Write a decrypt program and verify.
- b) Write a program to compute the number of characters, words and lines in a file.

**Exercise -6 Functions**

- a) Write a function ball collides that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.  
Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius  
If (distance between two balls centers)  $\leq$  (sum of their radii) then (they are colliding)
- b) Find mean, median, mode for the given set of numbers in a list.

**Exercise -7 Functions - Continued**

- a) Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
- b) Write a function dups to find all duplicates in the list.
- c) Write a function unique to find all the unique elements of a list.

**Exercise 8 - Multi-D Lists**

- a) Write a program that defines a matrix and prints
- b) Write a program to perform addition of two square matrices
- c) Write a program to perform multiplication of two square matrices

**Exercise - 9 - Modules**

- a) Install packages requests, flask and explore them. using (pip)
- b) Write a script that imports requests and fetch content from the page. Eg. (Wiki)
- c) Write a simple script that serves a simple HTTP Response and a simple HTML Page

**Exercise - 10 OOP**

- a) Class variables and instance variable and illustration of the self-variable for ATM Machine

**Exercise - 11 – Advanced**

Write a program (using threads) to allocate 100 students (each student modeled as a single thread) to 5 sections of a course.

II Year II Semester				L	T	P	C	
Subject Code: 16CS4T04				4	0	0	3	
<b>SOFTWARE ENGINEERING</b>								
<b>SYLLABUS</b>								

**Learning 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.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Analyze various software development process models and their suitability to industrial applications	Understanding
CO-2	Apply the methods of requirement elicitation, analysis and develop SRS document.	Analyzing
CO-3	Analyze different software architectural styles and understand user interface design methodology	Analyzing
CO-4	Apply software testing approaches and aspects	Applying
CO-5	Analyze software reliability and quality management	Applying
CO-6	Apply software maintenance activities and re-usability of software	Understanding

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	3	-	-	-	-	-	-	-	-	-	-	2	-	2
CO-2	2	2	-	-	-	-	-	-	-	-	-	-	2	-	2
CO-3	-	-	3	-	1	-	-	-	-	-	-	-	1	3	-
CO-4	1	1	-	2	-	-	-	-	-	-	-	-	-	2	-
CO-5	1	-	-	-	1	-	-	-	-	-	3	-	1	-	2
CO-6	1	-	-	-	-	-	-	-	-	-	-	1	1	-	2

**UNIT-I:**

**Software and Software Engineering:** The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

**Process Models:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

**UNIT-II:**

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

**Software Design:** Overview of the Design Process, How to Characterize of a Design? Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design

**UNIT – III:**

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

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

**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

**UNIT – V:**

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

**Computer Aided Software Engineering:** Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment.

**UNIT – VI**

**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 McGrawHill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
3. Software Engineering, Ian Sommerville, Ninth edition, Pearson education

**REFERENCE BOOKS:**

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

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2. <http://nptel.ac.in/downloads/106105087/>

II Year II Semester				L	T	P	C	
Subject Code: 16IT4T06				4	0	0	3	
<b>JAVA PROGRAMMING (Common to CSE &amp; IT)</b>								
<b>SYLLABUS</b>								

**Learning objectives:**

1. To make the students understand the fundamentals of Java programming and how to use Java to write applications.
2. To train the learners to implement and use inheritance and polymorphism, including interfaces and abstract classes, Packages.
3. To make the students to design appropriate Exception Handling in Java methods.
4. To make the students to understand the concepts of Threads, Files and I/O Streams, Applets in java.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Write, debug, and document well-structured Java applications	Understanding
CO-2	Apply decision and iteration control structures to implement algorithms and classes from the specifications.	Applying
CO-3	Implement inheritance and packages	Applying
CO-4	Implement the Exceptions and Multithreading concepts	Applying
CO-5	Develop java programs using applet class.	Applying
CO-6	Create java programs using Abstract Window toolkit.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	2	3	-	-	-	-	-	-	-	-	-	2	3	3
CO-2	2	2	3	-	-	-	-	-	-	-	-	-	2	3	3
CO-3	2	2	3	-	-	-	-	-	-	-	-	-	2	3	3
CO-4	2	2	3	-	-	-	-	-	-	-	-	-	2	3	3
CO-5	2	2	3	-	-	-	-	-	-	-	-	-	2	3	3
CO-6	2	2	3	-	-	-	-	-	-	-	-	-	2	3	3

**UNIT – I****Introduction to OOP**

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, C++ vs Java, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6 Variables, Primitive Data types, Identifiers- Naming Conventions, Keywords, Literals

**UNIT - II**

**Programming Constructs** Operators- Binary, Unary and ternary, Expressions, Precedence rules and Associative, Primitive Type Conversion and Casting, Flow of control- Conditional, loops., **Classes and Objects**- Classes, Objects, Creating Objects, Methods, constructors-Constructor overloading,

cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments.

### UNIT - III

**Inheritance:** Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class **Interfaces, Packages and Enumeration:** Interface-Extending interface, Interface vs. Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package

### UNIT – IV

**Exceptions & Assertions** – Introduction, Exception handling techniques-try...catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions **Multi-Threading:** java.lang.Thread, the main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive () and join(), Synchronization, suspending and Resuming threads, Communication between Threads

### UNIT – V

**Input/output:** reading and writing data, java.io package **Applets-** Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint()

### UNIT – VI

**Event Handling** Introduction, Event Delegation Model, java.awt.event Description, Sources of Events, Event Listeners, Adapter classes, Inner classes **Abstract Window Toolkit** Why AWT?,java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar

### TEXT BOOKS:

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

### REFERENCE BOOKS:

1. JAVA Programming, K.Rajkumar. Pearson
2. Object oriented programming with JAVA, Essentials and Applications, Raj KumarBuyya, Selvi, Chu TMH
3. Introduction to Java Programming, 7/e, Y Daniel Liang, Pearson.
4. Core Java Volume 1.Fundamentals, 8ed, Cay S.Horstmann, Gray Cornell, Pearson.
5. Advanced Programming in Java2: Updated to J2SE6 with Swing, Servlet and RMI, K.Somasundaram.
6. A Java Programming Book by N.B.Venkateswarlu

### WEB LINKS:

1. [https://www.tutorialspoint.com/java/java\\_object\\_classes.htm](https://www.tutorialspoint.com/java/java_object_classes.htm)
2. <http://beginnersbook.com/2015/07/java-swing-tutorial/>
3. <http://www.realapplets.com/tutorial/>
4. <https://www.youtube.com/watch?v=aUlwgdaKBug>
5. <http://beginnersbook.com/2013/04/java-exception-handling/> and words in a text file.

II Year II Semester				L	T	P	C	
Subject Code: 16CS4T05				4	0	0	3	
<b>ADVANCED DATA STRUCTURES</b>								
<b>SYLLABUS</b>								

**Learning objectives:**

1. Comprehensive understanding of dictionaries, hashing mechanism which supports faster data retrieval and skip lists.
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.
5. Illustration of pattern matching and tries which share some properties of table look up.
6. Understanding of external sorting methods and various issues related to the design of file structures.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Implement external sorting methods and file structure concepts	Applying
CO-2	Develop symbol table using hashing techniques	Applying
CO-3	Implement priority queues using Binary heap and Binomial Queue and their applications	Applying
CO-4	Analyze algorithms for Height balanced trees such as AVL trees, red-black trees.	Analyzing
CO-5	Analyze algorithms for Height balanced trees B-trees and B+ trees	Analyzing
CO-6	Develop algorithms for digital search trees, binary tries and patricia	Applying

The Mapping of CO and PO on 3 point scale {high-3, Medium-2, Low-1} is:

	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	PSO-3
CO-1	3	3	3	2	-	-	-	-	-	-	-	-	2	2	-
CO-2	3	3	3	2	-	-	-	-	-	-	-	-	2	2	-
CO-3	3	3	3	2	-	-	-	-	-	-	-	-	2	2	-
CO-4	3	3	3	2	-	-	-	-	-	-	-	-	2	2	-
CO-5	3	3	3	2	-	-	-	-	-	-	-	-	2	2	-
CO-6	3	3	3	2	-	-	-	-	-	-	-	-	2	2	-

**UNIT-I: SORTING**

External Sorting, Introduction, K-way Merging - Buffer Handling for parallel Operation- Run Generation- Optimal Merging of Runs.

**UNIT-II: HASHING**

Introduction-Static Hashing- Hash Table- Hash Functions- Secure Hash Function- Overflow Handling- Theoretical Evaluation of Overflow Techniques, Dynamic Hashing- Motivation for Dynamic Hashing -Dynamic Hashing Using Directories- Directory less Dynamic, Hashing.

### **UNIT-III: PRIORITY QUEUES (HEAPS)**

Model, Simple Implementation, Binary Heap-Structure Property-Heap-Order Property-Basic Heap Operations- Other Heap Operation, Applications of Priority Queues- The Selection Problem Event Simulation Problem, Binomial Queues- Binomial Queue Structure – Binomial Queue Operation- Implementation of Binomial Queues

### **UNIT-IV: EFFICIENT BINARY SEARCH TREES**

Optimal Binary Search Trees, AVL Trees, Red-Black Trees, Definition- Representation of a Red-Black Tree- Searching a Red-Black Tree- Inserting into a Red Black Tree- Deletion from a Red-Black Tree- Joining Red-Black Trees, Splitting a Red-Black tree.

### **UNIT-V: MULTIWAY SEARCH TREES**

M-Way Search Trees, Definition and Properties- Searching an M-Way Search Tree, B-Trees, Definition and Properties- Number of Elements in a B-tree- Insertion into B-Tree- Deletion from a B-Tree- B+-Tree Definition- Searching a B+-Tree- Insertion into B+-tree- Deletion from a B+-Tree.

### **UNIT-VI: DIGITAL SEARCH STRUCTURES**

Digital Search Trees, Definition- Search, Insert and Delete- Binary tries and Patricia, Binary Tries, Compressed Binary Tries- Patricia, Multiway Tries- Definitions- Searching a Trie- Sampling Strategies- Insertion into a Trie- Deletion from a Trie- Keys with Different Length- Height of a Trie- Space Required.

### **TEXT BOOKS:**

1. Fundamentals of DATA STRUCTURES in C: 2<sup>nd</sup> ed. Horowitz , Sahani, Anderson-freed, Universities Press
2. Data structures and Algorithm Analysis in C, 2<sup>nd</sup> ed. Mark Allen Weiss, Pearson

### **REFERENCE BOOKS:**

1. Data Structures, a Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.
2. File Structures :An Object oriented approach with C++, 3<sup>rd</sup> ed, Michel J Folk, Greg Riccardi, Bill Zoellick
3. C and Data Structures: A Snap Shot oriented Treatise with Live examples from Science and Engineering, NB Venkateswarlu& EV Prasad, S Chand, 2010.

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2. [http://utubersity.com/?page\\_id=878](http://utubersity.com/?page_id=878)
3. <http://freevidelectures.com/Course/2519/C-Programming-and-Data-Structures>
4. <http://freevidelectures.com/Course/2279/Data-Structures-And-Algorithms>
5. <http://lcm.csa.iisc.ernet.in/dsa/dsa.html>
6. [http://utubersity.com/?page\\_id=878](http://utubersity.com/?page_id=878)
7. <http://freevidelectures.com/Course/2519/C-Programming-and-Data-Structures>
8. <http://freevidelectures.com/Course/2279/Data-Structures-And-Algorithms>

II Year II Semester				L	T	P	C	
Subject Code: 16CS4T06				4	0	0	3	
<b>COMPUTER ORGANIZATION (Common for CSE &amp; IT)</b>								
<b>SYLLABUS</b>								

**Learning objectives****Comprehensive knowledge of computer system including the analysis and design of components of the system-**

1. Gives a view of computer system from user's perspective, representation of data
2. Understanding RTL, Micro operations, ALU, organization of stored program computer, types of instructions and design of basic components of the system
3. Illustration of data paths and control flow for sequencing in CPUs, Microprogramming of control unit of CPU
4. Illustration of algorithms for basic arithmetic operations using binary and decimal representation
5. Description of different parameters of a memory system, organization and mapping of various types of memories
6. Describes the means of interaction devices with CPU, their characteristics, modes and introduction to multiprocessors.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Compare Fixed Point Data Representation and Floating – Point Data Representation	Understanding
CO-2	Enumerate Arithmetic Micro operations, logic micro operations	Understanding
CO-3	Differentiate various Addressing modes	Analyzing
CO-4	Apply algorithms for basic arithmetic operations using binary and decimal representation	Applying
CO-5	List out various types of memory	Understanding
CO-6	Enumerate the characteristics of Multiprocessors	Understanding

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO-2	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO-3	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO-4	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO-5	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO-6	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-

**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-BCD-8421, 2421, excess-3, gray and excess-3 gray, error detection codes.

## UNIT - II

**Register Transfer Language and 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:** Instruction codes, Computer Register Computer instructions, 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, program control, reduced instruction set computer.

**Micro Programmed Control:** Control memory, address sequencing, micro program example.

## UNIT - IV

**Computer Arithmetic:** Addition and subtraction, multiplication algorithms, division algorithms, floating – point arithmetic operations.

## UNIT - V

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

Pipelining Arithmetic and Instruction Pipeline, Basics of vector processing and Array Processors.

## UNIT-VI

**Input-Output Organization:** Peripheral devices, input-output interface, asynchronous data transfer, modes of transfer, priority interrupts, direct memory access.

**Multi Processors:** Introduction, characteristics or multiprocessors, interconnection structures, inter processor arbitration.

## Text Books:

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

## References:

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, - SivaraamaDandamudi Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, 4/e, Elsevier

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3. <https://www.reference.com/technology/computer-organization-36c3a064b20f9b33>
4. [https://www.youtube.com/watch?v=CDO28Esqmcg&list=PLhwVAYxlh5dvB1MkZrcRZy6x\\_a2yORNAu](https://www.youtube.com/watch?v=CDO28Esqmcg&list=PLhwVAYxlh5dvB1MkZrcRZy6x_a2yORNAu)

II Year II Semester				L	T	P	C	
Subject Code: 16CS4T07				4	0	0	3	
<b>FORMAL LANGUAGES AND AUTOMATA THEORY</b>								
<b>SYLLABUS</b>								

**Learning objectives**

1. To provide students with an understanding of basic concepts in the theory of computation.
2. Identify different formal language classes and their relationships
3. Design grammars and recognizers for different formal languages
4. Prove or disprove theorems in automata theory using its properties
5. Determine the decidability and intractability of computational problems.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Analyze core concepts of automata theory and analysis of finite automata its representation, minimization and types.	Analyzing
CO-2	Solve Regular Expressions, their equivalence with finite automata and able to relate practical problems to formal languages & computability	Applying
CO-3	Compare deferent types of formal grammars and able to analyze applications of context free grammars	Analyzing
CO-4	Analyze pushdown automata, its types and applications by modeling	Analyzing
CO-5	Design Turing Machines for formal languages	Applying
CO-6	Analyze complexity of decidable and undecidable problems	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO-2	3	2	2	1	-	-	-	-	-	-	-	-	1	-	-
CO-3	2	3	2	2	-	-	-	-	-	-	-	-	1	-	-
CO-4	3	2	2	1	-	-	-	-	-	-	-	-	-	-	-
CO-5	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
CO-6	2	2	2	2	-	-	-	-	-	-	-	-	1	-	-

**UNIT – I: Finite Automata**

Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automata, Transition Systems, Acceptance of a String by a Finite Automata, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

**UNIT – II: Regular Expressions**

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata, and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

### **UNIT – III: Context Free Grammars**

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, E-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

### **UNIT – IV: Pushdown Automata**

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

### **UNIT – V: Turing Machine**

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine.

### **UNIT – VI: Computability**

Decidable and Un-decidable Problems, Halting Problem of Turing Machines, Post's Correspondence Problem, Modified Post's Correspondence Problem, Classes of P and NP, NP-Hard and NP-Complete Problems.

### **TEXT BOOKS:**

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwani and J.D.Ullman, 3<sup>rd</sup> Edition, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekharan, 3<sup>rd</sup> Edition, PHI, 2007.

### **REFERENCE BOOKS:**

1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu Kandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
4. Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.

### **URLs**

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](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				L	T	P	C	
Subject Code: 16CS4T08				4	0	0	3	
<b>COMPUTER GRAPHICS</b>								
<b>SYLLABUS</b>								

**Learning objectives**

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

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Analyze algorithms for various graphics shapes such as ellipse, circle by understanding the foundations of computer graphics	Analyzing
CO-2	Enumerate filled area primitives	Understanding
CO-3	Apply geometric transformations in 2D necessary for programming computer graphics and viewing transformations	Applying
CO-4	Analyze basic concepts of representing 3D objects	Analyzing
CO-5	Apply geometric transformations in 3D computer graphics applications	Applying
CO-6	Create interactive computer graphics application using OpenGL	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	2	-	-	-	-	-	-	-	-	-	1	2	-
CO-2	3	3	-	-	-	-	-	-	-	-	-	-	1	2	-
CO-3	3	-	2	-	-	-	-	-	-	-	-	-	1	2	-
CO-4	3	3	-	-	-	-	-	-	-	-	-	-	1	2	-
CO-5	3	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO-6	3	3	3	-	2	-	-	-	-	-	-	-	1	2	-

**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 and ellipse algorithms.

**UNIT – II**

**Filled area primitives:** Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms. Inside and outside tests.

**UNIT – III**

**2-D geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

**2-D viewing:** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

#### UNIT – IV

**3-D object representation:** Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces.

#### UNIT - V

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

#### UNIT – VI

##### 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
2. Computer Graphics with Virtual Reality Systems, Rajesh K Maurya, Wiley
3. Introduction to Computer Graphics, Using Java 2D and 3D, Frank Klawonn, Springer
4. Computer Graphics, Steven Harrington, TMH
5. Computer Graphics, Amarendra N Sinha, Arun Udai, TMH

#### 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

#### URLs

1. <https://www.ssmengg.edu.in/weos/weos/upload/EStudyMaterial/Cse/6th%20sem/computer%20graphics.pdf>
2. [https://www.tutorialspoint.com/computer\\_graphics/](https://www.tutorialspoint.com/computer_graphics/)

<b>II Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS4L03</b>				<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	
<b>ADVANCED DATA STRUCTURES LAB</b>								
<b>SYLLABUS</b>								

**Learning objectives**

1. To make the student learn about object oriented way of solving problems.
2. To make the student understand and implement operations for all data structures.
3. To make learners how to develop algorithms for text processing applications.

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Develop programs for, efficient data storage and text processing applications	Applying
CO-2	Implement graph and graph traversal algorithms.	Applying
CO-3	Develop programs for implementing balanced trees and their Operations.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	3	3	-	-	-	-	-	-	-	-	3	2	-
CO-2	3	3	3	3	-	-	-	-	-	-	-	-	3	2	-
CO-3	3	3	3	3	-	-	-	-	-	-	-	-	3	2	-

**List of Programs**

1. Implementation of Merge Sort
2. Implementation of Quick Sort
3. To implement operations on graphs
  - a. Vertex insertion
  - b. Vertex deletion
  - c. Finding vertex
  - d. Edge addition and deletion
4. To implement Depth First Search for a graph non recursively.
5. To implement Breadth First Search for a graph non recursively.
6. To implement functions of Dictionary using Hashing (division method, Multiplication method, Universal hashing)
7. To perform various operations i.e., insertions and deletions on AVL trees
8. To perform various operations i.e., insertions and deletions on 2-3 trees.
9. To implement operations on binary heap.
10. Implementation of Data Searching using divide and conquer technique
11. To implement pattern matching using Boyer-Moore algorithm.
12. To implement Knuth-Morris-Pratt algorithm for pattern matching.

II Year II Semester				L	T	P	C	
Subject Code: 16IT4L04				0	0	3	2	
<b>JAVA PROGRAMMING LAB</b>								
<b>(Common to CSE &amp; IT)</b>								
<b>SYLLABUS</b>								

**Learning Objectives**

1. To make the students understand how to use Java to write applications.
2. To make the students implement object-oriented concepts, including classes, objects, methods, properties, abstraction, polymorphism, inheritance, encapsulation, and more.
3. To make the learners implement and use inheritance and polymorphism, including interfaces and abstract classes, Packages.
4. To make the learners proficient in designing appropriate Exception Handling using Java methods.
5. To make students understand Threads, Files and I/O Streams, Applets in java

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Implementing java programs using basic concepts, classes and objects	Applying
CO-2	Applying the concepts of Threads and Exceptions in java programs.	Applying
CO-3	Develop java programs using applets and AWT components.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	3	2	-	-	-	-	-	-	-	-	3	2	3
CO-2	3	3	3	2	-	-	-	-	-	-	-	-	3	2	3
CO-3	3	3	3	2	-	-	-	-	-	-	-	-	3	2	3

**List of Programs****Week-1:**

- a) Write a JAVA program to display default value of all primitive data types of JAVA
- b) Write a JAVA program to display the Fibonacci sequence

**Week-2:**

- a) Write a JAVA program to check whether given string is palindrome or not.
- b) Write a JAVA program to sort given list of numbers.

**Week-3:**

- a) Write a JAVA program give example for command line arguments.
- b) Write a JAVA program to sort an array of strings

**Week-4**

- a) Write a JAVA program for the following
  1. Example for call by value.
  2. Example for call by reference.
- b) Write a JAVA program to give the example for 'this' operator. And also use the 'this' keyword as return statement

**Week-5**

- a) Write a JAVA program to demonstrate static variables, methods and blocks,
- b) Write a JAVA program to give the example for 'super' keyword.
- c) Write a JAVA program demonstrating the difference between method overloading and method overriding.
- d) Write a JAVA program demonstrating the difference between method overloading and constructor overloading.

**Week-6**

- a) Write a JAVA program that illustrates multi-level inheritance
- b) Write a JAVA program illustrating multiple inheritance using interfaces.
- c) Write a JAVA program to give a simple example for abstract class.

**Week-7:**

- a) Write a JAVA program to create a package named pl, and implements this package in ex 1 class.
- b) Write a JAVA program to create a package named my pack and import it in circle class.

**Week-8:**

- a) Write a JAVA program to illustrate sub class exception precedence over base class.
- b) Write a JAVA program for example of try and catch block. In this check whether the given array size is negative or not.
- c) Write a JAVA program for creation of user defined exception

**Week-9:**

- a) Write a JAVA program to illustrate creation of threads using Runnable interface. (Start method starts each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500milliseconds).
- b) Write a JAVA program to create a class My thread in this class a constructor, call the base class constructor, using super and starts the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently.

**Week-10:**

- a) Write a JAVA program that describes the life cycle of an applet.
- b) Write a JAVA program to create a dialog box and menu.

**Week-11:**

- a) Write a JAVA program to create a border layout control.
- b) Write a JAVA program to create a simple calculator.

**Week-12:**

- a) Write a JAVA program that displays that x and y position of the cursor movement using Mouse.
- b) Write a JAVA program that displays number of characters, lines and words in a text file.

III Year I Semester				L	T	P	C	
Subject Code: 16CS5T09				4	0	0	3	
<b>COMPILER DESIGN</b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

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:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Compare different types of language processors and design a lexical analyzer.	Understanding
CO-2	Construct top down parsers.	Applying
CO-3	Construct SLR, CLR, LALR bottom up parsers.	Applying
CO-4	Generate intermediate code by analyzing semantic analysis phase.	Applying
CO-5	Design a simple code generator by using symbol table.	Applying
CO-6	Apply machine independent code optimization techniques.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	3	3	-	-	-	-	-	-	-	-	1	-	-
CO-2	3	3	3	3	3	-	-	-	-	-	-	-	1	-	-
CO-3	3	3	3	3	-	-	-	-	-	-	-	-	1	-	-
CO-4	3	3	3	3	-	-	-	-	-	-	-	-	1	-	-
CO-5	3	3	3	3	-	-	-	-	-	-	-	-	1	-	-
CO-6	3	3	3	3	-	-	-	-	-	-	-	-	1	-	-

**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, specification of lexemes, tokens. 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.

#### **UNIT – IV**

Semantic Analysis: Syntax Directed Definition, Synthesized Attributes & Inherited attributes, Evolution order of SDD's.

Intermediate Code Generation: Variants of Syntax trees, DAGs, Three Address code, Quadruples, Triples, Indirect Triples, Types and Declarations, Type Checking.

#### **UNIT – V**

Symbol tables: Need of Symbol tables, Runtime Environments, Stack allocation of space, access to non-local data, Heap Management.

Code generation: Issues in design of code generation, The target Language, Basic blocks and Flow graphs, A Simple Code generator, Peephole Optimization.

#### **UNIT –VI**

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 Sethi, Jeffrey D. Ullman, 2<sup>nd</sup> edition, Pearson, 2007.
2. "Compiler Design," K. Muneeswaran, OXFORD, 2012.

#### **REFERENCE BOOKS:**

1. "Principles of compiler design," Nandhini Prasad, Elsevier, 2<sup>nd</sup> edition, 2012.
2. "Compiler Construction, Principles and practice," Kenneth C Loudon, CENGAGE, first edition 2006.
3. "Implementations of Compiler, A New approach to Compilers including the algebraic methods," Yunlinsu, SPRINGER, 2011.

#### **Web Resources**

1. <http://nptel.ac.in/courses/106108052/1> (Prof. Y.N. Srikanth, IISc Bangalore)

III Year I Semester				L	T	P	C	
Subject Code: 16EC5T18				4	0	0	3	
<b>MICROPROCESSORS &amp; INTERFACING</b>								
<b>SYLLABUS</b>								

**Subject Code:**

**Course objectives: The student will**

1. Study the organization and architecture of Microprocessor
2. Study minimum and maximum modes of 8086.
3. Study the interfacing of MP with I/O as well as other devices
4. Study the concepts 8251 architecture and interfacing.
5. Study the principles of Pentium and RISC processors
6. Study 8051 micro controller architecture

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Analyze the concepts of architecture and key features of 8086 Microprocessor.	Analyzing
CO-2	Examine the minimum and maximum modes of 8086 and memory interfacing of 8086	Analyzing
CO-3	Implement the concept of Interfacing 8086 microprocessor with other I/O peripherals	Creating
CO-4	Develop sample programs for serial data transfer	Creating
CO-5	Analyze the advances in Microprocessors (80286 & 80386) and their architectural differences	Analyzing
CO-6	Apply the concepts of 8051 microcontroller for simple applications	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	-	-	-	-	-	-	-	-	-	1	3	2	-
CO-2	3	2	-	-	-	-	-	-	-	-	-	1	3	2	-
CO-3	3	-	2	2	-	-	-	-	-	-	-	1	3	-	2
CO-4	3	2	2	-	-	-	-	-	-	-	-	1	3	2	2
CO-5	3	-	-	-	2	-	-	-	-	-	-	1	3	-	-
CO-6	3	-	-	-	-	-	-	-	-	-	-	1	3	-	-

### UNIT-I

Architecture of 8086 Microprocessor. Special functions of General purpose registers.8086 flag register and function of 8086 Flags. Addressing modes of 8086, Instruction set of 8086. Assembler directives, simple programs, procedures, and macros. Assembly language programs involving

logical, Branch & Call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

#### **UNIT-II**

Pin diagram of 8086-Minimum mode and maximum mode of operation. Timing diagram. Memory interfacing to 8086 (Static RAM & EPROM). Need for DMA. DMA data transfer Method. Interfacing with 8237/8257.

#### **UNIT-III**

8255 PPI – various modes of operation and interfacing to 8086. Interfacing Keyboard, Displays, 8279 Stepper Motor and actuators. D/A and A/D converter interfacing. Interrupt structure of 8086. Vector interrupt table. Interrupt service routines. Introduction to DOS and BIOS interrupts. 8259 PIC Architecture and interfacing cascading of interrupt controller and its importance.

#### **UNIT-IV**

Serial data transfer schemes. Asynchronous and Synchronous data transfer schemes. 8251 USART architecture and interfacing. TTL to RS 232C and RS232C to TTL conversion. Sample program of serial data transfer. Introduction to High-speed serial communications standards, USB.

#### **UNIT-V**

Advanced Micro Processors -Introduction to 80286, Salient Features of 80386, Real and Protected Mode Segmentation & Paging and Salient Features of Pentium, Branch Prediction, and Overview of RISC Processors.

#### **UNIT-VI**

8051 Microcontroller Architecture, Register set of 8051, Modes of timer operation, Serial port operation, Interrupt structure of 8051, Memory and I/O interfacing of 8051.

#### **TEXT BOOKS:**

1. Advanced microprocessor and Peripherals - A.K.Ray and K.M.Bhurchandi, TMH, 2000.
2. Micro Controllers Theory & Applications –Ajay .V. Deshmukh, TMH, 2007.

#### **REFERENCES:**

1. Micro Processors & Interfacing – Douglas V. Hall, 2007.
2. The 8088 and 8086 Micro Processors – 4<sup>th</sup>Edition, PHI, 2003.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design - By Yu-cheng Liu and Glenn.A. Gibson, Pearson Education, 4<sup>th</sup> Edition,2006

III Year I Semester				L	T	P	C	
Subject Code: 16CS5T10				4	0	0	3	
<b>SOFTWARE TESTING METHODOLOGIES</b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. Apply software testing knowledge and engineering methods.
2. Design and conduct a software test process for a software testing project.
3. Solve software testing problems by designing and selecting software test models, criteria, strategies, and methods.
4. Identify the needs of software test automation.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Outline the necessity of testing, debugging using program control flow.	Understanding
CO-2	Apply transaction flow, data flow testing to unit and integration testing.	Applying
CO-3	Enumerate white box testing methods and metrics.	Understanding
CO-4	Compare state graph, transaction testing, graph matrices for optimizing code.	Analyzing
CO-5	Examine testing strategies of system testing.	Analyzing
CO-6	Analyze the use of testing tools like WinRunner, loadrunner, JMeter.	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	1	3	-	-	-	-	-	-	-	-	2	-	2
CO-2	3	2	1	3	-	-	-	-	-	-	-	-	2	-	2
CO-3	3	2	1	3	-	-	-	-	-	-	-	-	2	-	2
CO-4	3	2	1	3	-	-	-	-	-	-	-	-	2	-	2
CO-5	3	2	1	3	-	-	-	-	-	-	-	-	2	-	2
CO-6	3	2	1	3	3	-	-	-	-	-	-	-	2	-	2

**UNIT-I:**

Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs. Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing, Need of Black box and White box testing.

**UNIT-II:**

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques.

Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Data flow Testing. Validation activities: Unit testing, Integration Testing,

**UNIT-III:**

Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.  
Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

**UNIT IV:**

State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips. Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

**UNIT – V:**

Validation activities: Function testing, system testing, acceptance testing  
Regression testing: Progressives Vs regressive testing, Regression testability, Objectives of regression testing, when regression testing done? Regression testing types, Regression testing techniques

**UNIT -VI:**

Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

**TEXT BOOKS:**

1. “Software testing techniques,” Boris Beizer, Dreamtech, second edition, 2003.
2. “Software Testing,” Yogesh Singh, Cambridge University Press, 2011.

**REFERENCE BOOKS:**

1. “The Craft of software testing,” Brian Marick, Pearson Education, 1995.
2. “Software Testing,” N.Chauhan, Oxford University Press, 2010.
3. “Introduction to Software Testing,” P.Ammann&J.Offutt, Cambridge University Press, 2<sup>nd</sup> edition, 2017.
4. “Effective methods of Software Testing,” Perry, John Wiley, 2<sup>nd</sup> Edition, 1999.

**Web Resources**

1. [https://onlinecourses.nptel.ac.in/noc17\\_cs32/preview](https://onlinecourses.nptel.ac.in/noc17_cs32/preview) (Meenakshi D Souza, IIIT-Bangalore)

III Year I Semester				L	T	P	C	
Subject Code: 16CS5T11				4	0	0	3	
<b><u>DATABASE MANAGEMENT SYSTEMS</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

Provide students with necessary skills for designing and development of databases for real world applications.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Enumerate different Data Models	Understanding
CO-2	Apply Relational Model to design a Database.	Applying
CO-3	Convert conceptual design into logical database design	Applying
CO-4	Apply Normalization techniques.	Analyzing
CO-5	Compare various concurrency control methods.	Analyzing
CO-6	Illustrate various methods for storing and indexing Database Files.	Understanding

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO-2	2	2	2	-	-	-	-	-	-	-	-	-	1	1	-
CO-3	2	-	2	-	1	-	-	-	-	-	-	-	1	2	-
CO-4	2	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO-5	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO-6	2	-	1	-	-	-	-	-	-	-	-	-	-	1	-

**UNIT – I**

**INTRODUCTION:** Database system, Characteristics (Database Vs File System), Database Users(Actors on Scene, Workers behind the scene), Advantages of Data base systems, Database applications.

Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment.

**UNIT – II**

**RELATIONALMODEL:** Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Logical Data Base Design.

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

**UNIT – III**

Entity Relationship Model: Introduction to ER Model, Data Base Design, Representation of entities, attributes, entity set, relationship, relationship set, Additional Features of ER Model: constraints, sub classes, super class, Strong and Weak entities, inheritance, specialization, generalization, Aggregation.

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

**UNIT – IV**

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

**UNIT – V**

TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL: Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and savepoint.

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

**UNIT – VI**

STORAGE AND INDEXING: Database file organization, file organization on disk, heap files and sorted files, hashing, single and multi-level indexes, dynamic multilevel indexing using B-Tree and B+ tree, index on multiple keys.

**TEXT BOOKS:**

1. "Database Management Systems," Raghuram Krishnan, Johannes Gehrke, TMH, 3<sup>rd</sup> edition, 2003.
2. "Database Management System," Ramez Elmasri, Shamkant B. Navathe, PEA, 6<sup>th</sup> edition, 2016.

**REFERENCE BOOKS:**

1. "Database System Concepts," Silberschatz, Korth, TMH, 5<sup>th</sup> edition, 2011.
2. "Introduction to Database Systems," C J Date, PEA, 8<sup>th</sup> edition, 2004.
3. "The Database book principles & practice using Oracle/MySql," Narain Gehani, Silicon Press, 2011.

**Web Resources:**

1. <http://nptel.ac.in/courses/106106093> (Prof. D. Janakiram, IIT, Madras)

III Year I Semester				L	T	P	C	
Subject Code: 16CS5T13				4	0	0	3	
<b>OPERATING SYSTEMS</b> (Common to CSE and IT)								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. Understand the structure and functions of Operating Systems.
2. Learn process, disk and memory management.
3. Learn basics of Linux and Android Operating Systems.

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Enumerate the operating system functions	Understanding
CO-2	Evaluate Scheduling algorithms for process management	Analyzing
CO-3	Analyze process synchronization techniques for concurrency	Analyzing
CO-4	Compare various memory management schemes.	Analyzing
CO-5	Illustrate different principles of deadlock.	Understanding
CO-6	Compare various disk scheduling algorithms	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO-3	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO-4	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO-5	2	2	-	1	-	-	-	-	-	-	-	-	2	-	-
CO-6	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-

**UNIT I**

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

**UNIT-II**

Process Management – Process concept, the process, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

**UNIT-III**

Memory Management: 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: ProcessSynchronization, The Critical- Section Problem, 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, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management

Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

#### UNIT VI

Linux System : Components of LINUX, Inter-process Communication, Synchronization, Interrupt, Exception and System Call.

Android Software Platform: Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management

#### TEXT BOOKS:

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

#### REFERENCE BOOKS:

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

#### Web Resources

1. <http://nptel.ac.in/courses/106108101> (Prof. P.C.P. Bhatt, IISc Bangalore)

III Year I Semester				L	T	P	C	
Subject Code: 16EC5L07				0	0	3	2	
<b>MICROPROCESSORS AND INTERFACING LAB</b>								
<b>SYLLABUS</b>								

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Development of assembly language programming using MASM.	Applying
CO-2	Design the interfacing of Microprocessor with peripheral devices.	Creating
CO-3	Design the interfacing of Microcontroller with peripheral devices.	Creating

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	1	1	3	-	-	-	-	-	-	-	-	-	-	-	-
CO-3	1	1	3	-	-	-	-	-	-	-	-	-	-	-	-

**LIST OF EXPERIMENTS****PART- A:**

8086 Assembly Language Programming using Assembler Directives

1. Sorting
2. Multibyte addition/subtraction
3. Sum of squares/cubes of a given n-numbers
4. Addition of n-BCD numbers
5. Factorial of given n-numbers
6. Multiplication and Division operations
7. Stack operations
8. BCD to Seven segment display codes

**PART- B:**

8086 Interfacing

1. Hardware/Software Interrupt Application
2. A/D Interface through Intel 8255

3. D/A Interface through Intel 8255
4. Keyboard and Display Interface through Intel 8279
5. Generation of waveforms using Intel 8253/8254

**PART- C:**

**8051 Assembly Language Programs**

1. Finding number of 1's and number of 0's in a given 8-bit number
2. Addition of even numbers from a given array
3. Ascending / Descending order
4. Average of n-numbers

**Equipment Required:**

- a) Regulated Power supplies
- b) Analog/Digital Storage Oscilloscopes
- c) 8086 Microprocessor kits
- d) 8051 microcontroller kits
- e) ADC module
- f) DAC module
- g) Stepper motor module
- h) Keyboard module
- i) LED, 7-Segment Units
- j) Digital Multimeters
- k) ROM/RAM Interface module
- l) Bread Board etc.

III Year I Semester				L	T	P	C	
Subject Code: 16CS5L04				0	0	3	2	
<b><u>OPERATING SYSTEM &amp; LINUX PROGRAMMING LAB</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives**

1. To understand the design aspects of operating system.
2. To study the process management concepts & Techniques, storage management concepts.
3. To familiarize students with the Linux environment

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Develop C programs for process scheduling, Memory Management, system calls	Applying
CO-2	Implement Deadlock Avoidance, Inter-process communication using shared memory and semaphore in Linux.	Applying
CO-3	Develop programs based on inter process communication and TCP	Applying

The Mapping of CO and PO on 3 point scale { high-3, Medium-2, Low-1 } is:

	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	PSO-3
CO-1	2	2	3	2	-	-	-	-	-	-	-	-	2	3	-
CO-2	2	2	3	2	-	-	-	-	-	-	-	-	3	3	-
CO-3	2	2	3	2	-	-	-	-	-	-	-	-	2	3	-

**OPERATING SYSTEMS**

1. Implement CPU scheduling algorithms like Round Robin, SJF, FCFS, Priority, etc.
2. Implement Multiprogramming-Memory management using fork (), wait (), exec() and exit () System calls.
3. Develop
  - 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 the following page replacement algorithms.
  - a) FIFO
  - b) LRU
  - c) LFU
6. Simulate the following File allocation strategies
  - a) Sequenced
  - b) Indexed
  - c) Linked

**LINUX PROGRAMMING**

1. a) Study of Unix/Linux general purpose utility command list man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.  
b) Study of vi editor.
2. Write a C program that makes a copy of a file using standard I/O, and system calls
3. Write a C program to emulate the UNIX ls -l command.
4. Write a C program that illustrates how to execute two commands concurrently with a command pipe.
5. Write a C program that illustrates two processes communicating using shared memory
6. Write a C program to simulate producer and consumer problem using semaphores

III Year I Semester				L	T	P	C	
Subject Code: 16CS5L05				0	0	3	2	
<b><u>DATABASE MANAGEMENT SYSTEMS LAB</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

To teach the student database design, querying and PL/SQL constructs.

**Course Outcomes:**

The student will be able to

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO-2	3	2	2	2	2	-	-	-	-	-	-	-	2	2	1
CO-3	3	3	3	3	3	-	-	-	-	-	-	-	2	2	1

**System/Software Requirements:**

- Intel based desktop PC
- MySQL/Oracle latest version Recommended

**PROGRAMS LIST:****SQL:**

1. Queries for Creating, Dropping, and Altering Tables.
2. Queries to Retrieve and Manipulate Data: Select, Insert, Delete, and Update
3. Queries related to Views and Constraints
4. Queries using operators in SQL
5. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
6. Queries using Group By, Order By, and Having Clauses
7. Queries on Controlling Data: Commit, Rollback, and Save point
8. Queries on Joins and Correlated Sub-Queries
9. Queries to Build Report in SQL \*PLUS

**PL/SQL:**

1. Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section
2. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
3. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
4. Program development using WHILE LOOPS, numeric FOR LOOPS, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.
5. Programs development using creation of procedures, passing parameters IN and OUT of Procedures.
6. Program development using creation of stored functions, invoke functions in SQL Statements.
7. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.
8. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
9. Write a PL/SQL Code Creation of forms for any Information System such as Student

Information System, Employee Information System etc.

10. Demonstration of database connectivity

**TEXT BOOKS :**

- 1) "ORACLE PL/SQL by example," Benjamin Rosenzweig, Elena Silvestrova, Pearson Education, 3rd Edition, 2004.
- 2) "ORACLE DATA BASE LOG PL/SQL Programming," SCOTT URMAN, Tata Mc-Graw Hill, 2008.
- 3) "SQL & PL/SQL for Oracle 10g," Black Book, Dr.P.S. Deshpande, dreamtech press, 2007.
- 4) "Database Systems Using Oracle", Nilesh Shah, PHI, 2007.

III Year I Semester				L	T	P	C	
Subject Code: 16BH5T17				0	3	0	0	
<b>Professional Ethics &amp; Human Values</b>								
<b>SYLLABUS</b>								

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Understand the basic perception of profession, professional ethics and role of human values in governing profession	Understanding
CO-2	Bring consensus in controversial engineering decisions through the application of theories of ethics and moral development while playing the role of engineering professionals	Applying
CO-3	Apply professional codes in Research and development while playing different roles as professionals by not sacrificing ethical issues	Applying
CO-4	Aware of responsibilities of an engineer for safety and risk	Remembering
CO-5	Understand the concepts of loyalty, collegiality and collective bargaining in solving complex engineering problems and in shunning occupational crimes	Understanding
CO-6	Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives	Understanding

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	1	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO-2	1	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO-3	1	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO-4	1	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO-5	1	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO-6	1	-	-	-	-	-	-	3	-	-	-	-	-	-	-

**UNIT - I**

**Professional Ethics and Human values:** Ethics -History of Ethics-Types of Ethics, Professional Ethics and its forms -Significance-Personal ethics vs Professional Ethics, Morals, Values – Integrity – Work Place Ethics and Business Ethics –Ethics in HRM, Finance, Marketing Management – Civic Virtue –Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time –Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

**UNIT - II**

**Engineering Ethics:** Engineering Ethics-Meaning & Purpose of Engineering Ethics- Consensus and Controversy –Profession, Professional and Professionalism –Key Characteristics of Engineering

Professionals – Professional Roles to be played by an Engineer-Self Interest, Customs and Religion-Ethical Theories-Meaning & Uses of Ethical Theories-Types of Inquiry -Theories of moral Development-Kohlberg's Theory – Gilligan's Argument –Heinz's Dilemma.

### UNIT - III

**Engineering as Social Experimentation:** Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering- Ethical issues involved in Clinical Trials.

### 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

**Engineers Responsibilities and Rights:** Collegiality-Techniques for Achieving Collegiality – Loyalty -Two Senses of Loyalty-obligations of Loyalty-Misguided Loyalty – professionalism and Loyalty- Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems - Ethical egoism-Collective bargaining-Confidentiality- Acceptance of Bribes/Gifts when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational Crimes-industrial espionage-price fixing-endangering lives- Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

### UNIT - VI

**Global Issues:** Globalization-Problems of globalization- Cross-culture Issues- Environmental Ethics-Computer Ethics-computers as the instrument of Unethical behavior-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analyzing Ethical Problems in Research-Food and Drug Adulteration.

Relevant case studies shall be dealt where ever necessary.

### REFERENCE BOOKS

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, DharanikotaSuyodhana- 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.

<b>III Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS6T15</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b><u>COMPUTER NETWORKS</u></b> <b>(Common to CSE and IT)</b>								
<b>SYLLABUS</b>								

**Learning 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:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Conceptualize the data communication models using OSI/ISO and TCP/IP protocol architectures.	Understanding
CO-2	Analyze protocols implemented in data link layer for error and flow control.	Analyzing
CO-3	Analyze the features and operations of different MAC mechanisms.	Analyzing

CO-4	Build the skills of subnetting and routing mechanisms.	Applying
CO-5	Choose network protocols by elucidate the way protocols currently in use in the Internet like IPv4, IPv6, ICMP, ARP, RARP, DHCP operate.	Applying
CO-6	Develop client/server-based applications using TCP and UDP protocols.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	2	1	-	-	-	-	-	-	-	-	2	-	-
CO-2	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO-3	3	2	2	1	-	-	-	-	-	-	-	-	2	-	-
CO-4	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO-5	3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO-6	3	2	2	2	-	-	-	-	-	-	-	-	2	-	-

### UNIT - I

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model. Physical Layer: Guided transmission media, wireless transmission media.

### 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

### UNIT - III

Multi Access Protocols - ALOHA, CSMA – CSMA/CD, CSMA/CA, Collision free protocols, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

### UNIT - IV

Network Layer: 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.

### UNIT - V

Internetworking: Tunneling, Internetwork Routing, Packet fragmentation, IPv4, introduction to IPv6 Protocol, IP addresses, ICMP, ARP, RARP, DHCP.

### UNIT - VI

Transport Layer: Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release, Connection Release, Crash Recovery.

The internet transport protocols – UDP, TCP.

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. "Data Communications and Networking," Behrouz A.Forouzan, TMH, Fifth Edition, 2013.
2. "Computer Networks," Andrew S Tanenbaum, Pearson Education, 4th Edition, 2003.

**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](http://epgp.inflibnet.ac.in/view_f.php?category=1736)
3. [http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e\\_videonotes/tanenbaum\\_video\\_Notes.html](http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e_videonotes/tanenbaum_video_Notes.html)

<b>III Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS6T16</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b><u>DATA WAREHOUSING AND MINING</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
2. They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
3. They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Implement data warehouse for heterogeneous data.	Applying
CO-2	Analyze real time datasets with basic summary statistics.	Analyzing
CO-3	Apply different preprocessing methods, Similarity, Dissimilarity measures for any given raw data.	Applying
CO-4	Construct a decision tree and resolve the problem of model overfitting	Applying
CO-5	Compare Apriori and FP-growth association rule mining	Analyzing

	algorithms for frequent itemset generation	
CO-6	Apply suitable clustering algorithm for the given data set	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	2	1	1	-	-	-	-	-	-	-	2	1	-
CO-2	3	3	3	1	1	-	-	-	-	-	-	-	2	1	-
CO-3	3	3	3	1	1	-	-	-	-	-	-	-	2	1	-
CO-4	3	3	3	1	1	-	-	-	-	-	-	-	2	1	-
CO-5	3	3	3	1	1	-	-	-	-	-	-	-	2	1	-
CO-6	3	3	3	1	1	-	-	-	-	-	-	-	2	1	-

### 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, Exploring Data, The Iris Dataset, summary statistics (Tan & Vipin)

### UNIT –III

Data Preprocessing: Aggregation, Sampling, Dimensionality Reduction, Feature Subset Selection, Feature creation, Discretization and Binarization, Variable Transformation, Measures of Similarity and Dissimilarity. (Tan & Vipin)

### UNIT –IV

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. (Tan & Vipin). Alternative Techniques: Bayes' Theorem, Naïve Bayesian Classification

### UNIT –V

Association Analysis: Basic Concepts and Algorithms: Problem Definition, Frequent Item Set Generation using Apriori, Rule Generation, Compact Representation of Frequent Itemsets, FP-Growth Algorithm. (Tan & Vipin)

### UNIT –VI

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, Pearson, 2<sup>nd</sup> edition, 2013.
2. "Data Mining concepts and Techniques," Jiawei Han, Michel Kamber, Elsevier, 3<sup>rd</sup> edition.2011.

**REFERENCE BOOKS:**

1. "Data Mining Techniques and Applications: An Introduction," Hongbo Du, Cengage Learning, 2010.
2. "Data Mining: Introductory and Advanced topics," Dunham, Pearson, 3<sup>rd</sup> edition, 2008.
3. "Data Warehousing Data Mining & OLAP," Alex Berson, Stephen Smith, TMH, 2008.
4. "Data Mining Techniques," Arun K Pujari, Universities Press, 2005.

**Web Resources**

1. [https://onlinecourses.nptel.ac.in/noc18\\_cs14/preview](https://onlinecourses.nptel.ac.in/noc18_cs14/preview) (PabitraMitra, IIT, Kharagpur)
2. <https://www-users.cs.umn.edu/~kumar001/dmbook/index.php>
3. [http://hanj.cs.illinois.edu/bk3/bk3\\_slidesindex.htm](http://hanj.cs.illinois.edu/bk3/bk3_slidesindex.htm)

<b>III Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS6T17</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b><u>DESIGN AND ANALYSIS OF ALGORITHMS</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. Analyze the asymptotic performance of algorithms.
2. Apply important algorithmic design paradigms and methods of analysis.
3. Synthesize efficient algorithms in common engineering design situations

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Describe asymptotic notation and basic concepts of algorithms	Understanding
CO-2	Apply divide and conquer paradigm to solve various problems	Applying
CO-3	Use greedy technique to solve various problems	Applying
CO-4	Apply dynamic programming technique to various problems	Analyzing
CO-5	Employ backtracking technique to various problems	Analyzing
CO-6	Apply branch and bound technique to various problems	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	1	1	1	-	-	-	-	-	-	-	-	-	1	-	-
CO-2	2	1	1	-	-	-	-	-	-	-	-	-	1	-	-
CO-3	2	1	1	-	-	-	-	-	-	-	-	-	1	-	-
CO-4	2	1	1	-	-	-	-	-	-	-	-	-	1	-	-
CO-5	2	1	1	-	-	-	-	-	-	-	-	-	1	-	-
CO-6	2	1	1	-	-	-	-	-	-	-	-	-	1	-	-

### UNIT-I

Introduction: What is an Algorithm, Algorithm Specification, Pseudocode Conventions, Recursive Algorithm, Performance Analysis, Space Complexity, Time Complexity, Amortized Complexity, Asymptotic Notations, Practical Complexities, Performance Measurement.

### UNIT-II

Divide and Conquer: General Method, Binary Search, Merge Sort, Quick Sort, Performance Measurement.

### UNIT-III

The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees, Prim's Algorithm, Kruskal's Algorithms, Single Source Shortest Paths.

### UNIT-IV

Dynamic Programming: All - Pairs Shortest Paths, Single – Source Shortest paths, General Weights, String Edition, 0/1 Knapsack, Reliability Design.

### UNIT-V

Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles.

### UNIT-VI

Branch and Bound: The Method, Least cost (LC) Search, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem, LC Branch-and-Bound Solution, 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. [https://onlinecourses.nptel.ac.in/noc18\\_cs20/preview](https://onlinecourses.nptel.ac.in/noc18_cs20/preview) (Madhavan Mukund, Chennai Mathematical Institute)
2. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/lecture-videos/>
3. <http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms>

III Year II Semester				L	T	P	C	
Subject Code: 16CS6T18				4	0	0	3	
<b><u>OBJECT ORIENTED ANALYSIS AND DESIGN USING UML</u></b>								
<b>SYLLABUS</b>								

**Learning 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:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Analyze complex systems using object-oriented approach.	Analyzing
CO-2	Identify classes, objects and their relationships & responsibilities.	Understanding
CO-3	Design structural model using Class & Object diagrams.	Applying
CO-4	Examine behavioral model using Use case, Interaction, Activity Diagrams.	Analyzing
CO-5	Develop advanced behavioral model using state chart, state transition diagrams, threads and processes.	Applying
CO-6	Design real time application using Object Oriented Analysis & Design (OOAD) methodology.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	2	-	2	-	-	-	-	-	-	-	2	3	2
CO-2	3	3	2	-	2	-	-	-	-	-	-	-	2	3	2
CO-3	3	3	2	-	2	-	-	-	-	-	-	-	2	3	2
CO-4	3	3	2	-	2	-	-	-	-	-	-	-	2	3	2
CO-5	3	3	2	-	2	-	-	-	-	-	-	-	2	3	2
CO-6	3	3	2	-	2	-	-	-	-	-	-	-	2	3	2

**UNIT-I**

Introduction: The structure of complex systems, the inherent complexity of software, attributes of complex system, organized and disorganized complexity, bringing order to chaos, designing complex systems, evolution of object model, foundation of object model, elements of object model, applying the object model.

**UNIT-II**

Classes and Objects: Nature of object, relationships among objects, nature of a class, relationship among classes, interplay of classes and objects, identifying classes and objects, importance of proper classification, identifying classes and objects, key abstractions and mechanisms.

**UNIT-III**

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

**UNIT-IV**

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

**UNIT-V**

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

**UNIT-VI**

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams. Case Study: The Unified Library application.

**TEXT BOOKS**

1. “Object- Oriented Analysis and Design with Applications”, Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, KelliaHouston, PEARSON, 3<sup>rd</sup> edition, 2013.
2. “The Unified Modeling Language User Guide”, Grady Booch, James Rumbaugh, Ivar Jacobson, PEARSON, 12<sup>th</sup> Impression, 2012.

**REFERENCE BOOKS**

1. “Head first object-oriented analysis and design”, Brett D. McLaughlin, Gary Pollice, Dave West, O’Reill, 2006.
2. “Object-oriented analysis and design with the Unified process”, John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning, 2004.
3. “The Unified modeling language Reference manual”, James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley, 2005.

**Web Resources**

1. [https://onlinecourses.nptel.ac.in/noc17\\_cs25](https://onlinecourses.nptel.ac.in/noc17_cs25) (Dr. ParthaPratim Das, IIT Kharagpur)
2. <http://www.uml.org/>

III Year II Semester				L	T	P	C	
Subject Code: 16IT6E01				4	0	0	3	
<b><u>ARTIFICIAL INTELLIGENCE</u></b>								
<b>SYLLABUS</b>								

**COURSE OBJECTIVES:**

- Learn about basic AI fundamentals and AI problems
- Students will gain an understanding about searching
- Study about AI game playing concepts
- Understand about AI knowledge
- Students will know about AI order logic

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	State applications of Artificial Intelligence	Remembering
CO-2	Enumerate problem solving strategies in AI	Understanding
CO-3	Illustrate problem reduction techniques	Understanding
CO-4	List the logic concepts	Understanding
CO-5	Analyze the current knowledge representation techniques in AI	Analyzing
CO-6	Investigate various expert systems	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CO-2	2	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CO-3	2	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CO-4	2	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CO-5	2	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CO-6	2	2	1	1	-	-	-	-	-	-	-	-	2	1	-

**UNIT I**

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, current trends in AI.

**UNIT II**

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening a\*, constraint satisfaction.

**UNIT III**

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning.

**UNIT IV**

Logic concepts: Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system.

**UNIT V**

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure.

**UNIT VI**

Expert system: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance system.

**TEXT BOOKS**

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

**REFERENCES**

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Luger, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

**WEB LINKS:**

1. [www.cs.jhu.edu/~phi/ai/slides/lecture-inference-in-first-order-logic.pdf](http://www.cs.jhu.edu/~phi/ai/slides/lecture-inference-in-first-order-logic.pdf)
2. [https://en.wikipedia.org/wiki/History\\_of\\_artificial\\_intelligence](https://en.wikipedia.org/wiki/History_of_artificial_intelligence)
3. [www.imada.sdu.dk/~marco/DM828/Slides/dm828-lec18.pdf](http://www.imada.sdu.dk/~marco/DM828/Slides/dm828-lec18.pdf)

III Year II Semester				L	T	P	C	
Subject Code: 16CS6E01				4	0	0	3	
<b><u>INTERNET OF THINGS</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. To understand IoT technology with respect to components, architecture, communication protocols
2. To design an IoT system for a real-world application

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Enumerate the list of IoT Applications	Remembering
CO-2	Evaluate different IoT application architectures	Analyzing
CO-3	Design IoT Applications, choosing the relevant IoT components and applicable technologies and protocols	Applying
CO-4	Compare storage, data collection, computing and communication protocol requirements for an IoT application	Analyzing
CO-5	Construct IoT applications with Cloud for data analytics	Applying
CO-6	Chose a real world commercial platform for deploying IoT Applications	Understanding

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	3	2	2	-	-	-	-	-	-	-	3	2	2
CO-2	3	2	3	2	2	-	-	-	-	-	-	-	3	2	2
CO-3	3	2	3	2	2	-	-	-	-	-	-	-	3	2	2
CO-4	3	2	3	2	2	-	-	-	-	-	-	-	3	2	2
CO-5	3	2	3	2	2	-	-	-	-	-	-	-	3	2	2
CO-6	3	2	3	2	2	-	-	-	-	-	-	-	3	2	2

**UNIT - I**

The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Levels of IoT Applications

**UNIT - II**

IoT/M2M systems LAYERS AND designs standardizations, Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and High-level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway, Ease of designing and affordability

**UNIT - III**

Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web

Connectivity for connected-Devices. Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

**UNIT - IV**

Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Transactions, Business Processes, Integration and Enterprise Systems. Security in IoT systems.

Unit V

Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms,

**UNIT - VI**

Sensors, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World. Edge Devices, Cloud offerings for IoT

**TEXT BOOKS:**

1. "Internet of Things: Architecture, Design Principles And Applications," Rajkamal, McGraw Hill Education, 2017.
2. "Internet of Things," A. Bahga and V. Madisetti, University Press, 2015.

**REFERENCE BOOKS:**

1. "Designing the Internet of Things," Adrian McEwen and Hakim Cassimally, Wiley, 2013.
2. "Getting Started with the Internet of Things," Cuno Pfister, O'Reilly, 2011.

Web Resources

1. <http://www.internet-of-things-book.com>
2. <https://www.postscapes.com/internet-of-things-protocols>
3. <http://www.electronicdesign.com/iot/understanding-protocols-behind-internet-things>

<b>III Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS6E02</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b><u>CYBER SECURITY</u></b>								
<b>SYLLABUS</b>								

**Learning 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:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Enumerate the principles of Cyber Security.	Remembering
CO-2	Identify System and application security threats and vulnerabilities.	Understanding
CO-3	Compare different classes of attacks.	Analyzing
CO-4	Apply Tools and techniques to identify Cybercrime.	Applying
CO-5	Analyze risk management processes and practices.	Analyzing
CO-6	Evaluate decision making outcomes of Cyber Security scenarios.	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	2	2	2	1	-	2	-	-	-	-	2	2	2
CO-2	3	2	2	2	2	1	-	2	-	-	-	-	2	2	2
CO-3	3	2	2	2	2	1	-	2	-	-	-	-	2	2	2
CO-4	3	2	2	2	2	1	-	2	-	-	-	-	2	2	2
CO-5	3	2	2	2	2	1	-	2	-	-	-	-	2	2	2
CO-6	3	2	2	2	2	1	-	2	-	-	-	-	2	2	2

**UNIT- I**

**Introduction to Cybercrime:** Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

**UNIT –II**

**Cyber offenses:** How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

### UNIT –III

**Cybercrime Mobile and Wireless Devices:** Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/CellPhones.

### UNIT –IV

**Tools and Methods Used in Cybercrime:** Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft)

### UNIT –V

**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 –VI

**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](https://onlinecourses.nptel.ac.in/noc18_cs07) (Sourav Mukhopadhyay, National University of Singapore)

III Year II Semester				L	T	P	C	
Subject Code: 16EC6E01				4	0	0	3	
<b><u>DIGITAL SIGNAL PROCESSING</u></b>								
<b>SYLLABUS</b>								

**Course Outcomes:**

The student will be able to

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Study the representation of discrete time signals, systems and their solutions using Z transforms.	Understanding
CO-2	Learn the concepts of DFS, DFT and FFT .	Applying
CO-3	Study and design of infinite impulse response (IIR) digital filters.	Creating
CO-4	Study the concepts and design of finite impulse response (FIR) digital filters.	Understanding
CO-5	Learn about multirate signal processing	Remembering
CO-6	Study various Digital Signal Processors and Architectures	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	1	1	1	-	-	-	-	-	-	-	1	2	1	1
CO-2	3	3	1	2	-	-	-	-	-	-	-	1	2	1	1
CO-3	3	2	2	2	-	-	-	-	-	-	-	1	2	1	1
CO-4	3	2	1	2	-	-	-	-	-	-	-	1	2	1	1
CO-5	3	2	-	1	-	-	-	-	-	-	-	1	2	1	1
CO-6	1	2	-	1	-	-	-	-	-	-	-	1	1	1	-

**UNIT-I**

**INTRODUCTION:** Introduction to Digital Signal Processing: Discrete time signals and sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems. Review of Z-transforms: Applications of Z – transforms, solution of difference equations.

**UNIT-II**

**DISCRETE FOURIER SERIES AND FOURIER TRANSFORMS:** Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT.

Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, Problem solving.

**UNIT-III**

**REALIZATION OF DIGITAL FILTERS:** Digital filters Basic structures of IIR systems, Transposed forms.

IIR DIGITAL FILTERS: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Analog-Digital transformations, Problem solving .

#### **UNIT-IV**

FIR DIGITAL FILTERS : Basic structures of FIR systems, System function, Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR and FIR filters.

#### **UNIT-V**

DSP PROCESSORS: Introduction to programmable DSPs- Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access scheme, Multiple access memory ,multiport memory, VLSI architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

Architecture of TMS 320C5X- Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register, Index Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, Some flags in the status registers, On- chip registers, On-chip peripherals.

#### **UNIT-VI**

MULTIRATE DIGITAL SIGNAL PROCESSING: Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion, sub band coding of speech signal.

#### **TEXT BOOKS**

1. Digital Signal Processing, Principles, Algorithms, and Applications --John G. Proakis,DimitrisG.Manolakis, 4<sup>th</sup> edition, PHI, 2013.
2. Digital Signal Processors, Architecture, Programming and Applications – B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002.
3. Digital signal Processing --A Anand Kumar, eastrn economy edition, PHI, 2013.

#### **REFERENCES**

- 1.Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer,4<sup>th</sup> edition ,PHI,2007.
- 2.Digital Signal Processing-- Tarunkumar Rawat, 1<sup>st</sup> edition, Oxford, 2015.Web links  
1. [www.nptelvideos.in/2012/12/digital signal processing.html](http://www.nptelvideos.in/2012/12/digital%20signal%20processing.html)

<b>III Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16EC6E04</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>EMBEDDED SYSTEMS</b>								
<b>SYLLABUS</b>								

**Course objectives:**

1. The basic concepts of an embedded system are introduced.
2. Basic working of a microcontroller system and its programming in assembly language are explained.
3. Different Real time operating systems and scheduling in embedded systems is elaborated.
4. Importance of inter task communication in Embedded systems were presented and explained.
5. Familiarize with fundamental problems in embedded systems when solving consumer-producer problem.
6. Develop familiarity with tools used to develop in an embedded environment.

**Course Outcomes:**

The student will be able to

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Understand the basic concepts of an embedded system	Understanding
CO-2	Correlate different features of embedded systems and knowing about 8051 architecture	Analyzing
CO-3	Manage the task scheduling to control the functions of various real time applications	Creating
CO-4	Assess the unique approach of real time operating systems through inter task communication	Evaluating
CO-5	Solve consumer producer problem through a design approach which integrates embedded hardware and firmware	Creating
CO-6	Explain different embedded system tools used for real time applications	Understanding

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	-	2	2	1	-	-	-	-	-	-	1	-	-	-
CO-2	3	2	3	3	3	-	-	-	-	-	-	-	-	-	-
CO-3	2	2	-	2	1	-	-	-	-	-	-	-	-	-	-
CO-4	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO-5	3	-	1	1	1	-	-	-	-	-	-	1	-	-	-
CO-6	1	-	-	1	2	-	-	-	-	-	-	1	-	-	-

**UNIT-I**

**INTRODUCTION TO EMBEDDED SYSTEMS:** What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

**UNIT-II**

8-BIT MICROCONTROLLERS ARCHITECTURE: Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

**UNIT-III**

RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

**UNIT-IV**

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

**UNIT-V**

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

**UNIT-VI**

Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

**TEXT BOOK**

1. Introduction to embedded systems-Shibu. K.V, TMH, 2009.
2. Embedded Software Primer-David Simon, Pearson.

**REFERENCE BOOKS**

1. The 8051 Microcontroller & Embedded Systems using Assembly and C-Ayala &Gadre, CENGAGE
2. Embedded Systems-K.Rajkamal, TMH, 2009.
3. The 8051 Microcontroller and Embedded Systems-Mazidi, Mazidi, Pearson,

III Year II Semester				L	T	P	C	
Subject Code: 16ME6E01				4	0	0	3	
<b>ROBOTICS</b>								
<b>(Common for ME, ECE, EEE, CSE and IT)</b>								
<b>SYLLABUS</b>								

**Course Objectives:**

To make the students aware of:

1. Robot applications, classifications, controlling systems and automation.
2. Robot components, their architecture, work envelope and types of drive systems.
3. Homogeneous transformations and Manipulator Kinematics of robots.
4. Robotic arm motion by using Mathematical approach.
5. Trajectory planning for a manipulator by avoiding obstacles and programming languages, software packages for path description to robots.
6. Functioning of sensors, actuators and Robot applications in manufacturing.

**Course outcomes:**

Students will be able to:

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Classify the coordinate systems and control systems of a robot.	Understanding
CO-2	Explain the architecture of a robot	Understanding
CO-3	Analyze kinematics of a serial manipulator.	Analyzing
CO-4	Analyze dynamics of serial manipulator.	Analyzing
CO-5	Develop the trajectory planning algorithms using programming languages.	Applying
CO-6	Illustrate the applications of robots in manufacturing, select the actuators and feedback components for a given robot application.	Understanding

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	1	1	2	-	-	-	-	-	-	-	-	-	1	1	1
CO-2	1	1	3	-	-	-	-	-	-	-	-	-	-	1	1
CO-3	2	3	1	1	1	-	-	-	-	-	-	-	-	1	1
CO-4	2	3	1	1	1	-	-	-	-	-	-	-	-	1	1
CO-5	2	1	2	2	2	-	-	-	-	1	-	-	-	2	2
CO-6	1	1	-	2	2	1	2	1	1	-	2	2	2	1	1

**UNIT – I**

Introduction: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

**UNIT – II**

Components of the Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

**UNIT – III**

Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems. Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

**UNIT – IV**

Differential transformations and manipulators , Jacobians–problems. Dynamics: Lagrange – Euler and Newton – Euler formulations – Problems.

**UNIT - V**

General considerations in path description and generation Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages-description of paths with a robot programming languages.

**UNIT - VI**

Robot actuators and Feedback components:

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.

Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

**TEXT BOOKS:**

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K &Nagrath I J / TMH.

**REFERENCES:**

1. Robotics / Fu K S/ McGraw Hill.
2. Robotic Engineering / Richard D. Klafter, Prentice Hall.
3. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
4. Introduction to Robotics / John J Craig / Pearson Edu.
5. <http://www.nptel.ac.in/courses/112101099/1#>

<b>III Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS6L07</b>				<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	
<b><u>NETWORK PROGRAMMING &amp; UML LAB</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. To write, execute and debug c programs which use Socket API.
2. To understand the use of client/server architecture in application development
3. To understand how to use TCP and UDP based sockets and their differences.
4. To get acquainted with Unix system internals like Socket files, IPC structures.
5. To Design reliable servers using both TCP and UDP sockets

**Course outcomes:**

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Implement connection oriented and connectionless protocols.	Applying
CO-2	Implement the SMTP, FTP & HTTP	Applying
CO-3	Create UML designs for LMS, POS & OBS using the building blocks of UML.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	3	2	3	-	-	-	-	-	-	-	3	2	2
CO-2	3	3	3	2	3	-	-	-	-	-	-	-	3	2	2
CO-3	3	3	3	2	3	-	-	-	-	-	-	-	3	2	2

EXP#	CO1	CO2	CO3
EXP1	<input type="checkbox"/>		
EXP2	<input type="checkbox"/>		
EXP3	<input type="checkbox"/>		
EXP4		<input type="checkbox"/>	
EXP5		<input type="checkbox"/>	
EXP6		<input type="checkbox"/>	
EXP7			<input type="checkbox"/>
EXP8			<input type="checkbox"/>
EXP9			<input type="checkbox"/>
EXP10			<input type="checkbox"/>

**List of Programs:**

1. Understanding and using of commands like ifconfig, netstat, ping, arp, telnet, ftp, finger, trace route, who is, etc. Usage of elementary socket system calls (socket (), bind(), listen(),accept(),connect(),send(),recv(),sendto(),recvfrom()).
2. Implementation of Connection oriented concurrent service (TCP).
3. Implementation of Connectionless Iterative time service (UDP).

4. Implementation of SMTP.
5. Implementation of FTP.
6. Implementation of HTTP.

**UML LAB**

1. Demonstration of Rational rose 98, ARGO UML and IBM RSA tools.
2. Design UML Diagrams for Customer Support System.
3. Design UML Diagrams for Point of Sale System.
4. Design UML Diagrams for Online Book Store.

<b>III Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS6L08</b>				<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	
<b>DATA WAREHOUSING AND MINING LAB</b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. Practical exposure on implementation of well-known data mining tasks.
2. Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.

**Course outcomes:**

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Apply preprocessing techniques on real world datasets	Applying
CO-2	Identify Association rules for any real-world dataset using Apriori algorithm	Applying
CO-3	Apply Classification and clustering algorithms	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	3	3	3	-	-	-	-	-	-	-	3	2	3
CO-2	3	2	3	3	3	-	-	-	-	-	-	-	3	2	3
CO-3	3	2	3	3	3	-	-	-	-	-	-	-	3	2	3

EXP	CO1	CO2	CO3
EXP1	<input type="checkbox"/>		
EXP2	<input type="checkbox"/>		
EXP3	<input type="checkbox"/>		
EXP4		<input type="checkbox"/>	
EXP5		<input type="checkbox"/>	
EXP6		<input type="checkbox"/>	
EXP7			<input type="checkbox"/>
EXP8			<input type="checkbox"/>
EXP9			<input type="checkbox"/>
EXP10			<input type="checkbox"/>

**System/Software Requirements:**

- **Pentaho Tool (Data Warehousing)**
- **WEKA Tool (Data Mining)**
  1. Apply data transformation using Pentaho
  2. Transform your data with java script code using Pentaho
  3. Validating data and handling errors using Pentaho
  4. Performing advanced operations with databases using Pentaho
  5. Developing and implementing a simple data mart using Pentaho
  6. Apply preprocessing techniques on dataset student.arff in WEKA

7. Generate Association rules on dataset contactlenses.arff using Apriori algorithm in WEKA
8. Build a classification model on dataset student.arff using j48 algorithm in WEKA
9. Build a classification model on dataset employee.arff using naïve Bayesalgorithm
10. Apply simple k-means clustering algorithm on dataset iris.arff in WEKA

III Year II Semester				L	T	P	C	
Subject Code: 16BH6T16				0	2	0	0	
<b><u>INTELLECTUAL PROPERTY RIGHTS AND PATENTS</u></b>								
<b>SYLLABUS</b>								

**Course outcomes:**

Students will be able to:

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Classify Intellectual Property Rights and explain basic concepts of Intellectual Property Rights	Comprehension
CO-2	Appraise the role of Copyright Registration process and evaluate legal requirements for Semi Conductor Chip Protection	Evaluating
CO-3	identify relationship between Product Patent and Process Patent and how patent will apply for new situations (Inventions)	Applying
CO-4	analyze trade mark registration process and distinguished between different Trademarks	Analysing
CO-5	Explain Employee Confidentiality Agreement and summarize Trade Secret Litigation Process	Comprehension
CO-6	Recommended suggestions for prevention of cyber crimes and justify with Information Technology Amendment Act 2008	Evaluating

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	1	-	-	-	-	-	-	3	-	1	-	-	-	-	-
CO-2	1	-	-	-	-	-	-	3	-	1	-	-	-	-	-
CO-3	1	-	-	-	-	-	-	3	-	1	-	-	-	-	-
CO-4	1	-	-	-	-	-	-	3	-	1	-	-	-	-	-
CO-5	1	-	-	-	-	-	-	3	-	1	-	-	-	-	-
CO-6	1	-	-	-	-	-	-	3	-	1	-	-	-	-	-

**UNIT - I**

**Introduction to Intellectual Property Law** – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration –WTO-WIPO- Regulatory – 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 – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers – Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law- Semiconductor Chip Protection Act.

**UNIT - III**

**Introduction to Patent Law** – Rights and Limitations – 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 – Patent Searching – New developments in Patent Law

**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 – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

**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- Service Level Agreements – Breach of Contract – Applying State Law.

**UNIT - VI**

**Introduction to Cyber Law** – Information Technology Act - Cyber Crime and E-commerce – Security -Data Security – Confidentiality – Data Privacy in India Vs Rest of the World. Relevant Cases Shall be dealt where ever necessary.

**REFERENCE BOOKS:**

1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning, New Delhi.
2. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
3. Kompal Bansal &Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press).
4. Cyber Law. Texts & Cases, South-Western's Special Topics Collections.
5. Prabhuddha Ganguli: 'Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi.
6. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
7. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
8. M.Ashok Kumar and Mohd.Iqbal Ali: "Intellectual Property Right" Serials Pub.

IV Year I Semester				L	T	P	C	
Subject Code: 16CS7T19				4	0	0	3	
<b><u>CRYPTOGRAPHY AND NETWORK SECURITY</u></b> (Common to CSE and IT)								
<b>SYLLABUS</b>								

**Learning Objectives:**

Understand symmetric block ciphers (DES, AES, other contemporary symmetric ciphers), public-key cryptography (RSA, discrete logarithms).

**Course outcomes:**

Students will be able to:

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Classify Security attacks, threats and its measures.	Understanding
CO-2	Evaluate security mechanisms with Symmetric Key cryptography.	Applying
CO-3	Evaluate Number theory and security mechanisms with Asymmetric Key cryptography.	Applying
CO-4	Analyze Data Integrity, Digital Signature Schemes & Key Management.	Analyzing
CO-5	Analyze network security models for ensuring security at Application layer and Transport layer.	Analyzing
CO-6	Analyze network security model at Network layer	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	3	1	2	-	-	-	-	-	-	-	3	3	3
CO-2	3	2	3	1	2	-	-	-	-	-	-	-	3	3	3
CO-3	3	2	3	1	2	-	-	-	-	-	-	-	3	3	3
CO-4	3	2	3	3	3	-	-	-	-	-	-	-	3	3	3
CO-5	3	2	3	3	3	-	-	-	-	-	-	-	3	3	3
CO-6	3	2	3	3	3	-	-	-	-	-	-	-	3	3	3

**UNIT- I:**

Classical Encryption Techniques

Security attacks, services & mechanisms, Network Security Model, Non-Cryptographic Protocol Vulnerabilities, Cryptography basics, Symmetric Cipher Model, Cryptanalysis and brute force attacks, Substitution and transposition techniques.

**UNIT- II**

Block Ciphers & Symmetric Key Cryptography Stream ciphers & Block ciphers, Feistel Cipher, DES, Triple DES, AES.

**UNIT- III**

Number Theory & Asymmetric Key Cryptography

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.

Public Key Cryptography: Principles, public key cryptosystems, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

**UNIT- IV**

Cryptographic Hash Functions & Digital Signatures

Application of Cryptographic Hash Functions, Requirements & Security, Secure Hash Algorithm(SHA-512), Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.

**UNIT -V**

Network Security-I (Transport Layer Security & Email Security)

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell (SSH) Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.

**UNIT -VI**

Network Security-II

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management. Intrusion detection: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS.

**TEXT BOOKS:**

1. "Cryptography & Network Security: Principles and Practices," William Stallings, PEA, Sixth edition, 2006.
2. "Introduction to Computer Networks & Cyber Security," Chwan Hwa Wu, J. David Irwin, CRC press, 2016.

**REFERENCE BOOKS:**

1. "Network Security and Cryptography," Bernard Meneges, Cengage Learning, 2012.
2. "Everyday Cryptography," Keith M. Martin, Oxford, 2<sup>nd</sup> edition, 2017.
3. "Cryptography and Network Security," Behrouz A Forouzan, Debdeep Mukhopadhyay, McGraw Hill, 3<sup>rd</sup> edition, 2008.

**Web Resources**

1. [http://nptel.ac.in/courses/106105031\(Prof. D. Mukhopadhyay, IIT, Kharagpur\)](http://nptel.ac.in/courses/106105031(Prof.D.Mukhopadhyay,IIT,Kharagpur))
2. <http://williamstallings.com/Extras/Security-Notes/>

IV Year I Semester				L	T	P	C	
Subject Code: 16CS7T20				4	0	0	3	
<b><u>CLOUD COMPUTING</u></b>								
<b>SYLLABUS</b>								

**Learning 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:**

Students will be able to:

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Differentiate among various cloud offerings, cloud environments, distributed and grid computing technologies	Understanding
CO-2	Distinguish among various virtualization techniques	Understanding
CO-3	Determine a cloud architecture for a given real world problem with respect to resource management and security management	Analyzing
CO-4	Design, develop and deploy a small application on commercial cloud platform like Amazon AWS, Microsoft Azure etc.	Applying
CO-5	Evaluate policies and mechanisms for resource management, performance, scheduling	Analyzing
CO-6	Choose among different storage technologies for cloud like DFS, GFS, HDFS, S#, Big Table etc.	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	1	3	1	3	-	-	-	-	-	-	-	3	3	3
CO-2	2	1	3	1	3	-	-	-	-	-	-	-	3	3	3
CO-3	2	1	3	1	3	-	-	-	-	-	-	-	3	3	3
CO-4	2	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO-5	2	1	3	3	3	-	-	-	-	-	-	-	3	3	3
CO-6	2	1	3	1	3	-	-	-	-	-	-	-	3	3	3

**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, Cloud offerings, Cloud Environments.

**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, 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, Cloud Scheduling Subject to Deadlines, Scheduling MapReduce Applications Subject to Deadlines. Creating an account on Amazon AWS / MS Azure, Creating VM Instance, deploying a small App.

**UNIT- VI**

Storage Systems Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service (S3)

**TEXT BOOKS:**

1. “Distributed and Cloud Computing,” Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra MK Elsevier, 2012.
2. “Cloud Computing, Theory and Practice,” Dan C Marinescu, MK Elsevier, 2<sup>nd</sup> edition 2017.
3. “Cloud Computing, A Hands-on approach,” Arshdeep Bahga, Vijay Madisetti, University Press, 2014.

**REFERENCE BOOKS:**

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				L	T	P	C	
Subject Code: 16CS7T21				4	0	0	3	
<b>WEB TECHNOLOGIES</b>								
<b>SYLLABUS</b>								

**Learning 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. The course will introduce web-based media-rich programming tools for creating interactive web pages.

**Course Outcomes:**

Students will be able to:

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Design web pages with basic html tags using CSS.	Applying
CO-2	Develop client-side scripts with JavaScript and DHTML.	Applying
CO-3	Apply XML for web document with XML parsers	Applying
CO-4	Build web applications using PHP My SQL &AJAX.	Applying
CO-5	Develop PERL scripts for web applications.	Applying
CO-6	Design applications using Ruby on Rails framework.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	3	2	3	-	-	-	-	-	-	-	3	2	3
CO-2	3	3	3	2	3	-	-	-	-	-	-	-	3	2	3
CO-3	3	3	3	2	3	-	-	-	-	-	-	-	3	2	3
CO-4	3	3	3	2	3	-	-	-	-	-	-	-	3	2	3
CO-5	3	3	3	2	3	-	-	-	-	-	-	-	3	2	3
CO-6	3	3	3	2	3	-	-	-	-	-	-	-	3	2	3

**UNIT-I**

HTML, CSS Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5

CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution.

**UNIT-II**

Javascript: The Basic of Javascript, Objects, Primitives Operations and Expressions, ScreenOutput and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions

DHTML: Positioning Moving and Changing Elements

**UNIT-III**

XML: Document type Definition, XML schemas, Document object model, XSLT,

DOM and SAX Approaches, AJAX A New Approach: Introduction to AJAX,

#### **UNIT-IV**

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. Working with forms and Databases such as MySQL, Integrating PHP and AJAX.

#### **UNIT-V**

Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashes and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

#### **UNIT-VI**

Introduction to Ruby, Variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching. Overview of Rails.

#### **TEXT BOOKS:**

1. Programming the World Wide Web, Robert W Sebesta, Pearson, 7<sup>th</sup> edition, 2005.
2. "Web Technologies," Uttam K Roy, Oxford, 2010.
3. "The Web Warrior Guide to Web Programming," Bai, Ekedahl, Farrell, Gosselin, Zak, Karparhi, MacIntyre, Morrissey, Cengage, 2003.

#### **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, 4<sup>th</sup> edition, 2012.

#### **Web Resources**

1. [www.w3schools.com](http://www.w3schools.com)
2. <http://ruby-for-beginners.rubymonstas.org/>

<b>IV Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16BH7T15</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>MANAGEMENT SCIENCE</b> (Common to Civil, ECE,EEE,CSE,IT)								
<b>SYLLABUS</b>								

**Course Outcomes:**

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Recognize management thoughts, motivational theories and types of organizations	Comprehension
CO-2	Apply the concepts of operations Management, such as Control Charts, work study, materials management for smooth functioning of production units	Applying
CO-3	Appraise the role of functional management in maximizing profits.	Evaluating
CO-4	Apply techniques of Project Management in controlling cost	Applying
CO-5	Apply principles of Strategic Management for managerial decisions	Applying
CO-6	Classify the management practices with reference to current business scenario	Comprehension

. The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	-	-	-	-	-	-	-	-	3	-	-	3	-	-	-
CO-2	-	3	-	-	-	-	-	-	-	-	3	-	-	-	-
CO-3	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
CO-4	-	3	-	-	-	-	-	-	-	-	3	-	-	-	-
CO-5	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-6	-	3	-	-	-	-	-	-	3	-	-	3	-	-	-

**UNIT - I**

**Introduction to Management:** Concept –nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making Process-Designing organization structure- Principles of organization - Types of organization structure.

**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, ABC analysis (simple problems) 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 -

Marketing Management- Functions of Marketing – Marketing strategies based on Product Life Cycle.

#### UNIT - IV

**Project Management:** (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems).

#### UNIT - V

**Entrepreneurship Management & Strategic Management:** Entrepreneurship-features- Financial Institutions facilitating entrepreneurship – Startup culture.

**Strategic Management:** Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives.

#### UNIT - VI

**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.

#### 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. Kanishka Bedi: 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. Dr. PG. Ramanujam, BVR Naidu, PV Rama Sastry : Management Science Himalaya Publishing House, 2013.
9. Management Shapers, Universities Press.
10. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications.
11. Principles of management and administration, D. Chandra Bose, Prentice Hall of India Pvt. Ltd. New Delhi.
12. Patterns of Entrepreneurship Management, Jack M. Kaplan.

<b>IV Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS7D01</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b><u>BIG DATA ANALYTICS</u></b>								
<b>SYLLABUS</b>								

**Learning 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 echo system.

**Course Outcomes:**

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Outline the challenges of Big Data using Hadoop.	Understanding
CO-2	Interpret Hadoop's architecture and core components of Hadoop Distributed File System.	Applying
CO-3	Apply data modeling techniques to large data sets using map reduce paradigm.	Applying
CO-4	Implement NOSQL database using MongoDB.	Applying
CO-5	Analyze semi structured datasets using Apache Pig.	Analyzing
CO-6	Analyze large databases using Apache Hive.	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	2	2	3	-	-	-	-	-	-	-	3	2	3
CO-2	3	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO-3	3	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO-4	3	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO-5	3	2	2	2	2	-	-	-	-	-	-	-	3	2	3
CO-6	3	2	2	2	2	-	-	-	-	-	-	-	3	2	3

**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 (Namenode, Datanode, Secondary Namenode, JobTracker, 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 MapReduce Programs:** A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner

**Reference:** Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'Reilly

#### UNIT-IV

NOSQL Databases, Introduction to Mongo DB, Features, Introduction to the Mongo DB Shell, Running the Shell, Basic operations with the shell, Data Types, Creating, Updating and Deleting Documents, Querying. **Reference:** "MongoDB : The definitive guide" by Kristina Chodorow, O'Reilly Publications, 2nd Edition

#### UNIT - V

**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 VI:

**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

#### TEXT BOOKS:

1. "Hadoop: The Definitive Guide," Tom White, O'Reilly, 3rd Edition, 2012.
2. "Hadoop in Action," Chuck Lam, MANNING Publ., 2016.
3. "MongoDB : The definitive guide," Kristina Chodorow, O'Reilly Publications, 2nd Edition, 2013.
4. "Hadoop for Dummies," Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss, 2014.

#### REFERENCE BOOKS:

1. "Hadoop in Practice," Alex Holmes, MANNING Publ., 2014.
2. "Hadoop MapReduce Cookbook," Srinath Perera, Thilina Gunarathne, 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				L	T	P	C	
Subject Code: 16CS7D02				4	0	0	3	
<b>ARTIFICIAL NEURAL NETWORKS</b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

Students will be able to-

1. Understand the role of neural networks in engineering, artificial intelligence, and cognitive modeling.
2. Provide knowledge of supervised and unsupervised learning using neural networks.

**Course Outcomes:**

Students will be able to:

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Illustrate basic neural network architecture	Understanding
CO-2	Compare different learning algorithms	Analyzing
CO-3	Develop classification algorithms using Perceptron as a pattern classifier.	Applying
CO-4	Design single and multi-layer feed forward neural networks.	Applying
CO-5	Develop radial basis function networks.	Applying
CO-6	Design of classification technique by using SVM.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CO-2	3	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CO-3	3	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CO-4	3	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CO-5	3	2	1	1	-	-	-	-	-	-	-	-	2	1	-
CO-6	3	2	1	1	-	-	-	-	-	-	-	-	2	1	-

**UNIT-I**

Introduction and ANN Structure. Biological neurons and artificial neurons. Model of an ANN. Activation functions used in ANNs. Typical classes of network architectures.

**UNIT-II**

Mathematical Foundations and Learning mechanisms. Re-visiting vector and matrix algebra. State-space concepts. Concepts of optimization. Error-correction learning. Memory-based learning. Hebbian learning. Competitive learning.

**UNIT-III**

Single layer perceptrons. Structure and learning of perceptrons. Pattern classifier - introduction and Bayes' classifiers. Perceptron as a pattern classifier. Perceptron convergence. Limitations of a perceptrons.

**UNIT-IV**

Feed forward ANN. Structures of Multi-layer feed forward networks. Back propagation algorithm. Back propagation - training and convergence. Functional approximation with back propagation. Practical and design issues of back propagation learning.

**UNIT-V**

Radial Basis Function Networks. Pattern separability and interpolation. Regularization Theory. Regularization and RBF networks. RBF network design and training. Approximation properties of RBF.

**UNIT-VI**

Support Vector machines. Linear separability and optimal hyperplane. Determination of optimal hyperplane. Optimal hyperplane for non-separable patterns. Design of an SVM. Examples of SVM.

**TEXT BOOKS**

1. "Neural Networks: A comprehensive foundation", Simon Haykin, Pearson Education Asia, Second Edition, 1999.
2. "Neural Networks: A classroom approach", Satish Kumar, Tata McGraw Hill, 2004.

**REFERENCE BOOKS**

1. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.

**Web Resources**

1. <http://nptel.ac.in/courses/117105084/> (Prof. S. Sengupta, IIT, Kharagpur)

<b>IV Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS7D03</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>SOFTWARE ARCHITECTURE &amp; DESIGN PATTERNS</b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

The course should enable the student:

2. To understand interrelationships, principles and guidelines governing architecture and evolution over time.
3. To understand various architectural styles of software systems.
4. To understand and implement design patterns providing solutions to real world software design problems

**Course Outcomes:**

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Compare Software Architecture types.	Understanding
CO-2	Analyze the Software Architectures.	Analyzing
CO-3	Classify Design Patterns.	Analyzing
CO-4	Apply various Structural Patterns.	Applying
CO-5	Use various Behavioral Patterns.	Applying
CO-6	Identify Architectural Structures for real world problems.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1 }is:

	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	PSO-3
CO-1	3	2	2	2	-	-	-	-	-	-	-	-	2	2	-
CO-2	3	2	2	2	-	-	-	-	-	-	-	-	2	2	-
CO-3	3	2	2	2	-	-	-	-	-	-	-	-	2	2	-
CO-4	3	2	2	2	-	-	-	-	-	-	-	-	2	2	-
CO-5	3	2	2	2	-	-	-	-	-	-	-	-	2	2	-
CO-6	3	2	2	2	-	-	-	-	-	-	-	-	2	2	-

**UNIT-I**

Envisioning Architecture What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.

Creating an Architecture Quality Attributes, achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

**UNIT-II**

Analyzing Architectures Architecture Evaluation, Architecture design decision making, ATAM, CBAM

Moving from One System to Many Software Product Lines, Building systems from off the shelf components, Software architecture in future.

### UNIT-III

Patterns & Pattern Description, organizing catalogs, role in solving design problems, Selection and usage.

Creational Patterns Abstract factory, Builder, Factory method, Prototype, Singleton

### UNIT-IV

Structural Patterns Adapter, Bridge, Composite, Decorator, Façade, Flyweight, PROXY.

### UNIT-V

Behavioral Patterns, Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

### UNIT-VI

Case Studies A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in Interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development.

### TEXT BOOKS

1. “Software Architecture in Practice,” Len Bass, Paul Clements & Rick Kazman, Pearson Education, second edition, 2003.
2. “Design Patterns,” Erich Gamma, Pearson Education, 1995.

### REFERENCE BOOKS

1. “Beyond Software architecture,” Luke Hohmann, Addison Wesley, 2003.
2. “Software architecture,” David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. “Software Design,” David Budgen, Pearson education, second edition, 2003.
4. “Head First Design patterns,” Eric Freeman & Elisabeth Freeman, O’REILLY, 2007.

### Web Resources:

1. [http://en.wikibooks.org/wiki/Introduction\\_to\\_Software\\_Engineering/Architecture/Design\\_Patterns](http://en.wikibooks.org/wiki/Introduction_to_Software_Engineering/Architecture/Design_Patterns)
2. <https://msdn.microsoft.com/en-us/library/ee658117.aspx>

IV Year I Semester				L	T	P	C	
Subject Code: 16CS7D04				4	0	0	3	
<b>MOBILE COMPUTING</b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. To understand the typical mobile networking infrastructure through a popular GSM protocol.
2. To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer.
3. To understand the ad hoc networks and related concepts.
4. To understand future generation platforms and protocols used in mobile environment.

**Course Outcomes:**

Students will be able to:

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Illustrate GSM architecture and data services in GSM	Understanding
CO-2	Summarize different Medium access control mechanisms	Understanding
CO-3	Elaborate Packet Delivery and Handover Management in mobile network layer	Understanding
CO-4	Analyze TCP/IP protocols in mobile transport layer	Analyzing
CO-5	Survey of Mobile Adhoc network protocols for distinguishing them from infrastructure-based networks.	Analyzing
CO-6	Analyze the principles of mobile networks by relating them to future generation networks.	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	1	2	1	1	1	-	-	-	-	-	-	1	1	-
CO-2	2	2	1	1	2	1	-	-	-	-	-	-	1	1	-
CO-3	2	2	1	2	1	1	-	-	-	-	-	-	1	1	-
CO-4	1	2	2	2	1	1	-	-	-	-	-	-	1	1	-
CO-5	2	2	1	2	1	1	-	-	-	-	-	-	1	1	-
CO-6	2	2	1	2	1	1	-	-	-	-	-	-	1	1	-

**UNIT- I**

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, GPRS Architecture.

**UNIT –II**

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

**UNIT –III**

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

**UNIT –IV**

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation.

**UNIT- V**

Mobile Ad hoc Networks (MANETs): Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV.

**UNIT- VI**

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, Introduction to Android and windows CE. Future generation networks: System architecture - 3G, 4G, 5G, LTE,

**TEXT BOOKS:**

1. “Mobile Communications”, Jochen Schiller, Addison-Wesley, Second Edition, 2009.
2. “Mobile Computing”, Raj Kamal, Oxford University Press, 2007.

**REFERENCE BOOKS:**

1. “Mobile Computing, Technology Applications and Service Creation,” ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, Second Edition, Mc Graw Hill, 2010.
2. “Principles of Mobile Computing,” UWE Hansmann, LotharMerk, Martin S. Nocklous, Thomas Stober, Second Edition, Springer, 2007.
3. “Android Programming: The Big Nerd Ranch Guide,” Bill Phillips, Chris Stewart, Brian Hardy, Kristin Marsicano, Pearson, 2<sup>nd</sup> edition, 2017.
4. “Windows CE 3.0: Application Programming,” Nick Grattan and Marshall Brain, 2001.
5. “3G,4G and Beyond: Bringing Networks, Devices and the Web Together,” Martin Sauter, 2nd Edition, 2013.

**Web Resources:**

1. [https://onlinecourses.nptel.ac.in/noc16\\_cs13](https://onlinecourses.nptel.ac.in/noc16_cs13) (Prof. Pushpendra Singh, IIIT-Delhi)
2. <https://disco.ethz.ch/courses/ss02/mobicomp/>

<b>IV Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS7D05</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b><u>DIGITAL FORENSICS</u></b>								
<b>SYLLABUS</b>								

### Learning Objectives

1. Analyze and conduct a computer forensics examination and report the findings that will lead to the incarceration of the perpetrators.
2. Learn different aspects of digital evidence: ways to uncover illegal or illicit activities left on disk and recovering files from intentionally damaged media with computer forensics tools and techniques.
3. Acquire Knowledge on Network Forensics, Advanced Computer Forensics that protects information assets from potential intrusion, damage, or theft.

### Course Outcomes:

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Analyze computer forensics services, computer forensics tools and techniques.	Analyzing
CO-2	Analyze types of forensic systems for investigations.	Analyzing
CO-3	Make use of computer forensic services and data recovery techniques	Applying
CO-4	Identify potential sources of electronic evidence for maintaining the integrity of digital evidence.	Applying
CO-5	Perform basic forensic data acquisition and analysis using computer-based applications and utilities.	Applying
CO-6	Analyze network-based applications and Advanced Computer Forensics.	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	3	2	3	-	-	-	-	-	-	3	3	3	-
CO-2	3	2	3	3	3	-	-	-	-	-	-	3	2	3	-
CO-3	3	3	3	3	2	-	-	-	-	-	-	-	3	2	-
CO-4	3	3	2	3	2	-	-	-	-	-	-	-	3	2	-
CO-5	3	3	3	3	2	-	-	-	-	-	-	-	3	2	-
CO-6	3	3	3	3	3	-	-	-	-	-	-	3	3	3	-

### 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, Second Edition Biometric Security Systems, Homeland Security Systems.

## **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.

## **UNIT -IV**

Evidence Collection and Data Seizure: Why Collect Evidence? Collection Options — Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure — Collection and Archiving — Methods of Collection — Artifacts — Collection Steps — Controlling Contamination: The Chain of Custody, Reconstructing the Attack.

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.

## **UNIT - V**

Computer Forensics Analysis: Discovery of Electronic Evidence, Identification of Data, Reconstructing of Past Events.

## **UNIT-VI**

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, Stuart, CENGAGE Learning, 2014.

## **REFERENCE BOOKS**

1. “Real Digital Forensics,” Keith J. Jones, Richard Bejtlich, 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, 2<sup>nd</sup> 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>

3. <http://www.hackingarticles.in/best-of-computer-forensics-tutorials/>

IV Year I Semester				L	T	P	C	
Subject Code: 16CS7D06				4	0	0	3	
<b><u>SCRIPTING LANGUAGES</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. Develop skills on scripting languages necessary for design and development of web applications

**Course Outcomes:**

Students will be able to:

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Integrate python scripts with web application framework	Applying
CO-2	Develop applications using TCL	Applying
CO-3	Make use of Java Script Primer for web applications	Applying
CO-4	Construct applications using Node.js	Applying
CO-5	Make use of HTTP Services using Node.js at server and client-side application.	Understanding
CO-6	Design databases Mongo DB using Node.js	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	3	3	3	2	-	-	-	-	-	-	-	3	3	3
CO-2	2	3	3	3	2	-	-	-	-	-	-	-	3	3	3
CO-3	2	3	3	3	2	-	-	-	-	-	-	-	3	3	3
CO-4	2	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO-5	2	3	3	3	2	-	-	-	-	-	-	-	3	3	3
CO-6	2	3	3	3	3	-	-	-	-	-	-	-	3	3	3

**UNIT - I**

Python Introduction to Python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling. Integrated Web Applications in Python – Building Small, Efficient Python Web Systems, Web Application Framework (Django).

**UNIT - II**

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

**UNIT- III**

Java Script Primer – Defining Variables, Datatypes, Operators, Looping, Creating Functions, Variable Scope, Java Script Objects, Manipulating Strings, working with arrays, Adding Error Handling.

**UNIT - IV**

Getting Started with Node.js: Understanding Node.js, Installing, Working with Node.js Packages, Creating a Node.js application, writing data to console, using Events, Listeners, Timers and Callbacks.

**UNIT -V**

Implementing HTTP Services in Node.js: Processing Web Resources, Query strings and form parameters, understanding Request, Response and Server objects, Implementing HTTP Clients and Servers in Node.js, Implementing HTTPS Servers and Clients.

**UNIT- VI**

Getting Started with Mongo DB and Node.js: Building the Mongo DB Environment, Adding the Mongo DB driver to Node.js, connecting to Mongo DB to Node.js, understanding the objects used in the Mongo DB Node.js driver, Accessing and Manipulating databases.

**TEXT BOOKS**

1. “The World of Scripting Languages,” David Barron, Wiley Publications, 2009.
2. “Python Web Programming,” Steve Holden and David Beazley, New Riders Publications, 2002.
3. “Node.js, Mongo DB and Angular JS Web Development,” Brad Dayley, Addison - Wesley, Pearson Education, Second Edition, 2014.

**REFERENCE BOOKS**

1. “Programming Python,” M.Lutz,SPD, O'Reilly Media, Inc, 2001.
2. “Core Python Programming,” Chun, Pearson Education, 2006.
3. “Guide to Programming with Python,”M. Dawson, Cengage Learning, 2007.
4. “Write Modern Web Apps with the MEAN Stack,” Jeff Dicky, Peachpit Press, 2014.
5. “Full Stack Java Script Development,” Eric Bush, Red Sky, 2016.

**Web Resources**

1. [https://onlinecourses.nptel.ac.in/noc17\\_cs06/preview](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>

<b>IV Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS7L09</b>				<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	
<b>CLLOUD &amp; BIG DATA LAB</b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. Bring awareness of various Commercial Cloud Platforms like Amazon AWS, Microsoft Azure.
2. Develop and deploy simple web application on cloud
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:**

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Create a web application on commercial or open source cloud	Applying
CO-2	Develop a map reduce programs to solve real world problems which deals with big data	Applying
CO-3	Build applications using Apache PIG and HIVE in Hadoop Eco System	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	2	3	3	2	-	-	-	-	-	-	-	3	3	2
CO-2	3	2	3	3	2	-	-	-	-	-	-	-	3	3	2
CO-3	3	2	3	3	2	-	-	-	-	-	-	-	3	3	2

EXP#	CO1	CO2	CO3
EXP1	<input type="checkbox"/>		
EXP2	<input type="checkbox"/>		
EXP3	<input type="checkbox"/>		
EXP4	<input type="checkbox"/>		
EXP5	<input type="checkbox"/>		
EXP6	<input type="checkbox"/>		
EXP7	<input type="checkbox"/>		
EXP8	<input type="checkbox"/>		
EXP9		<input type="checkbox"/>	
EXP10		<input type="checkbox"/>	
EXP11		<input type="checkbox"/>	
EXP12		<input type="checkbox"/>	
EXP13		<input type="checkbox"/>	
EXP14			<input type="checkbox"/>
EXP15			<input type="checkbox"/>
EXP16			<input type="checkbox"/>
EXP17			<input type="checkbox"/>

EXP18			<input type="checkbox"/>
EXP19			<input type="checkbox"/>

1. Create a Web application on a Commercial / open source Cloud
2. Appreciate cloud architecture
3. Create and run virtual machines on open source OS
4. Implement Infrastructure as a Service, and Storage as a Service (IaaS, SaaS)
5. Get familiar with Amazon AWS and Microsoft Azure
6. Demonstrate storage of Big Data using Hadoop Distributed File System
7. Implement map reduce paradigm to real world problems which deals with big data
8. Development of applications using PIG & HIVE in Hadoop ecosystem

## PART-A

### CLOUD COMPUTING

1. Setting Up Account Creation, Downloading and installing Cloud SW.  
Objective: In this module student will learn how to create accounts in Amazon AWS and Microsoft Azure and to prepare the environment for developing Cloud applications  
Scope: Installing Visual Studio for Azure and AWS.  
Technology: Amazon AWS, Microsoft Azure, Visual Studio
2. Study and implementation of Infrastructure as a Service.  
Objective: In this module student will learn Infrastructure as a Service and implement it by using Open Stack.  
Scope: Installing Open Stack and use it as Infrastructure as a Service.  
Technology: Quanta Plus / Aptana / Kompozer
3. Study and installation of Storage as Service. (SaaS)  
Objective: is that, students must be able to understand the concept of SaaS, and how it is implemented using ownCloud which gives universal access to files through a web interface.  
Scope: is to installation and understanding features of ownCloud as SaaS.  
Technology: ownCloud
4. Case study on Amazon EC2.  
Objective: in this module students will learn about Amazon EC2. Amazon Elastic Compute Cloud is a central part of Amazon.com's cloud computing platform, Amazon Web Services. EC2 allows users to rent virtual computers on which to run their own computer applications
5. Case study on Microsoft Azure.  
Objective: students will learn about Microsoft Azure is a cloud computing platform and infrastructure, created by Microsoft, for building, deploying and managing applications and services through a global network of Microsoft-managed data centers. How it works, different services provided by it.  
Technology: Microsoft Azure

## PART-B

### BIG DATA

1. (i) Perform setting up and Installing Hadoop in its three operating modes: Standalone, Pseudo distributed, fully distributed  
(ii) Use web-based tools to monitor your Hadoop setup.
2. Implement the following file management tasks in Hadoop:
  - Adding files and directories
  - Retrieving files
  - Deleting files
3. Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented.
4. Implement word count using Map Reduce.

5. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
6. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

<b>IV Year I Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS7L11</b>				<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>	
<b><u>WEB TECHNOLOGIES LAB</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. To acquire knowledge of XHTML, Java Script and XML to develop web applications
2. Ability to develop dynamic web content using Java Servlets and JSP
3. To understand JDBC connections and Java Mail API
4. To understand the design and development process of a complete web application

**Course Outcomes:**

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Develop static web pages, Construct Web pages with style sheets	Applying
CO-2	Demonstrate the constructs of Ruby scripting Language, use of Perl language elements	Applying
CO-3	Build dynamic client server web applications with PHP	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	2	2	3	2	2	-	-	-	-	-	-	-	3	3	3
CO-2	2	2	3	2	2	-	-	-	-	-	-	-	3	3	3
CO-3	2	2	3	2	2	-	-	-	-	-	-	-	3	3	3

EXP#	CO1	CO2	CO3
EXP1	<input type="checkbox"/>		
EXP2	<input type="checkbox"/>		
EXP3	<input type="checkbox"/>		
EXP4	<input type="checkbox"/>		
EXP5		<input type="checkbox"/>	
EXP6		<input type="checkbox"/>	
EXP7		<input type="checkbox"/>	
EXP8			<input type="checkbox"/>
EXP9			<input type="checkbox"/>
EXP10			<input type="checkbox"/>

1. Design the following static web pages required for an online book store web site.

a) HOME PAGE:

The static home page must contain three frames.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left frame: At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link “MCA” the catalogue for MCABooks should be displayed in the Right frame.

Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
mca mba BCA	Description of the Web Site			

b) login page

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA BCA	<p>Login : <input type="text" value="11a51f0003"/></p> <p>Password: <input type="password" value="*****"/></p> <p><input type="button" value="Submit"/> <input type="button" value="Reset"/></p>			

2. Design a web page using CSS (Cascading Style Sheets) which includes the following:

1) Use different font, styles:

In the style definition you define how each selector should work (font, color etc.).

Then, in the body of your pages, you refer to these selectors to activate the styles

3. REGISTRATION PAGE:

Create a “registration form “with the following fields and validate using javascript.

1) Name (Text field)

2) Password (password field)

3) E-mail id (text field)

4) Phone number (text field)

5) Sex (radio button)

6) Date of birth (3 select boxes)

7) Languages known (check boxes – English, Telugu, Hindi, Tamil)

8) Address (text area)

4.a) Write Ruby program reads a number and calculates the factorial value of it and prints the same.

b) Write a Ruby program which counts number of lines in a text files using its regular expressions facility.

- c) Write a Ruby program that uses iterator to find out the length of a string.  
d) Write simple Ruby programs that uses arrays in Ruby.
- 5.a) Write programs which uses associative arrays concept of Ruby.  
b) Write Ruby program which uses Math module to find area of a triangle.  
c) Write Ruby program which uses tk module to display a window
- 6.a) Write a program which illustrates the use of associative arrays in perl.  
b) Write PERL program takes set names along the command line and prints whether they are regular files or special files  
c) An example PERL program to connect to a MySQL database table and executing simple commands.
7. Install a database (Mysql or Oracle).  
Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form).  
Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
8. User Registration:  
Example PHP program for registering users of a website and login. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week 2).  
Create four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively.
9. User Authentication:  
Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.  
1. Create a Cookie and add these four user id's and passwords to this Cookie.  
2. Read the user id and passwords entered in the Login form (week 1) and authenticate with the values (user id and passwords) available in the cookies. If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user".
10. HTTP is a stateless protocol. Session is required to maintain the state.  
The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time (i.e., from different systems in the LAN using the ip-address instead of local host). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session.invalidate()).  
Modify your catalogue and cart PHP pages to achieve the above-mentioned functionality using sessions.
5. Write an 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

Write a Document Type Definition (DTD) to validate the above XML file.

<b>IV Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS8T22</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b><u>DISTRIBUTED SYSTEMS</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. Provides fundamentals of distributed computer systems, IPC mechanisms in distributed systems, Remote procedure calls.
2. Expose students to current technology used to build architectures to enhance distributed Computing infrastructures with various computing principles.

**Course Outcomes:**

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	List the characteristics of distributed systems for designing architectural models.	Understanding
CO-2	Implement Inter Process Communication to make a shared communication between client and server	Applying
CO-3	Implement Remote invocation methods for distributed object communication	Applying
CO-4	Make use of Operating System functionality in distributed system	Applying
CO-5	List out the components of file service architecture.	Remembering
CO-6	Enumerate various types of replications.	Understanding

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	1	2	2	-	-	-	-	-	-	-	-	3	2	-
CO-2	2	3	1	2	-	-	-	-	-	-	-	-	3	2	-
CO-3	2	3	1	2	-	-	-	-	-	-	-	-	3	2	-
CO-4	3	1	3	2	-	-	-	-	-	-	-	-	3	2	-
CO-5	2	1	2	2	-	-	-	-	-	-	-	-	3	2	-
CO-6	2	1	1	2	-	-	-	-	-	-	-	-	3	2	-

**UNIT-I**

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

System Models: Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

**UNIT-II**

Interprocess Communication: Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling.

**UNIT-III**

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call.

**UNIT-IV**

Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

**UNIT-V**

Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

**UNIT-VI**

Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication- Introduction, Passive (Primary) Replication, Active Replication.

**TEXT BOOKS**

1. “Distributed Computing, Principles, Algorithms and Systems”, Ajay D Kshemkalyani, MukeshSignal, Cambridge, First Edition, 2008.
2. “Distributed Systems- Concepts and Design”, George Coulouris, Jean Dollimore, Tim Kindberg, PearsonPublication, Fourth Edition, 2006.

**REFERENCE BOOKS**

1. Distributed-Systems-Principles-Paradigms, A.S. Tanenbaum, M. V. Steen, PHI, Second edition, 2007.

**Web Resources**

1. <http://nptel.ac.in/courses/106106168/> (Dr. Rajiv Misra, IIT Patna)
2. [http://www2.imm.dtu.dk/courses/02222/Spring\\_2011/W1L1/Chapter\\_01.pdf](http://www2.imm.dtu.dk/courses/02222/Spring_2011/W1L1/Chapter_01.pdf)
3. <http://courses.washington.edu/css434/slides/Replication.ppt>

<b>IV Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS8T23</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b><u>INFORMATION RETRIEVAL SYSTEMS</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives**

To provide the foundation knowledge in design and develop the search engine for Internet and Web environment.

**Course Outcomes**

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Identify basic theories and analysis tools in information retrieval systems	Understanding
CO-2	List out the Structures used in Inverted Files	Remembering
CO-3	Compare vertical partitioning with horizontal partitioning	Analyzing
CO-4	Analyze different information retrieval algorithms, and give an account of the difficulties of evaluation	Analyzing
CO-5	Apply IR principles to locate relevant information large collections of data	Applying
CO-6	Enumerate the limitations of different information retrieval techniques	Remembering

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	1	2	1	2	-	-	-	-	-	-	-	-	2	1	-
CO-2	1	2	1	3	-	-	-	-	-	-	-	-	3	2	-
CO-3	2	2	2	3	-	-	-	-	-	-	-	-	2	3	-
CO-4	2	2	2	1	-	-	-	-	-	-	-	-	2	2	-
CO-5	2	3	2	1	-	-	-	-	-	-	-	-	2	3	-
CO-6	3	2	2	2	-	-	-	-	-	-	-	-	2	2	-

**UNIT - I**

Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

**UNIT- II**

Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

**UNIT -III**

Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

**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

**UNIT- VI**

Thesaurus Construction: Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri

**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 -Neto Yates Pearson Education, 1st Edition ,1999.
3. "Information Storage & Retrieval" by Robert Korfhage – John Wiley & Sons, Wiley, 1stEdition, 2010.

**REFERENCES**

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 Ophir Frieder, Springer, 2<sup>nd</sup>edition, 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)

IV Year II Semester				L	T	P	C	
Subject Code: 16CS8T24				4	0	0	3	
<b><u>MACHINE LEARNING</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

The main objective of this course is for the students to achieve basic knowledge of artificial intelligence, a deepened technical understanding of machine learning research and theories, as well as practical experience of the use and design of machine learning and data mining algorithms for applications and experiments.

**Course Outcomes:**

Students will be able to:

COURSE OUTCOME	COURSE OUTCOMES	BLOOMS TAXONOMY LEVEL
CO-1	Enumerate the perspectives and issues in machine learning	Understanding
CO-2	Apply linear regression and logistic regression techniques for finding best-fit parameters.	Applying
CO-3	Apply artificial neural networks for face recognition.	Applying
CO-4	Evaluating the accuracy of hypothesis using limited samples of data for the calculation of confidence intervals.	Analyzing
CO-5	Apply Support vector machines, PCA for Dimensionality reduction.	Applying
CO-6	Analyze instance-based learning methods.	Analyzing

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	3	2	-	-	-	-	-	-	-	-	2	3	2
CO-2	3	3	3	2	-	-	-	-	-	-	-	-	2	2	2
CO-3	3	3	3	3	-	-	-	-	-	-	-	-	2	3	2
CO-4	3	3	3	3	-	-	-	-	-	-	-	-	2	2	2
CO-5	3	2	3	3	-	-	-	-	-	-	-	-	2	3	2
CO-6	2	3	3	2	-	-	-	-	-	-	-	-	2	2	2

**UNIT - I**

**Introduction:** Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning. Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find- S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Inductive bias.

**UNIT - II**

**Linear Regression & Logistic Regression:** Predicting numeric values: regression - Finding the best fit lines with linear regression, Locally weighted linear regression, Shrinking Coefficients, The bias / Variance trade-off.

Logistic Regression: Classification with logistic regression and the sigmoid function, Using optimization to find the best regression coefficients.

### UNIT – III

**Artificial Neural Networks:** Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, An illustrative example face recognition.

### UNIT IV

Evaluation Hypothesis: Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms.

### UNIT V

Support Vector Machines & Dimensionality Reduction techniques:  
Separating data with the maximum margin, finding the maximum margin, efficient optimization with SMO algorithm, speeding up optimization with full Platt SMO, Using Kernels for more Complex data.

Dimensionality Reduction techniques: Principal Component analysis, Example.

### UNIT VI

Instance-Based Learning- Introduction, k-Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning

### TEXT BOOKS

1. "Machine Learning," Tom M. Mitchell, MGH, 1997.
2. "Machine Learning in Action," Peter Harington, Cengage, 2012.

### REFERENCE BOOKS

1. Ethem Alpaydin, Introduction to Machine Learning, Second Edition, PHI, 2010

#### Web Resources

1. [https://onlinecourses.nptel.ac.in/noc18\\_cs26/preview](https://onlinecourses.nptel.ac.in/noc18_cs26/preview) (Prof. Balaraman Ravindran, IIT Madras)
2. <https://www.cs.ubbcluj.ro/~gabis/ml/ml-books/McGrawHill%20Machine%20Learning%20Tom%20Mitchell.pdf>
3. [http://www2.ift.ulaval.ca/~chaib/IFT-4102-7025/public\\_html/Fichiers/Machine\\_Learning\\_in\\_Action.pdf](http://www2.ift.ulaval.ca/~chaib/IFT-4102-7025/public_html/Fichiers/Machine_Learning_in_Action.pdf)
4. [http://cs.du.edu/~mitchell/mario\\_books/Introduction\\_to\\_Machine\\_Learning\\_-\\_2e\\_-\\_Ethem\\_Alpaydin.pdf](http://cs.du.edu/~mitchell/mario_books/Introduction_to_Machine_Learning_-_2e_-_Ethem_Alpaydin.pdf)

<b>IV Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16IT8D18</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>CONCURRENT AND PARALLEL PROGRAMMING</b>								
<b>SYLLABUS</b>								

**COURSE OBJECTIVES:**

- To study fundamental concepts of concurrency: non-determinism, race conditions, atomicity, synchronization, safety, liveness, fairness, deadlock
- To learn multithreaded programming using Java threads, Java concurrency constructs, Intel Threading Blocks, OpenMPI
- To know message passing model and programming with MPI
- To learn basic parallel algorithm design 5. To teach performance analysis of parallel program

**COURSE OUTCOMES:**

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Compare parallel programs and sequential programs	Understanding
CO-2	Classify parallel computing platforms.	Analyzing
CO-3	List the parallel algorithm models.	Remembering
CO-4	Write shared memory parallel programs with openMP	Applying
CO-5	Develop distributed memory parallel programs using MPI	Applying
CO-6	Design the parallel algorithm for Matrix and Graph related problems.	Applying

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
CO-1	3	3	3	2	2	-	-	-	-	-	-	-	3	3	1
CO-2	3	3	3	2	2	-	-	-	-	-	-	-	3	3	1
CO-3	3	3	3	2	2	-	-	-	-	-	-	-	3	3	1
CO-4	3	3	3	2	2	-	-	-	-	-	-	-	3	3	1
CO-5	3	3	3	2	2	-	-	-	-	-	-	-	3	3	1
CO-6	3	3	3	2	2	-	-	-	-	-	-	-	3	3	1

**UNIT - I**

Why Parallel Computing

Why We Need Ever-Increasing Performance, Why We're Building Parallel Systems, Why We Need to Write Parallel Programs, How Do We Write Parallel Programs, and Concurrent Vs Parallel Vs Distributed Computing.

**UNIT - II**

Parallel Programming Platforms

Implicit Parallelism: Trends in Microprocessor Architectures, Limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines; GPGPU.

**UNIT - III**

Principles of Parallel Algorithm Design Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Parallel Algorithm Models.

**UNIT - IV**

Shared-Memory Programming with OpenMP Getting Started, The Trapezoidal Rule, Scope of Variables, The Reduction Clause, The parallel for Directive, More about Loops in OpenMP: Sorting, Scheduling Loops, Producers and Consumers

**UNIT - V**

Distributed-Memory Programming with MPI Getting started, the Trapezoidal Rule in MPI, Dealing with I/O, Collective Communication, MPI Derived Data types, Performance Evaluation of MPI Programs

**UNIT - VI**

Dense Matrix and Graph Algorithms Matrix-Vector Multiplication, Matrix-Matrix Multiplication, Solving a System of Linear Equations, Minimum Spanning Tree: Prim's Algorithm, Single-Source Shortest Paths: Dijkstra's Algorithm

**TEXT BOOKS:**

1. An Introduction to Parallel Programming, Peter S. Pacheco, University of San Francisco, Morgan Kaufmann, Publishers (Units 1,4 & 5)
2. Introduction to Parallel Computing, Second Edition By Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Addison Wesley (Units 2,3 & 6)

**REFERENCE BOOKS:**

1. Parallel Programming in C with MPI and OpenMP by M J Quinn
2. Programming Massively Parallel Processors by D.Kirk and W. Hwu

**WEB LINKS:**

1. [http://nptel.ac.in/syllabus/syllabus\\_pdf/106102114.pdf](http://nptel.ac.in/syllabus/syllabus_pdf/106102114.pdf)
2. <http://nptel.ac.in/courses/106102114/23>
3. <http://nptel.ac.in/courses/106102163/>

<b>IV Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16ME8D11</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b><u>OPERATIONS RESEARCH</u></b>								
<b>SYLLABUS</b>								

**Course Objectives:**

To make the students learn about

1. Types of principles to find solutions to linear programming and its importance.
2. Formulation of transportation problems and their applications and optimal solutions.
3. Sequence the jobs and machines while processing to find out the processing time and applications of assignment problems.
4. Calculate the optimal strategies of players by using various methods.
5. Replacement of machine/equipment and waiting line problems applications in industries.
6. Types of principals to find solutions to dynamic programming and its importance.
7. Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Define the objective function by linear programming problem and find solution to it.	Remembering
CO-2	Demonstrate the transportation and assignment problems to find the optimal solutions to the objective function.	Understanding
CO-3	Apply in sequencing the jobs on a machine and items replacements.	Applying
CO-4	Compare the optimal strategies of players by using various methods.	Analyzing
CO-5	Make use of machine/equipment and waiting line problems applications in industries.	Applying
CO-6	Demonstrate the principle of dynamic programming in planning budget and shortest path problems.	Understanding

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
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CO-2	3	3	3	1	3	-	-	-	-	3	3	-	3	1	3
CO-3	3	3	3	1	3	-	-	-	-	3	3	-	3	1	3
CO-4	3	3	3	2	3	-	-	-	-	3	3	-	3	2	3
CO-5	3	3	3	1	3	-	-	-	-	3	3	-	3	2	3
CO-6	3	3	3	2	3	-	-	-	-	3	3	-	3	1	3

**UNIT – I**

Introduction to operation research – definition, Scope, objectives, characteristics and phases – types of operation research models – Limitations and applications.

Allocation: Linear programming problem formulation – graphical solution – simplex method – artificial variables techniques – two – phase method, big-M method – duality principle. Degeneracy and unbound solutions.

**UNIT – II**

Transportation problem: Formulation – optimal solution, unbalanced transportation problem, - Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method, degeneracy. Optimality test: the stepping stone method and MODI method.

**UNIT – III**

Assignment Problem - Formulation – optimal solution – variants of assignment problem – traveling salesman problem.

Sequencing - Introduction – flow – shop sequencing – n jobs through two machines – n jobs through three machines – job shop sequencing – two jobs through 'm' machines.

**UNIT – IV**

Theory of games: Introduction – mini. Max (max, mini) – criterion and optimal strategy - solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games – graphical method.

**UNIT – V**

Replacement: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.

Waiting Lines: Introduction – single channel poisson arrivals – exponential service times – with infinite population and finite population models – multichannel – poisson arrivals – exponential service times with infinite population single channel poisson arrivals.

**UNIT – VI**

Dynamic Programming: Introduction – Bellman's principle of optimality – applications of dynamic programming – capital budgeting problem – shortest path problem – linear programming problem. Sample computer programme for simplex method, travelling sales man problem and queing model.

**TEXT BOOKS:**

1. Operations Research / S.D.Sharma –Kedarnath

**REFEREMCES:**

1. Operations Research / A.M.Natarajan, P. Balasubramani, A. Tamilarasi / Pearson Education.
2. Operations Research / R.Pannerselvam, PHI Publications.
3. Operations Research / Wagner / PHI Publications.
4. Operations Research / S Kalavathy / Vikas Publishers.
5. Operations Research / D S Cheema / University Science Press.
6. Operations Research / Ravindran, Philips, Solberg / Wiley Publishers.
7. <http://www.nptelvideos.in/2012/12/fundamentals-of-operations-research.html>.

<b>Year II Semester</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>Subject Code: 16CS8D07</b>				<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b><u>SOFTWARE PROJECT MANAGEMENT</u></b>								
<b>SYLLABUS</b>								

**Learning Objectives:**

1. To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2. To identify risks and handle them
3. To understand successful software projects that support organization's strategic goals

**Course Outcomes:**

Students will be able to:

<b>COURSE OUTCOME</b>	<b>COURSE OUTCOMES</b>	<b>BLOOMS TAXONOMY LEVEL</b>
CO-1	Apply skills necessary to manage software project	Applying
CO-2	Implementation of Project Management skills and techniques	Applying
CO-3	Demonstrate theoretical and practical aspects of managing software projects	Understanding
CO-4	Conduct project planning activities that accurately forecast project costs, timelines, and quality. Implement processes for successful resource, communication, and risk and change management.	Understanding
CO-5	Conduct project closure activities and obtain formal project acceptance.	Understanding
CO-6	Demonstrate effective organizational leadership and change skills for managing projects, project teams, and stakeholders.	Understanding

The Mapping of CO and PO on 3 point scale {high-3,Medium-2,Low-1} is:

	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	PSO-3
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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	-	-	-	1	2	2	3	2	3	2	3
CO-6	1	1	2	1	3	-	-	1	2	2	3	2	3	2	2

**UNIT –I**

Introduction Project Life cycle phases: Life cycle model, Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts.

**UNIT –II**

Project Approach Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows.

Check Points of the Process: Major milestones, Minor milestones and Periodic status assessments.

**UNIT –III**

Effort estimation & activity Planning Estimation techniques, Function Point analysis, Work breakdown structures, SLOC, COCOMO, Use case-based estimation, Activity Identification Approaches, Network planning models, Critical path analysis

**UNIT –IV**

Risk Management Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

**UNIT –V**

Project Monitoring & Control, Resource Allocation

The seven core Metrics, Management indicators, quality indicators, Types of Resources, Identifying resource requirements, Resource scheduling

**UNIT –VI**

Software Quality

Planning Quality, Defining Quality - ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality

Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality (Book3)

**TEXT BOOKS**

1. “Software Project Management”, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill, Fifth Edition, 1968.
2. “Software Project Management”, Walker Royce: Pearson Education, First Edition, 2005.
3. “Software Project Management in practice”, Pankaj Jalote, Pearson Education, First edition, 2002.

**REFERENCE BOOKS:**

1. “Software Project Management,” Joel Henry, Pearson Education, first edition, 2005.

**Web Resources:**

1. <http://nptel.ac.in/courses/106101061>(Prof. Shashi Kelkar, IIT Bombay)