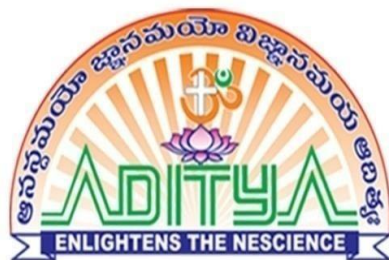


# **ACADEMIC REGULATIONS, PROGRAM STRUCTURE AND SYLLABUS**

**INFORMATION  
TECHNOLOGY**

**For**

**B.TECH. FOUR YEARS DEGREE PROGRAM**  
**(Applicable to the batches admitted from 2019-20)**  
**(I To V Semesters)**



**ADITYA ENGINEERING COLLEGE**  
**(An Autonomous Institution)**

Approved by AICTE, Affiliated to JNTUK & Accredited by NBA, NAAC with 'A' Grade  
Recognized by UGC under the sections 2(f) and 12(B) of UGC act 1956  
Aditya Nagar, ADB Road, SURAMPALEM - 533 437



## **ABOUT ADITYA ENGINEERING COLLEGE**

ADITYA ENGINEERING COLLEGE (AEC) was established in 2001 at Surampalem, Kakinada, Andhra Pradesh in 180 Acres of pollution free and lush green landscaped surroundings by the visionaries of Aditya Academy who have been in the field of education since last 3 ½ decades, extending their relentless and glorious services.

AEC believes in the holistic development of society at large and is striving hard by putting its efforts in multi-disciplinary activities. The College shoulders the responsibility of shaping the Intellect, Character and Physique of every student, because it believes that these are rudimentary aspects for students to develop a humanized and harmonious society, and become meaningful architects of the nation as a whole.

Our vision is to impart quality education, in a congenial atmosphere, as comprehensive as possible, with the support of all the modern technologies and produce graduates and post graduates in engineering with the ability and passion to work wisely, creatively, and effectively for the welfare of the society. It is our endeavor to develop a system of Education which can harness students' capabilities, potentialities and the muscles of the mind thoroughly trained to enable it to manifest great feats of intellectualism.

AEC has International standards and aims to be a centre of excellence to produce principal architects of the future. AEC is in the field of education for enriching the knowledge of budding youth with innovative calibre and to equip them with competitive skills fit for job, fit for life.

### **SALIENT FEATURES:**

- Autonomous status by UGC, Accredited by NBA & NAAC with A Grade.
- Rated as “SILVER” by AICTE for best industry linked institution under CII.
- Recognized by UGC under sections 2(f) & 12(B).
- Recognized by JNTUK, Affiliating University as “Research Center”.
- Rated Grade “A” by Govt. of AP.
- Students from 17 states across India & 15 foreign countries, 500+ International students.
- 36 Ph. Ds, 50+Research Scholars, 25Patents & 600+ National/International Research Publications.
- An ISO 9001-2015 certified institution.

- Recognized by Scientific and Industrial Research Organizations (SIROs) Govt. of India.
- Incubation Centre Campus & only campus in the state to receive financial Assistance from Govt. of India.
- Infosys Campus Connect Institution.
- NASCOM certification training program Campus.
- Collaboration with Co-cubes and AMCAT for Scientific Assessment.
- Nodal Center for Indian School of Business & AP Information Tech. Academy (APITA).
- Honoured with Best Placement Award by Chief Minister of AP.
- Only college in AP to receive Best Performance Award from Tech Mahindra for its outstanding achievement in campus placements.
- Special CRT Training from first year with 30 experienced faculty.
- Received 13 Pratibha Awards from Govt. of AP at District Level.
- Got 1<sup>st</sup> prize in AICTE CHHATRA VISWAKARMA student research awards at all India level in Water and Irrigation Category and received award from Hon'ble Vice-President of India.
- MOU with Educational Consultants India Ltd., (EdCIL) and MOUs with 5 foreign universities.
- MOU with CL Educate to increase the research activities in students.
- In campus hostels for Boys and Girls with good infrastructure facilities.
- Transportation facility with 80+ buses.
- Best Rankings & Ratings
  - Careers360-AAA.
  - Times Engineers-13<sup>th</sup> Rank in AP.
  - India Today-14<sup>th</sup> Rank in AP & 132<sup>nd</sup> Rank at All India Level.
  - THE WEEK-89<sup>th</sup> Rank in South Zone & 13<sup>th</sup> Rank in AP.
  - Digital Learning- AAAA.
  - The Academic Insights-35<sup>th</sup> Rank in top 50 Colleges in India.
  - Silicon India-17<sup>th</sup> rank in top 100 colleges in India and 4<sup>th</sup> Rank in South Zone.
  - The Sunday Indian-One of the best 20 Engineering Colleges in India.
  - 4Ps-13 rank in India out of top 25 Engineering Colleges.
  - WCRC Leaders-Asia Top 100 colleges.
  - Higher Education Review-India's 34 rank.
- Established Applied Robo Controlled Lab (ARC) Siemens Centre of Excellence Campus, in association with APSSDC, Indo European Skilling Centers for Mechatronics and Industrial Robotics.
- Established 7 excellent engineering labs by incurring Rs. 12 crores for improving skill based training in the students funded by SIEMENS. The only campus to receive such huge amount from SIEMENS through APSSDC in the district.
- Recognized as CM Centre of Excellence Campus. APSSDC with the collaboration of Dassault Systems have established 4 prestigious labs under this program.
- Recognized as PMKVY-TI Centre by AICTE.
- Fellowship program with Stanford University, California, USA
- India's first Microsoft Ed-vantage Platinum Campus, Microsoft Innovation Centre campus.
- Recognized by Computer Society of India (CSI) as Best Accredited Student Branch

- NPTEL Best Local Chapter Award with AA Grade and stood 39<sup>th</sup> position in India and 7<sup>th</sup> position in AP
- MOUs with CISCO Networking Academy, SAP, ORACLE Academy, Dell EMC, Red Hat Academy, VMWare IT Academy, Hacker Rank, Comp Tia, SAK Robotix Lab, ARM University, GIT Hub, Ui Path and more under Aditya's Technical HUB (T-HUB)
- Campus with Student Start-ups & these Start-ups received appreciation from Chief Minister of AP.
- Received Gold medal from Governor of AP (through Red Cross) for conducting Blood Donation camps every year & highest No. of students donated blood in a single phase (2541 Students) in 2017-18
- Strong Network of ALUMNI
- 100% Wi-fi Campus, 100% Surveillance Campus under CC cameras and in campus Bank with 8 ATMs.

## **ACADEMIC REGULATIONS (AR19) FOR B.TECH. (REGULAR)**

Applicable to the students of B.Tech.(Regular) admitted from the academic year 2019-20 onwards

### **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 If he pursued a Program of study in not less than four and not more than eight academic years. After eight academic years from the year of his admission, he shall forfeit his seat in B.Tech. and his admission stands cancelled.

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

1.3 The medium of instruction for the entire under graduate program will be in English only.

### **2. PROGRAMS OF STUDY**

The following programs of study are offered at present as specializations for the B. Tech. program with English as a medium of Instruction.

<b>S. No</b>	<b>Branch</b>	<b>Program code</b>	<b>Short Name</b>
01	Civil Engineering	01	CE
02	Electrical and Electronics Engineering	02	EEE
3	Mechanical Engineering	03	ME
04	Electronics and Communication Engineering	04	ECE
05	Computer Science and Engineering	05	CSE
06	Information Technology	12	IT
07	Mining Engineering	26	Min.E
08	Petroleum Technology	27	PT
09	Agricultural Engineering	35	Ag.E

### **3. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS**

3.1 The performance of a student in each semester shall be evaluated course-wise with a maximum of 100 marks for both Theory and Practical courses. The Mandatory Courses, Employability Skills, Engineering Exploration Project, Socially Relevant Project, Internship, Project Part – I shall be evaluated for 100 marks and Project Part – II shall be for 200 marks.

- 3.2 For theory courses, the distribution shall be 40 marks for Sessional examinations and 60 marks for the Semester End Examinations (SEE). There shall be 2 Sessional examinations during the semester. The Sessional marks shall be awarded by giving a weightage of 80% for best of the two Sessional examinations and 20% for the other Sessional examination. The I Sessional examination (Descriptive, Objective and Assignment) is conducted for first 2 ½ units of syllabus and II Sessional examination for the remaining 2 ½ units for each course in a semester. The weightage of Sessional marks for 40 consists of Descriptive - 24, Objective -10 (20 Multiple choice questions with a weightage of ½ mark each) and Assignment - 06 (Design, Analysis, Simulation, Algorithms, Drawing, Quiz, Term paper, Tutorial, Surprise test, Seminar, Case study, Lab activity, Minor Project, etc. as the case may be and for Physics-Virtual lab, for Mathematics - MATLAB).

For Assignment, the nature of test will be intimated by the concerned faculty member at the beginning of the semester. The descriptive examination is conducted for 90 minutes and the objective examination is for 20 minutes. Each descriptive examination question paper shall contain 3 questions of equal marks and all questions need to be answered. The Objective examination marks conducted for 10 and descriptive examination marks conducted for 24 are to be added to the assignment of 06 marks for finalizing Sessional marks of 40.

Example:

$$\text{Sessional Marks} = (\text{Best Sessional Marks} \times 0.8 + \text{other Sessional Marks} \times 0.2)$$

- 3.3 The End examination is conducted for 60 marks for a duration of 180 minutes, which contains ten questions, two questions are from each unit and each question may have sub-questions. The student has to write one question from each unit. Each question carries 12 marks.
- 3.4 For practical courses, there shall be continuous evaluation during the semester for 40 Sessional marks and 60 End examination marks. The Sessional 40 marks shall be awarded as, continuous evaluation -15 marks, Observation and Record -10 marks and laboratory Exam -15 marks. The End examination shall be conducted by the concerned faculty and external examiner appointed by the Principal.
- 3.5 For design and/or drawing, (such as Engineering Drawing, Machine Drawing) and estimation courses, the distribution shall be 40 marks for Sessional

evaluation (20 marks for continuous evaluation, and 20 marks for Sessional examination) and 60 marks for End examination. There shall be two Sessional examinations in a Semester. The Sessional marks shall be awarded by giving a weightage of 80% for the best of two Sessional examinations and 20% for the other Sessional examination.

- 3.6 For Mandatory Courses, during a semester there shall be one examination for 100 marks for a duration of 180 minutes in which a student should get minimum 40% of the marks for satisfactory, otherwise the student performance is considered as not satisfactory. The examination is conducted at the department level by covering the topics of all units, which contains five 20 marks questions with internal choice from each unit and each question may have sub-questions. If a student fails to get satisfactory marks or is absent for examination, he has to write the examination in that course when conducted next.
- 3.7 For Employability Skills (which includes Aptitude and Soft Skills) as a Mandatory Course, during a semester, there shall be an evaluation for 100 marks at the department level. For Aptitude, an examination is conducted for 100 minutes with 100 questions carrying 50 marks (multiple choice questions weightage of  $\frac{1}{2}$  mark each). For Soft Skills, an activity-based examination is conducted for 50 marks. The marks obtained for Employability Skills is the sum of marks obtained in Aptitude and Soft Skills together for 100. The student should get a minimum of 40% of the marks for satisfactory grade; otherwise the student performance is considered as not satisfactory. If a student fails to get satisfactory marks or is absent for examination, he has to write the examination in that course when conducted next.
- 3.8 For Employability Skills (which includes Aptitude and Soft Skills) as a credit course, the examination is conducted for 100 marks in which 40 marks are conducted for Sessional examination and 60 marks for Semester End Examination. There shall be two sessional examinations during the semester. For Aptitude, Sessional examination is conducted for 40 minutes with 40 questions (multiple choice questions weightage of  $\frac{1}{2}$  mark each) carrying 20 marks and for Soft Skills, Sessional examination is conducted as activity-based for 20 marks. The Sessional Marks for Employability Skills is the sum of marks obtained in Aptitude and Soft Skills together for 40. The final Sessional marks shall be



awarded by giving 80% weightage for the best of two Sessional examinations and 20% weightage for other Sessional examination. The Semester End Examination for Aptitude is conducted for 120 minutes with 120 questions (multiple choice questions weightage of  $\frac{1}{4}$  mark each) carrying 30 marks and for Soft Skills, an activity-based examination is conducted for 30 marks by the concerned teacher and external examiner appointed by the Principal.

- 3.9 Engineering Exploration Project is offered to the First year students of all engineering disciplines. The motivation of including this in the curriculum is to make the students practice creative problem solving method – Design Thinking which fosters collaboration and solve problems in human-centered ways. It enables the students to exercise and identify design opportunities through various phases with the help of hands-on activities. Obtaining a best solution for an identified problem involves a non-linear, iterative process which seeks to understand users, challenges assumptions, redefine problems and creative innovative solutions to prototype and test. The students are encouraged to explore real-world problems and expected to take charge of their own learning, work together in teams towards the problem. The students have to write their observations in Activity Cards at the end of each task given in syllabus and submit a final report along with working prototype.

For Engineering Exploration Project, 100 marks are awarded, out of which 40 marks shall be for Sessional evaluation and 60 marks for Semester End Examination. The Sessional evaluation shall be based on 2 presentations given by each student. For the Semester End Examination, the student shall submit a report and give a presentation before the PRC\*, which shall be evaluated for 60 marks.

\*The Project Review Committee (PRC) consists of Head of the Department, Supervisor and a senior faculty member of the department.

- 3.10 For Socially Relevant Project, the students have to identify social problems existing in any geographical area/village and try to solve them technically or suggest people the necessary solutions for solving these problems. The work has to be carried out for a minimum period of 3 days. Every student has to submit a report regarding the work carried out and undergo a viva-voce examination by

the PRC, which shall be evaluated for 100 marks. A student has to secure atleast 40% of marks to pass the course.

- 3.11 For Internship, the students can undergo Industrial Training / Internship / Research projects in National Laboratories/Academic Institutions after completion of IV Semester End Examination during summer/winter breaks for a minimum period of 2 weeks. However, the Internship shall be evaluated in VII Semester. A student shall submit a report and present his work before the PRC, which shall be evaluated for 100 marks. A student has to secure atleast 40% of marks to pass the course.
- 3.12 For Project Part – I, 100 marks are awarded. A student has to submit a report on the Problem Statement and Literature Survey phases of the Project. The other phases of the Project shall be carried out in Project Part – II. The Evaluation of Project Part - I shall be done by the PRC based on two presentations and a report submitted by each student on the topic of his project. A student has to secure atleast 40% of marks to pass Project Part - I.
- 3.13 For Project Part – II, 200 marks are awarded, out of which 80 marks shall be for Sessional Evaluation and 120 marks for the End Examination. The Sessional Evaluation shall be done by the PRC based on two presentations given by each student on the topic of his project. The End Examination (Viva-Voce) shall be conducted by the committee that consists of an External Examiner (appointed by Principal from the panel of three members given by HOD), Head of the Department and Supervisor of the Project.
- 3.14 Students can opt for Full Semester Internship (FSI) at industries in their VIII semester to get practical insight relevant to their core branch of engineering under the guidance of internal and external expert from the college and Industry respectively. To facilitate the students to learn the semester courses during FSI and to inculcate the habit of self-learning in compliance with the UGC guidelines, MOOCs (Massive Open Online Courses) have been introduced. There shall be Discipline Centric Elective Courses that can be done through MOOCs. Students can learn these elective courses of VIII semester through MOOCs by registering and participating in the courses (Minimum of 12 weeks) online under any recognized MOOCs platform like SWAYAM/NPTEL etc. with the approval of the Head of the Department.

The Head of the Department shall appoint one mentor for each of the MOOCs offered. The student needs to register for the course in MOOCs portal in the previous semester. During the course, the mentor monitors the student's assignment submission at the end of every week. The student needs to submit all the assignments given and needs to take final exam at the proctor centre. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in the curriculum only upon submission of the certificate.

#### **4. ATTENDANCE REQUIREMENTS**

- 4.1 A student shall be eligible to write the Semester End Examinations if he acquires a minimum of 50% of attendance in each course and 75% of attendance in aggregate of all the courses.
- 4.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) on medical grounds in a semester may be granted by the College Academic Committee and a student can be condoned for a maximum of three times only.
- 4.3 Shortage of Attendance below 65% in aggregate shall not be condoned.
- 4.4 Students whose shortage of attendance is not condoned in any semester are not eligible to write their End examinations of that semester.
- 4.5 A medical certificate and a fee of Rs. 500/- shall be payable towards condonation for the shortage of attendance.
- 4.6 A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester.
- 4.7 If any student fulfills the attendance requirement in the present semester, he shall not be eligible for re-admission into the same semester.
- 4.8 A student who has shortage of attendance in a semester may seek re-admission into that semester when offered within 4 weeks from the date of the commencement of classwork.

#### **5. MINIMUM ACADEMIC REQUIREMENTS**

The following academic requirements have to be fulfilled by the students in addition to the attendance requirements mentioned in item no.4.

- 5.1 A student is deemed to have passed a course and earns the credits allotted to that course by securing not less than 35% of marks in the End examination, and a

minimum 40% of marks of the total marks (sum of Sessional marks and End examination marks).

- 5.2 A student will be promoted from IV semester to V semester, if he fulfills the academic requirement of 50% of the credits up to IV semester from all the examinations, whether or not the student take the examinations.
- 5.3 A student shall be promoted from VI semester to VII semester if he fulfills the academic requirements of 50% of the credits up to VI semester from all the examinations, whether or not the students takes the examinations.
- 5.4 All the credit courses shall be considered for the calculation of SGPA and CGPA.

## 6. PROGRAM PATTERN

- 6.1 The entire program of study is for four academic years and all the years are in semester pattern.
- 6.2 A student is eligible to appear for the End examination in a course, but absent from it or has failed in the End examination, may write the examination in that course when conducted next.
- 6.3 When a student is detained for lack of credits/shortage of attendance, he may be re-admitted into the same semester in which he has been detained.

## 7. AWARD OF DEGREE AND 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 Secured from 160 Credits</b>
First Class with Distinction	$\geq 7.75$
First Class	$\geq 6.75$ to $< 7.75$
Second Class	$\geq 5.75$ to $< 6.75$
Pass Class	$\geq 4.75$ to $< 5.75$

### 7.1 Cumulative Grade Point Average (CGPA)

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

For Credit Courses:

Range of Marks (%)	Letter Grade	Level	Grade Point
$\geq 90$	O	Outstanding	10
$\geq 80$ to $<90$	A+	Excellent	9
$\geq 70$ to $<80$	A	Very Good	8
$\geq 60$ to $<70$	B+	Good	7
$\geq 50$ to $<60$	B	Fair	6
$\geq 40$ to $<50$	P	Satisfactory	5
$<40$	F	Fail	0
	AB	Absent	0

For Mandatory Courses/Non-Credit Courses:

Range of Marks	Letter Grade	Result
$\geq 40$	S	Satisfactory
$< 40$	N	Not Satisfactory

### COMPUTATION OF SGPA

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

$$SGPA(S) = \frac{\sum_i (C_i \cdot G_i)}{\sum (C_i)}$$

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 consideration all the courses undergone by a student over all the semesters of the program, i.e.

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

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.

- iii. Grade Point Average can be converted into equivalent percentage using

$$\text{Percentage of Marks} = (\text{CGPA} - 0.75) \times 10$$

## **8. MINIMUM INSTRUCTION DAYS**

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

## **9. TRANSFER OF STUDENTS**

9.1 The guidelines given by JNTUK / State Government will be followed for students to transfer from one college to other colleges.

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

## **10. WITHHOLDING OF RESULTS**

If the student has any dues in the college or involved in indisciplinary/malpractice/court cases, his result will be withheld.

## **11. TRANSITORY REGULATIONS**

11.1 Discontinued or detained students are eligible for readmission as and when next offered.

11.2 The re-admitted students will be governed by the regulations under which the student has been admitted.

11.3 In case of transferred students from other Universities/Colleges to AEC, the credits shall be transferred as per the academic regulations and course structure. Students have to obtain the credits of any equivalent courses as prescribed by the college, if required.

## **12. GENERAL**

12.1 Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

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

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

12.4 The college may change or amend the academic regulations or syllabi as and when the need arises and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the College.

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## **ACADEMIC REGULATIONS (AR19) FOR B.TECH. (LATERAL ENTRY)**

Applicable to the students admitted into B.Tech. III semester from the Academic Year 2020-21 onwards

### **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 If he pursues a course of study in not less than three academic years and not more than six academic years. After six academic years from the year of his admission, he shall forfeit his seat in B.Tech. and his admission stands cancelled.
- 1.2 The student shall register for 121 credits and secure all the 121 credits. All the credit courses shall be considered for the calculation of SGPA and CGPA.
- 1.3 The attendance regulations of B.Tech.(Regular) shall be applicable to B.Tech (Lateral Entry).

### **2. PROMOTION RULE**

- 2.1 A student shall be promoted from VI semester to VII semester if he fulfills the academic requirements of 50% of the credits up to VI semester from all the examinations, whether or not the student takes the examinations.

### **3. AWARD OF CLASS**

After a student has satisfied the requirement 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 Secured from 121 Credits</b>
First Class with Distinction	$\geq 7.75$
First Class	$\geq 6.75$ to $< 7.75$
Second Class	$\geq 5.75$ to $< 6.75$
Pass Class	$\geq 4.75$ to $< 5.75$

4. **All the other regulations applicable to B. Tech Program remain the same for B. Tech. Lateral Entry also.**

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## **MALPRACTICES RULES**

### **Disciplinary Action for /Improper Conduct in Examinations**

The Chief controller of examinations shall refer the cases of malpractices in Sessional and End Examination to an Enquiry Committee constituted by him / her. The Committee will submit a report on the malpractice allegedly committed by the student to the Chief Controller of Examinations. The Chief Controller of Examinations along with the members of the Committee is authorized to impose a suitable punishment, if the student is found guilty as per the following guidelines.

	<b>Nature of Malpractices / Improper conduct</b>	<b>Punishment</b>
	<b>If the candidate</b>	
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 course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	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 examination hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester.
3	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the



		courses of that Semester
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 the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester. The candidate is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is course to the academic regulations in connection with forfeiture of seat.
5	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester. The candidate is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
6	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that Semester. The candidate is also debarred and forfeits of seat.
7	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the courses of the examination (including practical and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester/year. The

		candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he will be handed over to the police and a case is registered against him.
8	Refuses to obey the orders of the Chief controller of examinations / Observer / 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 or property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester. 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.
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 course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred and forfeits the seat.
10	Uses objectionable, abusive or	Cancellation of the performance in that






	offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	course.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that End examination.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Chief controller of examinations for further action to award suitable punishment.	

# Ragging

## Prohibition of ragging in educational institutions Act 26 of 1997

### Salient Features

- ⇒ Ragging within or outside any educational institution is prohibited.
- ⇒ Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment Upto		Fine Upto
Teasing, Embarrass 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 Years	+	<b>Rs. 50,000/-</b>

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE ADITYA A RAGGING FREE CAMPUS

# **Ragging**

## **ABSOLUTELY NO TO RAGGING**

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- 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.**

**In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288**

**LET US MAKE ADITYA A RAGGING FREE CAMPUS**

## **VISION & MISSION OF THE COLLEGE**

### **VISION**

To induce higher planes of learning by imparting technical education with International standards, Applied research, Creative ability and Value based instruction to emerge as a premier institute.

### **MISSION**

Achieving academic excellence by providing globally acceptable technical education by forecasting technology through.

- Innovative research & development
- Industry institute interaction
- Empowered manpower

## **VISION & MISSION OF THE DEPARTMENT**

### **VISION**

To achieve global standards in quality of education, research and development by producing technically competent and innovative IT Professionals.

### **MISSION**

- M1: Providing an academic environment in which students are given the essential resources for solving real-world problems and work in multidisciplinary teams.
- M2: Imparting value based education and research orientations for sustained growth in technological aspects and leadership qualities.
- M3: Collaborating with the industry for making the students adoptable to evolving changes in Information Technology and related areas.

\*\*\*\*\*

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs):****Graduates of the Program will**

PEO 1	Produce computing solutions for real world problems and adapt to the technical challenges and changing career opportunities leading to new innovations in Information Technology (IT) and related interdisciplinary areas.
PEO 2	Communicate effectively with multi-disciplinary teams to develop quality computing systems with an orientation towards research and development for lifelong learning.
PEO 3	Use emerging technologies in ethical & professional manner to fulfill industrial & societal needs and to take up higher studies and other creative efforts in science & technology.

**PROGRAM OUTCOMES (POs)****After successful completion of the program, the graduates will be able to**

PO 1	Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO 2	Identify, formulate, research literature and analyze complex engineering problems, reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO 3	Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO 5	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.
PO 6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO 7	Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of, and need for sustainable development.
PO 8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO 9	Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.
PO 10	Communicate effectively on complex engineering activities with the engineering community and with 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.
PO 11	Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member and leader in a

	team and to manage projects in multidisciplinary environments.
PO 12	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 OUTCOMES (PSOs):

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

PSO 1	Solve real world problems using specific programming languages like Java, Python and R.
PSO 2	Develop IT solutions to specific business problems using current software tools like Rational rose, Hadoop and NS2.
PSO 3	Use technical knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations in the field of IT.

### Mission of the department – PEOs mapping

PEO's Statements		M1	M2	M3
PEO 1:	Produce computing solutions for real world problems and adapt to the technical challenges and changing career opportunities leading to new innovations in Information Technology (IT) and related interdisciplinary areas.	3	3	3
PEO 2:	Communicate effectively with multi-disciplinary teams to develop quality computing systems with an orientation towards research and development for lifelong learning.	2	2	3
PEO 3:	Use emerging technologies in ethical & professional manner to fulfill industrial & societal needs and to take up higher studies and other creative efforts in science & technology.	3	3	3

Note:.

Bloom's Taxonomy Knowledge Level	Knowledge Level Representation
Remember	K1
Understand	K2
Apply	K3
Analyse	K4
Evaluate	K5
Create	K6

Mapping / Correlation levels
1: Slight (Low)
2: Moderate (Medium)
3: Substantial (High)



## PROGRAM STRUCTURE

### I SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191HS1T01	Communicative English	HSMC	3	0	0	3	3
191BS1T01	Differential Equations and Linear Algebra	BSC	3	0	0	3	3
191BS1T03	Applied Physics	BSC	3	0	0	3	3
191ES1T01	Programming For Problem Solving Using C	ESC	3	0	0	3	3
191HS1L01	Communicative English Lab -I	HSMC	0	0	3	3	1.5
191BS1L03	Applied Physics Lab	BSC	0	0	3	3	1.5
191ES1L01	Programming For Problem Solving Using C Lab	ESC	0	0	3	3	1.5
191ES1L02	Basic Engineering Workshop	ESC	0	0	3	3	1.5
191MC1A01	Environmental Science	MC	2	0	0	2	0
191MC1A02	Constitution of India	MC	2	0	0	2	0
<b>TOTAL</b>			<b>16</b>	<b>0</b>	<b>12</b>	<b>28</b>	<b>18</b>

### II SEMESTER

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191BS2T10	Numerical Methods and Complex Variables	BSC	3	0	0	3	3
191BS2T09	Engineering Chemistry	BSC	3	0	0	3	3
191ES2T02	Engineering Graphics and Design	ESC	1	0	3	4	2.5
191ES2T03	Essential Electrical and Electronics Engineering	ESC	3	0	0	3	3
191ES2T09	Data Structures through C++	ESC	3	0	0	3	3
191HS2L02	Communicative English Lab-II	HSMC	0	0	2	2	1
191BS2L04	Engineering Chemistry Lab	BSC	0	0	3	3	1.5
191ES2L10	Data Structures Through C++ Lab	ESC	0	0	3	3	1.5
191ES2L11	IT Workshop	ESC	0	0	3	3	1.5
191PR2P01	Engineering Exploration Project	PROJ	0	0	2	2	1
<b>TOTAL</b>			<b>13</b>	<b>0</b>	<b>16</b>	<b>29</b>	<b>21</b>

**III SEMESTER**

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191BS3T14	Discrete Mathematics	BSC	3	0	0	3	3
191ES3T13	Digital Logic Design	ESC	3	0	0	3	3
191HS3T02	Managerial Economics and Financial Analysis	HSMC	2	0	0	2	2
191CS3T01	Software Engineering	PCC	3	0	0	3	3
191CS3T02	Object Oriented Programming through Java	PCC	3	0	0	3	3
191CS3T03	Advanced Data Structures	PCC	3	0	0	3	3
191CS3L01	Object Oriented Programming through Java Lab	PCC	0	0	3	3	1.5
191CS3L02	Advanced Data Structures Lab	PCC	0	0	3	3	1.5
191MC3A03	Employability Skills - I	MC	0	0	2	2	0
191MC3A04	Essence of Indian Traditional Knowledge	MC	2	0	0	2	0
<b>TOTAL</b>			<b>19</b>	<b>0</b>	<b>8</b>	<b>27</b>	<b>20</b>

**IV SEMESTER**

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191BS4T18	Probability and Statistics	BSC	3	0	0	3	3
191IT4T01	Theory of Computation	PCC	3	0	0	3	3
191CS4T05	Python Programming	PCC	3	0	0	3	3
191CS4T06	Design and Analysis of Algorithms	PCC	3	0	0	3	3
191ES4T15	Internet of Things	ESC	3	0	0	3	3
191CS4T07	Computer Organization	PCC	3	0	0	3	3
191CS4L03	Python Programming Lab	PCC	0	0	3	3	1.5
191ES4L17	Internet of Things Lab	ESC	0	0	3	3	1.5
191MC4A05	Employability Skills - II	MC	0	0	2	2	0
191MC4A06	Biology for Engineers	MC	2	0	0	2	0
<b>TOTAL</b>			<b>20</b>	<b>0</b>	<b>8</b>	<b>28</b>	<b>21</b>

**V SEMESTER**

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191CS5T08	Compiler Design	PCC	3	0	0	3	3
191CS5T09	Computer Networks	PCC	3	0	0	3	3
191CS5T10	Database Management Systems	PCC	3	0	0	3	3
191CS5T11	Operating Systems	PCC	3	0	0	3	3
----	Professional Elective -I	PEC	3	0	0	3	3
----	Open Elective -I	OEC	3	0	0	3	3
191CS5L04	Operating Systems and Computer Networks Lab	PCC	0	0	3	3	1.5
191CS5L05	Database Management Systems Lab	PCC	0	0	2	2	1
191HS5T06	Employability Skills - III	HSMC	0	0	2	2	1
191PR5P02	Socially Relevant Project	PROJ	0	0	0	0	1
<b>TOTAL</b>			<b>18</b>	<b>0</b>	<b>7</b>	<b>25</b>	<b>22.5</b>

**VI SEMESTER**

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191CS6T12	Data Ware Housing and Data Mining	PCC	3	0	0	3	3
191CS6T13	Object Oriented Analysis of Design	PCC	3	0	0	3	3
191CS6T14	Web Technologies	PCC	3	0	0	3	3
----	Professional Elective II	PEC	3	0	0	3	3
----	Professional Elective III	PEC	3	0	0	3	3
----	Open Elective II	OEC	3	0	0	3	3
191CS6L06	Data Mining and Object Oriented Analysis of Design Lab	PCC	0	0	3	3	1.5
191CS6L07	Web Technologies Lab	PCC	0	0	3	3	1.5
191HS6T07	Employability Skills - IV	HSMC	0	0	2	2	1
<b>TOTAL</b>			<b>18</b>	<b>0</b>	<b>8</b>	<b>26</b>	<b>22</b>

**VII SEMESTER**

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
191CS7T15	Cryptography and Network Security	PCC	3	0	0	3	3
191HS7T06	Management Science	HSMC	2	0	0	2	2
191CS7T16	Mobile Computing	PCC	3	0	0	3	3
----	<b>Professional Elective-IV</b>	PEC	3	0	0	3	3
----	<b>Professional Elective V</b>	PEC	3	0	0	3	3
----	<b>Open Elective III</b>	OEC	3	0	0	3	3
191CS7L08	Mobile Application Development Lab	PCC	0	0	3	3	1.5
191IT7P03	Industry Oriented (Internship) Mini Project	PROJ	0	0	0	0	2
191IT7P04	Project Part I	PROJ	0	0	0	0	2
<b>TOTAL</b>			<b>17</b>	<b>0</b>	<b>3</b>	<b>20</b>	<b>22.5</b>

**VIII SEMESTER**

Course Code	Name of the Course	Course Component	Total Number of contact hours				Credits (C)
			Lecture (L)	Tutorial (T)	Practice (P)	Total Hours	
---	Professional Elective-VI (MOOCS)	PEC	3	0	0	3	3
---	Open Elective IV (MOOCS)	OEC	3	0	0	3	3
191IT8P05	Project Part II	PROJ	0	0	0	0	7
<b>TOTAL</b>			<b>6</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>13</b>

MOOCs – Massive Open Online Courses

BSC: Basic Sciences Courses; HSMC: Humanities and Social Sciences including Management Courses; ESC: Engineering Sciences Courses; PCC: Professional Core Courses; PEC: Professional Elective Courses; OEC: Open Elective Courses; SSC: Self Study Course; MC: Mandatory Courses; PROJ: Project.

**PROFESSIONAL ELECTIVES**

<b>Professional Elective – I (V Semester)</b>			<b>Professional Elective – II (VI Semester)</b>		
<b>S.No</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>S.No</b>	<b>Course Code</b>	<b>Name of the Course</b>
1	191CS5E01	Functional and Logic Programming	1	191CS6E06	Scripting languages
2	191CS5E02	Advanced Computer Architecture	2	191CS6E07	Advance Operating Systems
3	191CS5E03	Artificial Intelligence	3	191CS6E08	Machine Learning
4	191CS5E04	Software Requirement and Estimation	4	191CS6E09	Software Testing Methodologies
5	191CS5E05	Computer Graphics	5	191CS6E10	Image Processing
<b>Professional Elective – III (VI Semester)</b>			<b>Professional Elective – IV (VII Semester)</b>		
<b>S.No</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>S.No</b>	<b>Course Code</b>	<b>Name of the Course</b>
1	191CS6E11	C# .Net	1	191CS7E16	Middleware Technologies
2	191CS6E12	Distributed Systems	2	191CS7E17	Embedded Systems
3	191CS6E13	Natural Language Processing	3	191CS7E18	Data Analytics
4	191CS6E14	Software Quality Assurance	4	191CS7E19	Software Configuration Management
5	191CS6E15	Cloud Computing	5	191CS7E20	Human Computer Interaction
<b>Professional Elective – V (VII Semester)</b>			<b>Professional Elective – VI (VIII Semester)</b>		
<b>S.No</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>S.No</b>	<b>Course Code</b>	<b>Name of the Course</b>
1	191CS7E21	Design Patterns	1	191CS8E26	Block chain Architecture Design and Use cases
2	191CS7E22	Fault Tolerant Computing	2	191CS8E27	Real Time Operating Systems
3	191CS7E23	No SQL databases	3	191CS8E28	Deep Learning
4	191CS7E24	Agile Methodologies (Using Devops)	4	191CS8E29	Software Project Management
5	191CS7E25	Parallel Computing	5	191CS8E30	Cyber Security

**PROFESSIONAL ELECTIVES**

<b>Track</b>		<b>Professional Elective I</b>	<b>Professional Elective II</b>	<b>Professional Elective III</b>	<b>Professional Elective IV</b>	<b>Professional Elective V</b>	<b>Professional Elective VI</b>
<b>Track 1</b>	<b>Programming languages</b>	Functional and Logic Programming	Scripting languages	C# .Net	Middleware Technologies	Design Patterns	Block chain Architecture Design and Use cases
<b>Track 2</b>	<b>Systems</b>	Advanced Computer Architecture	Advance Operating Systems	Distributed Systems	Embedded Systems	Fault Tolerant Computing	Real Time Operating Systems
<b>Track 3</b>	<b>Data Science and Machine Intelligence</b>	Artificial Intelligence	Machine Learning	Natural Language Processing	Data Analytics	No SQL databases	Deep Learning
<b>Track 4</b>	<b>Software Systems Engineering</b>	Software Requirement and Estimation	Software Testing Methodologies	Software Quality Assurance	Software Configuration Management	Agile Methodologies (Using Devops)	Software Project Management
<b>Track 5</b>	<b>Applications/ Generic</b>	Computer Graphics	Image Processing	Cloud Computing	Human Computer Interaction	Parallel Computing	Cyber Security

**OPEN ELECTIVE - I (V Semester)**

S. No	Course Code	Course Name	Not Offered to Branches	Offered By Department
1	191CE5O01	Basic Concrete Technology	CE, EEE	CE
2	191EE5O01	Electrical Safety	EEE	EEE
3	191EE5O02	Electrical Materials	EEE	EEE
4	191EE5O03	Basic Electrical Measurements	EEE, ECE	EEE
5	191ME5O01	Renewable Energy Sources	CE, EEE, ME, Ag. E	ME
6	191ME5O02	Fundamentals of Mechanical Engineering	ME	ME
7	191ME5O03	Supply Chain Management	ME	ME
8	191ME5O04	3D Printing	ME	ME
9	191ME5O05	Entrepreneurship Development and Incubation		ME
10	191EC5O01	Signals & Systems	EEE, ECE	ECE
11	191EC5O02	Digital Electronics and Logic Design	EEE, ECE, CSE, IT	ECE
12	191EC5O03	Semi conductor devices	EEE, ECE	ECE
13	191CS5O01	Data Structures	EEE, ECE, CSE, IT	CSE
14	191CS5O02	OOP Through C++	CSE, IT	CSE
15	191CS5O03	Java Programming	CSE, IT	CSE
16	191CS5O04	R Programming		CSE
17	191IT5O01	Data Base Management Systems	CSE, IT	IT
18	191IT5O02	Computer Graphics	CSE, IT	IT
19	191MI5O01	Overview of Mining	Min.E	Min.E
20	191PT5O01	Process Intensification in Petroleum Industry	PT	PT
21	191PT5O02	Fundamentals of Petroleum Industry	PT	PT
22	191AG5O01	Basic Crop Production Practices	Ag.E	Ag.E

**OPEN ELECTIVE - II (VI Semester)**

<b>S. No</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Not Offered to Branches</b>	<b>Offered By Department</b>
1	191CE6O02	Disaster Management		CE
2	191EE6O04	Energy Audit and Conservation Management	EEE	EEE
3	191EE6O05	Non Conventional Energy resources	EEE	EEE
4	191EE6O06	Instrumentation	EEE, ECE, Ag. E	EEE
5	191ME6O06	Solar Energy Utilisation	ME, Ag. E	ME
6	191ME6O07	Basic Thermodynamics and Heat Transfer	EEE, ME, PT, Ag.E, Min.E	ME
7	191ME6O08	Introduction to Hydraulics and Pneumatics	CE, ME, PT	ME
8	191ME6O09	3D Printing	ME	ME
9	191ME6O06	Robotics	ME	ME
10	191ME6O07	Biomedical Instrumentation		ECE
11	191ME6O08	ECAD Tools	ECE	ECE
12	191ME6O09	Management Science	CE, CSE, IT, PT, Min. E	ME
14	191IT6O03	Computer Organization	CSE, IT	IT
15	191CS6O05	Python Programming	EEE, CSE, IT	CSE
16	191CS6O06	Operating Systems	CSE, IT	CSE
17	191IT6O04	AI Tools & Techniques	CSE, IT	IT
18	191CS6O07	Web Technologies	CSE, IT	CSE
19	191IT6O05	Robotic Process Automation		IT
20	191CS6O08	Cyber Security	CSE, IT	CSE
21	191CS6O09	AR / VR		CSE
22	191MI6O02	Industrial Safety Practices	Ag.E	Min.E
23	191MI6O03	Electrical Equipment's in Mines		Min.E
24	191PT6O03	Unconventional Hydrocarbon Resources	PT	PT
25	191PT6O04	Asset Management		PT
26	191AG6O02	Weather forecast in Agriculture		Ag.E
27	191AG6O03	Bio-energy systems design and applications		Ag.E
28	191ME6O12	Entrepreneurship Development and Incubation		ME

**OPEN ELECTIVE - III (VII Semester)**

<b>S. No</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Not Offered to Branches</b>	<b>Offered By Department</b>
1	191CE7O03	Waste Water Management	CE	CE
2	191EE7O07	Electrical and Hybrid Vehicles	EEE	EEE
3	191EE7O08	Special Electrical Machines	EEE	EEE
4	191EE7O09	Industrial Electrical Systems	EEE	EEE
5	191ME7O13	Optimization techniques		ME
6	191ME7O14	Energy Conservation		ME
7	191ME7O15	Introduction to Material Handling Systems		ME
8	191ME7O16	Robotics	ME	ME
9	191ME7O17	Entrepreneurship Development and Incubation		ME
10	191EC7O06	Overview of Digital Signal Processing	EEE, ECE	ECE
11	191EC7O07	Basics of VLSI Design	ECE	ECE
12	191EC7O08	Micro Electro Mechanical Systems		ECE
13	191EC7O09	Image Processing	ECE, CSE, IT	ECE
14	191CS7O10	Big Data Analytics	CSE, IT	CSE
15	191CS7O11	Mobile Application Development	CSE, IT	CSE
16	191CS7O12	Data Science	CSE, IT	CSE
17	191IT7O06	Machine Learning	CSE, IT	IT
18	191IT7O07	Quantum Computing		IT
19	191IT7O08	Block Chain Technologies	CSE, IT	IT
20	191MI7O04	Communication System in Mines		Min.E
21	191MI7O05	Drilling & Blasting	Min.E	Min.E
22	191PT7O05	Introduction to Earth Sciences	CE, PT, Min. E	PT
23	191PT7O06	Basic Concepts in Petroleum Drilling and Completions	PT	PT
24	191AG7O04	Greenhouse Technology	Ag.E	Ag.E
25	191AG7O05	Reusability of Municipal Effluent in Agriculture		Ag.E

**OPEN ELECTIVE – IV (VIII Semester)**

<b>S. No</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Not Offered to Branches</b>	<b>Offered By Department</b>
1	191CE8O04	Integrated Waste Management for a Smart City		CE
2	191EE8O10	Fundamentals of Electrical Engineering	EEE, ECE	EEE
3	191EE8O11	Basic Electrical Circuits	EEE, ECE	EEE
5	191EE8O12	Electrical Machines	EEE	EEE
6	191EE8O13	Power Electronics	EEE	EEE
7	191EE8O14	Non-Conventional Energy Sources	CE, EEE, ME	EEE
8	191ME8O18	Fabrication processes	ME	ME
9	191ME8O19	Smart Materials		ME
10	191EC8O10	Micro Electro Mechanical Systems		ECE
11	191EC8O11	Basic Electronic Circuits	EEE & ECE	ECE
12	191EC8O12	Principles of Communications	ECE	ECE
13	191EC8O13	Electronic Instrumentation	EEE & ECE	ECE
14	191EC8O14	Digital Image Processing	ECE, CSE, IT	ECE
15	191CS8O13	Cyber Security	CSE, IT	CSE
16	191CS8O14	Data Science	CSE, IT	CSE
17	191CS8O15	Game Theory	CSE, IT	CSE
18	191CS8O16	AR / VR		CSE
19	191IT8O09	Deep learning	CSE, IT	IT
20	191IT8O10	Block Chain Technologies	CSE, IT	IT
21	191PT8O07	Chemical Process Safety		PT
22	191PT8O08	Mechanical Unit Operations		PT
23	191AG8O06	GIS essentials in Agriculture and its application	CE	Ag.E
24	191AG8O07	Organic Farming for Sustainable Agricultural Production		Ag.E



## COMMUNICATIVE ENGLISH

(Common to all branches)

I Semester

Course Code: 191HS1T01

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Introduction:**

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

As far as the detailed textbooks are concerned, the focus 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.

**Course Objectives:**

- COB 1: To improve the language proficiency of the students in English with emphasis on LSRW skills.
- COB 2: To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
- COB 3: To develop the communication skills of the students in both formal and informal situations.
- COB 4: To develop the ways to overcome fear and use of words for irony.
- COB 5: To make the learners understand the development conditions and the core Competences of the state to prioritize education system.
- COB 6: To discuss that water is the world's most precious natural resources.
- COB 7: To discuss how human sensitivity changes in accordance to times and situations in life.
- COB 8: To inform the learner that all men can come together to abolish the war.

**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, paragraphs, e-mails and essays.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students to write coherently and cohesively.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Identify the ways to overcome fear and use of words for irony.
- CO 2: Interpret the development conditions and the core competences of the state to prioritize education system.
- CO 3: Explain water as the world's most precious natural resources.
- CO 4: Illustrate human sensitivity to the changing times and situations in life.
- CO 5: Identify that all men can come together to abolish the war.
- CO 6: Rephrase coherent writing in social, political and religious background.
- CO 7: Demonstrate writing and concepts of grammar skills.

### Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	-	-	-	-	-	-	-	-	-	2	-	-
CO2 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO3 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO4 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO5 (K3)	-	-	-	-	-	-	-	-	-	2	-	-
CO6 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO7 (K2)	-	-	-	-	-	-	-	-	-	3	-	-

## Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	-	-
CO2 (K2)	-	-	-
CO3 (K2)	-	-	-
CO4 (K2)	-	-	-
CO5 (K3)	-	-	-
CO6 (K2)	-	-	-
CO7 (K2)	-	-	-

### Methodology:

1. The class is 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

### Recommended Topics:

#### UNIT-I:

1. An Astrologers's Day - R.K. Narayan (Detailed)
2. Bade Bhai Saab - Munshi Premchand (Non-Detail)

#### UNIT-II:

1. Building A New State - A. P. J. Abdul Kalam (Detailed)
2. Morning Bells- Jayashree Mohan Raj (Non-Detail)

#### UNIT-III:

1. Water: The Elixer Of Life- C. V. Raman (Detailed)
2. The Power Of Plate Of Rice- Ifeoma Okoye (Non-Detail)

#### UNIT-IV:

1. The Woodrose-Abburi Chaya Devi (Detailed)
2. The Cop And The Anthem- O. Henry (Non-Detail)

#### UNIT-V:

1. Progress- St. John Ervine (Detailed)
2. Dial 000- Barry Rosenberg (Non-Detail)

### Textbooks:

**Detailed Text Book:** 'Using English' by Orient Black Swan.

**Non Detailed Text Book:** 'Life, language and Culture -Explorations' by Cengage.

**Reference Books:**

1. Objective English, Pearson Publications.
2. Effective English Communication, Tata Mc Graw-Hill Publishing.
3. Effective Technical English, Scitech.

**Web Links:**

1. <http://sittingbee.com/an-astrologers-day-r-k-narayan/>
2. <http://bbrenglishforall.blogspot.com/2014/01/building-new-state-study-material.html>
3. <https://www.literatureworms.com/2012/10/water-elixir-of-life-by-sircvraman.html>
4. <http://macon.hol.es/woodrose-abburi-chaya-devi.pdf>
5. <https://ardhendude.blogspot.com/2013/07/analysis-of-progress-by-st-john-ervine.html>

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## DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA

(Common to all branches)

I Semester

Course Code: 191BS1T01

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- COB 2: To help the student form a necessary base to develop analytical and design skills.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Apply the concepts of Mean Value theorem, Partial Differentiation and identify the maxima and minima of a given function.
- CO 2: Solve the linear differential equations and model various situations involving differential equations of first order.
- CO 3: Solve linear differential equations of higher order and model various situations involving second order differential equations.
- CO 4: Calculate Rank of a matrix and solve the system of Linear equations and find the Eigen values and Eigen vectors.
- CO 5: Compute various powers of a matrix and identify the nature of the quadratic form.

### Mapping of Course Outcomes with Program Outcomes:

CO / PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO 1 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 2 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 3 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 4 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 5 (K3)	3	2	-	-	-	-	-	-	-	-	-	-

### Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO 1 (K3)	-	-	-
CO 2 (K3)	-	-	-
CO 3 (K3)	-	-	-
CO 4 (K3)	3	-	-
CO 5 (K3)	3	-	-

### UNIT I:

#### Differential Calculus:

Rolle's theorem, Lagrange's theorem, Cauchy Mean Value theorem, Taylor's and Maclaurin's theorems ( All theorems Without Proof)

**Partial Differentiation:** Euler's theorem (without proof), Total derivative, Chain rule, Taylor's and Maclaurin's series expansion of functions of two variables, Jacobian, Functional dependence.

#### Applications:

Maxima and Minima of functions of several variables without constraints and with constraints

(Lagrange's method).

\*\* (SCILAB Exercise: Plot graphs of various single and multivariable functions)

## **UNIT II:**

### **Differential equations of first order:**

Introduction to differential equations, linear differential equation of first order - Bernoulli differential equation - Exact differential equations- Equations reducible to exact,

### **Applications:**

Orthogonal trajectories, Newton's Law of cooling, RL circuit.

## **UNIT III:**

### **Linear differential equations of second and higher order:**

Linear differential equations of higher order with constant coefficients, Complementary function and Particular integral with RHS term of the type polynomials in  $x$ ,  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ ,  $e^{ax} V(x)$ ,  $xV(x)$ - Method of Variation of parameters, Equations reducible to constant coefficients –Cauchy-Euler equation, Legendre's equation.

### **Application:** LCR Circuit

\*\* (SCILAB Exercise: Introduction to SCILAB commands and Solution of Initial Value Problems)

## **UNIT IV:**

### **System of linear equations, Eigen values and Eigen vectors:**

Definition of a Vector space, Linear dependence and independence of vectors, Rank of a matrix, Echelon form and Normal form, solving system of Homogenous and Non homogenous linear equations- Gauss Jordan elimination method, Eigen values, Eigen vectors, Properties of eigen values and eigen vectors (without proof )

### **Applications:**

Free vibrations of a two mass system

## **UNIT V:**

### **Quadratic forms:**

Cayley -Hamilton theorem (without proof ), Inverse and powers of a matrix by using Cayley - Hamilton theorem, Diagonalization of a matrix, Quadratic forms, Reduction of quadratic form to canonical form using orthogonal transformation, Nature of the quadratic form.

\*\*(SCILAB Exercise: Basic Operations on matrices, computation of rank, computation of eigen values and eigen vectors).

\*\*Not to be examined.

## **Text Books:**

1. Advanced Engineering Mathematics, R.K.Jain, S.R.K.Iyenkar, Alpha Science Publications.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India.
3. B.S.Grewal, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
4. P.Sivaramakrishna Das, C.Vijayakumari, Engineering Mathematics, Pearson Publications.

## **Reference Books:**

1. D.G.Zill, MICHAEL R CULTER, Advanced Engineering Mathematics Third Edition Norosa Publications 2009.
2. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press.
3. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.

4. Glyn James, Advanced modern engineering mathematics, Pearson education.

**Web Links:**

1. <https://nptel.ac.in/courses/111106100/>
2. <https://nptel.ac.in/courses/122107037/14>
3. <https://nptel.ac.in/courses/111106051/>
4. <http://mathworld.wolfram.com>
5. <https://www.khanacademy.org>
6. [https://spoken-tutorial.org/tutorial-search/?search\\_foss=Scilab&search\\_language=English](https://spoken-tutorial.org/tutorial-search/?search_foss=Scilab&search_language=English)

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## APPLIED PHYSICS

### (Common to ECE & CSE)

**I Semester****Course Code: 191BS1T03**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To impart Knowledge of Physical Optics phenomena like Interference and Diffraction required to design instruments with higher resolution.
- COB 2: To make the student understand Physics of Semiconductors and their working mechanism for their utility in sensors.
- COB 3: To impart the knowledge of materials with characteristic utility in appliances.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Apply the principles of interference and diffraction to design and enhance the resolving power of various optical instruments.
- CO 2: Explain the fundamental concepts of Quantum behaviour of matter.
- CO 3: Classify the solids based on energy band structure.
- CO 4: Explain the basic concepts of Semi-Conductors and Identify the type of semiconductors using Hall Effect.
- CO 5: Explain about magnetic and dielectric properties of different materials.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO2 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO3 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	3	2	-	-	-	-	-	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	-	-
CO2 (K2)	3	-	-
CO3 (K2)	-	-	-
CO4 (K2)	2	-	-
CO5 (K3)	-	-	-

**UNIT-I**

**Wave Optics:** Principle of Superposition - Interference of light - Conditions for sustained Interference - Interference in thin films (reflected geometry) - Newton's Rings (reflected geometry).

Diffraction - Fraunhofer Diffraction - Diffraction due to Single slit (quantitative), Double slit, N -slits and circular aperture (qualitative) – Intensity distribution curves - Diffraction Grating – Grating spectrum – missing order – resolving power – Rayleigh's criterion – Resolving powers of Microscope, Telescope and grating (qualitative).



**UNIT-II**

**Quantum Mechanics:** Introduction – Matter waves – de Broglie's hypothesis – Davisson-Germer experiment – G.P.Thomson experiment – Heisenberg's Uncertainty Principle – interpretation of wave function – Schrödinger Time Independent and Time Dependent wave equations – Particle in a potential box.

**UNIT-III**

**Free Electron Theory:** Introduction – Classical free electron theory (merits and demerits only) – Quantum Free electron theory – electrical conductivity based on quantum free electron theory – Fermi Dirac distribution function – Temperature dependence of Fermi- Dirac distribution function - expression for Fermi energy -Density of states .

**BAND THEORY OF SOLIDS** Bloch's theorem (qualitative) – Kronig-Penney model(qualitative) – energy bands in crystalline solids – E Vs K diagram – classification of crystalline solids – effective mass of electron –  $m^*$  Vs K diagram - concept of hole.

**UNIT-IV**

**Semiconductor Physics:** Introduction – Intrinsic semi conductors - density of charge carriers Electrical conductivity – Fermi level – extrinsic semiconductors - p-type & n-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature – Hall effect- Hall coefficient - Applications of Hall effect - Drift and Diffusion currents – Einstein's equation.

**UNIT-V**

**Magnetism:** Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr magneton – Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism Hysteresis – soft and hard magnetic materials – applications of Ferromagnetic material.

**Dielectrics:** Introduction - Dielectric polarization – Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation Frequency dependence of polarization – Applications of dielectrics.

**Text Books:**

1. "A Text book of Engineering Physics" by M.N. Avadhanulu, P.G.Kshirsagar – S.Chand Publications, 2017.
2. "Engineering Physics" by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).
3. "Engineering Physics" by R.K Gaur. and S.L Gupta., - Dhanpat Rai publishers, 2012.

**Reference Books:**

1. "Engineering Physics" by M.R.Srinivasan, New Age international publishers (2009).
2. "Optics" by Ajoy Ghatak, 6<sup>th</sup> Edition McGraw Hill Education, 2017.
3. Engineering Physics by Mani naidu – Pearson Publications – 2017.

**Web Links:**

1. <http://nptel.ac.in/courses/122107035/11>
2. <http://nptel.ac.in/courses/115102023/>
3. <https://phet.colorado.edu/en/simulations/category/physics>
4. <http://physicsgecg.blogspot.in/p/reading-materials.html>
5. <https://sites.google.com/site/physicsbysureshsaganti/home>

## PROGRAMMING FOR PROBLEM SOLVING USING C

(Common to all branches)

I Semester

Course Code: 191ES1T01

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To impart adequate knowledge on the need of programming languages and problem solving techniques and develop programming skills.
- COB 2: To enable effective usage of control structures and implement different operations on arrays.
- COB 3: To demonstrate the use of strings and functions.
- COB 4: To impart the knowledge on pointers and understand the principles of dynamic memory allocation.
- COB 5: To make the students understand the concepts of structures, unions, files and their operations.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Illustrate the fundamental concepts of computers and basics of computer programming
- CO 2: Make use of control structures and arrays in solving complex problems.
- CO 3: Develop program on modular and strings fundamentals.
- CO 4: Demonstrate the ideas of pointers usage.
- CO 5: Solve real world problems using the concept of structures, unions and File operations.

### Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1(K2)	2	1	-	-	1	-	-	-	-	-	-	3
CO2(K3)	3	2	1	1	3	-	-	-	-	-	-	3
CO3(K3)	3	2	1	1	3	-	-	-	-	-	-	3
CO4(K2)	2	1	-	-	2	-	-	-	-	-	-	3
CO5(K3)	3	2	1	1	3	-	-	-	-	-	-	3

### Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1(K2)	2	2	1
CO2(K3)	3	3	2
CO3(K3)	3	3	2
CO4(K2)	2	2	1
CO5(K3)	3	3	2

### UNIT-I

#### Computer History, Hardware, Software, Programming Languages and Algorithms:

Components and functions of a Computer System, Concept of Hardware and Software  
 Programming Languages: Low-level and High-level Languages, Program Design Tools:  
 Algorithm, Flowchart, Pseudo code.

**Introduction to C Programming:** Introduction, Structure of a C Program, Comments, Keywords, Identifiers, Data Types, Variables, Constants, Input/Output Statements, Operators, Type Conversion.

**UNIT -II**

**Control Flow, Relational Expressions & Arrays:** Conditional Branching Statements: if, if-else, if-else-if, switch. Basic Loop Structures: while, do-while loops, for loop, nested loops, The Break and Continue Statements, goto statement.

**Arrays:** Introduction, Operations on Arrays, One dimensional Array, Two dimensional Array, Multi dimensional arrays.

**UNIT-III**

**Strings:** String Fundamentals, String Processing with and without Library Functions.

**Functions:** Introduction, Function Declaration, Function Definition, Function call, Categories of Functions, passing parameters to Functions, Arrays as Function Arguments, Scope of Variables, Variable Storage Classes, Recursion.

**UNIT-IV**

**Pointers:** Concept of a Pointer, Declaring and Initializing Pointer Variables, Pointer Expressions and Address Arithmetic, Null Pointers, Generic Pointers, Pointers as Function arguments, Pointers and Arrays, Pointers and Strings, Pointer to Pointer, Dynamic Memory Allocation, Dangling Pointer, Command line Arguments.

**UNIT-V**

**Structures, Unions, Bit Fields:** Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type –enum variables, Using Typedef keyword, Bit Fields.

**Data Files:** Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

**Text Books:**

1. Computer Programming, Reema Thareja, Oxford University Press.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
3. Programming In C A-Practical Approach, Ajay Mittal, Pearson.

**Reference Books:**

1. C Programming – A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. The C Programming Language, Dennis Richie And Brian Kernighan, Pearson Education.
3. Programming in C, Ashok Kamthane, Second Edition, Pearson Education.
4. Programming in ANSI C, E. Balagurusamy, 4E, Tata Mc Graw-Hill Education, 2008.

**Web Links:**

1. <http://www.c4learn.com/>
2. <http://www.geeksforgeeks.org/c/>
3. <http://nptel.ac.in/courses/122104019/>
4. <http://www.learn-c.org/>
5. <https://www.tutorialspoint.com/cprogramming/>

## COMMUNICATIVE ENGLISH LAB –I

(Common to all branches)

**I Semester****Course Code: 191HS1L01**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Objectives:**

- COB 1: To facilitate computer- aided multi- media instruction enabling Individualized and independent language learning.
- COB 2: To sensitize the students to the nuances of English speech sounds, word accent and intonation.
- COB 3: To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking.
- COB 4: To improve the fluency in spoken English and neutralize mother tongue influence.
- COB 5: To train students to use language appropriately.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Demonstrate nuances of language through audio-visual experience and group activities.
- CO 2: Identify accent for intelligibility.
- CO 3: Demonstrate in conversation, jams and public speaking.
- CO 4: Make use of the concepts to communicate confidently and competently in English Language in all spheres.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO2 (K3)	-	-	-	-	-	-	-	-	-	2	-	-
CO3 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO4 (K3)	-	-	-	-	-	-	-	-	-	2	-	-

**Mapping of Course Outcomes with Program Specific Outcomes**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	-	-	-
CO2 (K3)	-	-	-
CO3 (K2)	-	-	-
CO4 (K3)	-	-	-

**PRACTICE 1:**

- A. Greeting, Introducing and taking leave
- B. Pure Vowel

**PRACTICE 2:**

- A. Giving Information and Asking for Information
- B. Diphthongs

**PRACTICE 3:**

- A. Inviting, Accepting and Declining Invitations

**B. Consonants****PRACTICE 4:**

- A. Commands, Instructions and Requests
- B. Accent and Rhythm

**PRACTICE 5:**

- A. Suggestions and Opinions
- B. Intonation

**Reference Books:**

1. Strengthen your Communication Skills by Dr.M.Hari Prasad, Dr.Salivendra J.Raju and Dr.G.Suvarna Lakshmi, Maruthi Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. A Handbook of English for Professionals by Prof Eliah, B.S Publications.
4. Effective Technical Communication by M. Ashraf Rizvi, Tata McGraw – Hill Publishing Company.
5. Word power made handy, Dr. Shalini verma, S. Chand Company.
6. Let us hear them speak, Jayashree Mohanraj, Sage texts.

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## APPLIED PHYSICS LAB (Common to ECE & CSE)

**I Semester****Course Code: 191BS1L03**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Objectives:**

- COB 1: To make the students gain practical knowledge to co- relate with the theoretical studies.
- COB 2: To impart skills in measurements.
- COB 3: To plan the experimental procedure, to record and process the results.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1 : Use spectrometer, travelling microscope for making measurements.
- CO 2 : Determine energy gap of a semiconductor, draw characteristic curves to estimate thermal coefficient of a thermistor, Zener diode.
- CO 3 : Determine the dielectric constant and resistivity.
- CO 4 : Determine wavelength of source and width of the narrow slits.
- CO 5 : Find the strength of magnetic field.

**Mapping of Course outcomes with Program Outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO2 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO3 (K3)	3	1	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	2	2	-	-	-	-	-	-	-	-	-	-
CO5 (K2)	2	2	-	-	-	-	-	-	-	-	-	-

**Mapping of Course outcomes with Program Specific Outcomes:**

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K4)
CO1 (K2)	-	-	-
CO2 (K3)	-	-	-
CO3 (K3)	-	-	-
CO4 (K2)	2	-	-
CO5 (K2)	-	-	-

**LIST OF EXPERIMENTS**

**(Any 10 of the following listed experiments can be performed)**

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

effect.

15. Variation of dielectric constant with temperature.

### **LIST OF AUGMENTED EXPERIMENTS**

**16 to 19 (Any two of the following experiments can be performed)**

16. Determine the Young's Modulus of the material of the bar subjected to uniform bending

17. Determine the Young's Modulus of the material of the bar subjected to non-uniform bending

18. V-I characteristics of P-N junction Diode.

19. V-I characteristics and Breakdown voltage of Zener Diode

### **Reference Books:**

1. Engineering Physics Lab Manual by Dr.C.V.Madhusudhana Rao, V.Vasanth Kumar, Scitech Publications.
2. Laboratory Manual Cum Record for Engineering Physics I & II by Dr.Y.Aparna, Dr.K.Venkateswara Rao, VGS Technoseries.

## **APPLIED PHYSICS - VIRTUAL LAB – ASSIGNMENTS**

### **LIST OF EXPERIMENTS**

1. Hall Effect
2. Crystal Structure
3. Brewster's angle
4. Numerical Aperture of Optical fiber
5. Photoelectric Effect
6. LASER – Beam Divergence and Spot size
7. Michelson's interferometer
8. Black body radiation
9. Flywheel –moment of inertia
10. AC Sonometer
11. Resistivity by four probe method
12. Newton's rings –Refractive index of liquid

### **Web Links:**

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

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## PROGRAMMING FOR PROBLEM SOLVING USING C LAB

(Common to all branches)

**I Semester**

**Course Code: 191ES1L01**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

### Course Objectives:

- COB 1: To impart knowledge on basic Linux commands, various Editors, Raptor.
- COB 2: To make the students understand the concepts of C programming.
- COB 3: To nurture the students on Control Structures and develop different operations on arrays.
- COB 4: To enable the students to learn string fundamentals and modular programming constructs.
- COB 5: To impart knowledge on dynamic memory allocation.
- COB 6: To explain the concepts of Structure, Unions and files for solving various problems.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Develop the basic programs in C and draw the flowcharts using Raptor.
- CO 2: Make use of conditional and iterative statements to solve real time scenarios in C.
- CO 3: Apply the concept of arrays, modularity and strings to handle complex problems.
- CO 4: Apply the dynamic memory allocation functions using pointers.
- CO 5: Develop programs using structures, and Files.

### Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1(K2)	2	1	-	-	1	-	-	-	-	-	-	3
CO2(K3)	3	2	1	1	3	-	-	-	-	-	-	3
CO3(K3)	3	2	1	1	3	-	-	-	-	-	-	3
CO4(K3)	2	1	-	-	3	-	-	-	-	-	-	3
CO5(K3)	3	2	1	1	3	-	-	-	-	-	-	3

### Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	2	2	1
CO2 (K3)	3	3	2
CO3 (K3)	3	3	2
CO4 (K3)	2	2	1
CO5 (K3)	3	3	2

### List of Experiments:

#### 1. Introduction to C Programming

- 1.1) Basic Linux Commands
- 1.2) Exposure to Turbo C, Vi, Emacs, Code Blocks IDE, Dev C++
- 1.3) Writing simple programs using printf(), scanf()

#### 2. Raptor

- 2.1) Installation and Introduction to Raptor.
- 2.2) Draw a flow chart to find the Sum of 2 numbers.



2.3) Draw a flow chart to find Simple interest.

**For the below experiments develop flow charts using Raptor and implement using C programs to:**

### **3. Basic Math**

- 3.1) Convert Celsius to Fahrenheit and vice versa.
- 3.2) Find largest of three numbers using ternary operator.
- 3.3) Calculate area of a Triangle using Heron's formula.

### **4. Control Flow- I**

- 4.1) Find Whether the Given Year is a Leap Year or not.
- 4.2) Find the roots of a Quadratic Equation.
- 4.3) Make a simple Calculator to Add, Subtract, Multiply or Divide Using switch...case.

### **5. Control Flow- II**

- 5.1) Find Whether the Given Number is Prime number or not
- 5.2) Find Whether the Given Number is Armstrong Number or not.
- 5.3) Print Floyd Triangle.

### **6. Control Flow- III**

- 6.1) Find the sum of individual digits of a positive integer.
- 6.2) Check whether given number is palindrome or not.
- 6.3) Read two numbers, x and n, and then compute the sum of the geometric progression  $1+x+x^2+x^3+\dots+x^n$ .

### **7. Arrays**

- 7.1) Search an element in the given array (Linear Search)
- 7.2) Perform matrix addition.
- 7.3) Perform matrix multiplication.

### **8. Strings**

- 8.1) Implement string manipulation operations with library function.
  - a) copy
  - b) concatenate
  - c) length
  - d) compare
- 8.2) Implement string manipulation operations without library function.
  - a) copy
  - b) concatenate
  - c) length
  - d) compare
- 8.3) Verify whether the given string is a palindrome or not

### **9. Functions, Array & Pointers**

- 9.1) Demonstrate parameter passing in Functions.
- 9.2) Find Fibonacci, Factorial of a number with Recursion and without Recursion.
- 9.3) Find the sum of given numbers with arrays and pointers.

### **10. Pointers**

- 10.1) Perform Addition, Subtraction, Multiplication and Division of two numbers using Command line arguments.
- 10.2) Find sum of n elements entered by user. To perform this program, allocate memory

dynamically using malloc () function.

10.3) Find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

## 11. Structures

11.1) Store Information of a book Using Structure

11.2) Add Two Complex Numbers by Passing Structure to a Function

## 12. Files

12.1) Open a file and to print the contents of the file on screen.

12.2) Copy content of one file to another file.

12.3) Merge two files and store content in another file.

## LIST OF AUGMENTED EXPERIMENTS:

**13 to 16 (Any 2 of the following experiments can be performed)**

### 13. Atm Pin Generation:

Aditya purchased a credit card. He has to generate a PIN number to access the ATM and Net banking for which OTP was sent to his registered mobile number. Using this OTP number he has to generate ATM PIN number. After generating PIN number, he can use it for further transactions. Maximum login he can make is 3 times.

Sample Input:

OTP: 6732

If valid

Enter PIN: 8858

Confirm your PIN: 8858

Sample output:

valid/Invalid

PIN generated successfully.

Note: OTP is hard coded.

### 14. Reset Password:

Aditya was using Syndicate Bank's Online Account. She wanted to pay her bills through Online. But she forgets her password. Now she has to reset the password. For resetting the password, she has to select reset option from the Menu.

NOTE: using switch case.

Sample input:

Fast withdrawal

Mini Statement

Balance Enquiry

Reset Password Enter your choice: 4

Sample Output:

Reset password: New password: \*\*\*\*\* Confirm password: \*\*\*\*\*

### 15. Student Attendance Report Generation:

Some of the school staff had failed to maintain the attendance of the students, causing lack of essential records related to students attendance that should be submitted in a parents meet. The school management has decided to automate the process in order to maintain the attendance of every student effectively. You are asked to write a program to the above scenario and display whether the student is allowed to write the Exam or not.

Percentage<65	Detained
>=65 and <75	should pay condonation to appear for Exams
>=75	Allowed for exams

Sample Input:

Enter no of students: 5

Enter Students Details:

Rno:1	Name:Kalyan	Attendance(%): 67	Should pay condonation to appear for exams
Rno:2	Name: Laxman	Attendance(%): 56	
Rno:3	Name:Yamini	Attendance(%): 79	
Rno:4	Name: Aryan	Attendance(%): 60	
Rno:5	Name: Raghav	Attendance(%): 88	

Sample output:

Rno	Name	Attendance (%)	Remarks
1	Kalyan	67	67 should pay condonation to appear for Exams
2	Laxman	56	detained
3	Yamini	79	allowed for Exams
4	Aryan	60	detained
5	Raghav	88	allowed for Exams

## 16. Library Management

Shilpa is a student of PGEC got the Library Card. She wants to lend the books from the Library. The college gave two cards to each and every student. The students can lend only two books at a time and it has to be returned back after 15 days. If the books are not returned late fee will be collected for no. of days the books were returned after the due date. Late fee per day is Rs.50/-

Sample output:

Enter the name of student: nalini

Enter the Roll No.:555

Enter the branch: cse

Enter the section: A

Enter the year: 3

Enter the Date of Lend (dd mm yyyy ) : 08 08 2017

Enter the Date of return (dd mm yyyy ): 09 10 2017

The no. of days book used by the student = 62

Extra days used by the student = 47

Late return fine fee = 2350

## Reference Books:

1. Let Us C Yashwanth Kanetkar, Eighth edition, BPB Publications.
2. Programming in C A-Practical Approach Ajay Mittal. Pearson Education.
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

**Web Links:**

1. <https://www.hackerrank.com/>
2. <https://www.codechef.com/>
3. <https://www.topcoder.com/>
4. <https://code-cracker.github.io/>
5. <https://raptor.martincarlisle.com/>
6. <https://nptel.ac.in/courses/106105085/2>

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## BASIC ENGINEERING WORKSHOP (Common to all branches)

**I Semester**  
**Course Code: 191ES1L02**

**L T P C**  
**0 0 3 1.5**

### Course Objectives:

- COB 1: To make the students practice basic engineering trades and skills.  
COB 2: To nurture the students build various joints used in different trades for several applications.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 : Construct the various wooden joints.  
CO 2 : Develop various fitting joints.  
CO 3 : Develop components for making the various sheet metal models.  
CO 4 : Experiment with the various house wiring connections.

### Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	2	1	-	3	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	-	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	-	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	-	3	-	-	-	-	-	-	-

### Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	-	-
CO2 (K3)	-	-	-
CO3 (K3)	-	-	-
CO4 (K3)	-	-	-

### List of Experiments:

#### Carpentry:

1. Cross Lap Joint
2. Dovetail Joint
3. T - Joint

#### Fitting:

4. Vee Fit
5. Square Fit

#### House Wiring:

6. Parallel Connection of three bulbs
7. Series Connection of three bulbs

#### Tin Smithy:

8. Taper Tray
9. Funnel
10. Plain Pipe

#### List of Augmented Experiments:

(Student can perform any one of the following experiments)

1. Stair Case wiring

## 2. Florescent Lamp Fitting

**Reference Books:**

1. Engineering Workshop by Dr. A. B. Srinivasa Rao, AMIGO Books.
2. Manual on Workshop practice by Dr. P.Kannaiah & Dr. K.L.Narayana, Scitech publications.

**Web Links:**

1. <http://tite.ac.in/index.php/departments/mechanical-engineering/workshop>
2. <https://www.gopracticals.com/basic-engineering/workshop/>

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**ENVIRONMENTAL SCIENCE****(Common to all branches)****I Semester****Course Code: 191MC1A01**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Course Objectives:**

- COB 1: To define the various ecosystems and its diversity.  
 COB 2: To summarize the overall natural resources.  
 COB 3: To classify environmental impacts of developmental activities.  
 COB 4: To discuss social issues, environmental legislation and global treaties.  
 COB 5: To educate human population and environment.

**Course Outcomes**

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

- CO 1 : Identify the need for protecting the producers and consumers in various ecosystems and their role in the food web  
 CO 2 : Outline the natural resources and their importance for the sustenance of the life.  
 CO 3 : List out the biodiversity of India, threats and its conservation methods  
 CO 4 : Illustrate various attributes of the pollution, impacts and measures to control the pollution along with waste management practices.  
 CO 5 : Describe social issues both rural and urban environment to combat the challenges.  
 CO 6 : Summarize the legislations of India in environmental protection.  
 CO 7 : Explains the population growth and its implications.  
 CO 8 : Transforms existing campus into self sustaining green campus with environment Friendly aspects of – Energy, Water and waste water reuse, plantation, rain water Harvesting and Parking Curriculum.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K1)	1	-	-	-	-	1	2	1	-	-	-	-
CO2 (K2)	1	-	-	-	-	1	2	1	-	-	-	-
CO3 (K1)	1	-	-	-	-	1	2	1	-	-	-	-
CO4 (K2)	1	-	-	1	-	1	2	1	-	-	-	-
CO5 (K2)	1	-	-	-	-	1	2	1	-	3	-	-
CO6 (K2)	1	-	-	-	-	1	2	1	-	-	-	-
CO7 (K4)	1	-	-	-	-	1	2	1	-	-	-	-
CO8 (K2)	2	1	2	1	-	2	3	2	3	3	2	2

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO/PSO	PSO1 (K3)	PSO2 (K3)	PSO3 (K2)
CO1 (K1)	-	-	-
CO2 (K2)	-	2	-
CO3 (K1)	-	-	-
CO4 (K2)	-	-	-
CO5 (K2)	-	-	-
CO6 (K2)	-	-	-
CO7 (K4)	-	-	-
CO8 (K2)	2	2	-

**UNIT- I:****Multidisciplinary Nature Of Environmental Studies:**

Definition, Scope and Importance, Need for Public Awareness.

**Natural Resources:** Renewable and non-renewable resources – Natural resources and associated problems

## **UNIT - II:**

**Ecosystems:** Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers. Food chains, food webs and ecological pyramids.

**Biodiversity And Its Conservation:** Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Values of biodiversity. Hot-spots of biodiversity – Threats to biodiversity. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

## **UNIT - III:**

**Environmental Pollution:** Definition, Cause, effects and control measures of:

- a. Air Pollution.
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution

**Solid Waste Management:** Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution.

## **UNIT - IV:**

**Social Issues and the Environment:** From Unsustainable to Sustainable development – Urban problems related to Energy & Water. Resettlement and rehabilitation of people, Environmental ethics, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment 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 - V:**

**Human population and the environment:** Population growth, variation among nations. Environment and human health, Human Rights, Value Education. Role of Information Technology in Environment and human health.

### **Text Books:**

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education.
3. Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company.

### **Reference Books:**

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House.
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.



**Web Links:**

- 1 <https://www.youtube.com/watch?v=mOwyPENHhbc>
- 2 [https://www.youtube.com/watch?v=\\_mgvsPnCYj4](https://www.youtube.com/watch?v=_mgvsPnCYj4)
- 3 <https://www.youtube.com/watch?v=L5B-JMnBlyQ>
- 4 [https://www.youtube.com/watch?v=3RDGV5i82\\_Q](https://www.youtube.com/watch?v=3RDGV5i82_Q)

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## CONSTITUTION OF INDIA

(Common to all branches)

**I Semester****Course Code: 191MC1A02**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Course Objectives:**

- COB 1: To enable the student to interpret the importance of constitution.
- COB 2: To facilitate the students to illustrate the structure of executive, legislature and judiciary.
- COB 3: To allow the students to classify philosophy of fundamental rights and duties.
- COB 4: To facilitate the students to outline the autonomous nature of constitutional bodies like Supreme Court, High Court, Comptroller and Auditor General of India and Election Commission of India.
- COB 5: To enable the student to interpret the central and state relations of finance and administration.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1 : Explain historical background of the constitution making and its importance for building a democratic India.
- CO 2 : Compare the functioning of three wings of the government i.e., executive, legislative and judiciary.
- CO 3 : Interpret the value of the fundamental rights and duties for becoming good citizen of India.
- CO 4 : Compare the decentralization of power between central, state and local self-government.
- CO 5 : Extend the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	-	-	-	-	-	-	-	-	2	-	-	-
CO2 (K2)	-	-	-	-	-	-	-	-	3	-	-	-
CO3 (K2)	-	-	-	-	-	-	-	-	3	-	-	-
CO4 (K2)	-	-	-	-	-	-	-	-	3	-	-	-
CO5 (K3)	-	-	-	-	-	-	-	-	2	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes**

CO/ PSO	PSO1 (K3)	PSO2 (K3)	PSO3 (K2)
CO1 (K3)	-	-	-
CO2 (K2)	-	-	-
CO3 (K2)	-	-	-
CO4 (K2)	-	-	-
CO5 (K3)	-	-	-

**UNIT-I**

**Introduction to Indian Constitution:** Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

**UNIT-II**

**Union Government and its Administration Structure of the Indian Union:** Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers,

Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

### **UNIT-III**

**State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat:** Organisation, Structure and Functions

### **UNIT-IV**

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation  
**PachayatiRaj:** Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila  
**Panchayat:** Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

### **UNIT-V**

**Election Commission:** Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

#### **Text Books:**

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd. New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.

#### **Reference Books:**

1. J.A. Siwach, Dynamics of Indian Government & Politics.
2. D.C. Gupta, Indian Government and Politics.
3. H.M. Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication).
4. J.C. Johari, Indian Government and Politics Hans.

#### **Web Links:**

1. [nptel.ac.in/courses/109104074/8](http://nptel.ac.in/courses/109104074/8)
2. [nptel.ac.in/courses/109104045/](http://nptel.ac.in/courses/109104045/)
3. [nptel.ac.in/courses/101104065/](http://nptel.ac.in/courses/101104065/)
4. [www.hss.iitb.ac.in/en/lecture-details](http://www.hss.iitb.ac.in/en/lecture-details)
5. [www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution](http://www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution)

## NUMERICAL METHODS AND COMPLEX VARIABLES

(Common to CSE & IT)

**II Semester****Course Code: 191BS2T10**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- COB 2: To help the students acquire a necessary base to develop analytical and design skills.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Apply numerical methods to obtain approximate solution of equations.
- CO 2: Apply various numerical methods to interpolate polynomials.
- CO 3: Apply numerical methods to initial value problems and problems involving integration.
- CO 4: Identify the analyticity of functions of complex variables.
- CO 5: Apply Cauchy's theorem, Cauchy's integral formula and Cauchy's residue theorem.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO2 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO3 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO4 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	3	2	-	-	-	-	-	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes**

CO /PO	PSO1 (K3)	PSO2 (K3)	PSO3 (K2)
CO1 (K3)	-	-	-
CO2 (K3)	-	-	-
CO3 (K3)	-	-	-
CO4 (K3)	-	-	-
CO5 (K3)	-	-	-

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

Introduction to Numerical methods, Bisection method, Secant method, Method of false position, Iteration method, Newton - Raphson method.

**UNIT II:****Interpolation:**

Introduction to Interpolation, Finite differences, Forward differences, Backward differences, Relation between operators, Newton's formula for interpolation, Lagrange's interpolation, Newton's divided difference interpolation.

**UNIT III:****Numerical Integration and solution of Ordinary Differential equations:**

Trapezoidal rule, Simpson's  $1/3^{\text{rd}}$  and  $3/8^{\text{th}}$  rule, Solution of ordinary differential equations by Taylor's series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge - Kutta method (fourth order).

**UNIT - IV:****Functions of Complex variables:**

Introduction, Continuity, Differentiability, Analyticity, Properties of analytic functions, Cauchy-Riemann equations in Cartesian and polar co-ordinates, Harmonic functions, Milne Thompson method.

**UNIT V:****Complex Integration:**

Introduction to complex integration, Cauchy's integral theorem, Cauchy integral formula, Liouville's theorem, Taylor's series, Maclaurin's series, Laurent's series (All theorems without proof), Singular point, Types of singularities-Isolated, Essential and Removable singularities, pole of order  $m$ , Residues, Cauchy Residue theorem.

**Text Books:**

1. Advanced Engineering Mathematics, R.K.Jain, S.R.K.Iyenkar, Alpha Science Publications.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India.
3. B.S.Grewal, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
4. P.Sivaramakrishna Das, C.Vijayakumari, Engineering Mathematics, Pearson Publications.

**Reference Books:**

1. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press.
2. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.
3. Higher engineering mathematics by John Bird, 5<sup>th</sup> edition Elsevier Limited, 2006.

**Web Links:**

1. <https://nptel.ac.in/courses/111107108/25>
2. <https://nptel.ac.in/courses/111103021/>
3. <https://nptel.ac.in/courses/111107105/>
4. <http://mathworld.wolfram.com>
5. <https://www.khanacademy.org>

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**ENGINEERING CHEMISTRY****(Common to ECE & CSE)****II Semester****Course Code: 191BS2T09**

L	T	P	C
3	0	0	3

**Course Objectives**

- COB 1: To acquaint the students with soft and hard water types and softening methods.  
 COB 2: To impart knowledge on the basic concepts of electrochemical cells and battery technology.  
 COB 3: To impart knowledge about polymers and plastic materials.  
 COB 4: To impart knowledge about various sources of Non-renewable and renewable energy and their harnessing.  
 COB 5: To introduce different types of Nano-materials and the necessity of green chemistry.

**Course Outcomes**

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

- CO 1: Compare the quality of drinking water and problems associated with hard water.  
 CO 2: Outline the difference between primary and secondary cells.  
 CO 3: Explain different types of polymers and their applications.  
 CO 4: Compare various sources of Non-renewable and renewable energy.  
 CO 5: Summarize the importance of Nano materials and Green chemistry.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO2 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO3 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO5 (K2)	2	-	-	-	-	-	-	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO/PSO	PSO1 (K3)	PSO2 (K3)	PSO3 (K2)
CO1 (K2)	-	-	-
CO2 (K2)	-	2	-
CO3 (K2)	-	-	-
CO4 (K2)	-	-	-
CO5 (K2)	-	-	-

**UNIT-I:****Water Technology:**

Introduction – Soft Water and hardness of water, types of hardness of water, degree of hardness of water, Units of hardness of water, problems on hardness, Boiler troubles - scale and sludge, Boiler corrosion, Industrial water treatment- zeolite and ion-exchange processes. Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards, - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

**UNIT-II:****Electrochemical Energy Systems:**

Introduction- Electrochemical Cell(Galvanic cell), Electrochemical series, Applications, single electrode potential, Hydrogen and Calomel electrode, Nernst Equation for a single electrode, Concentration Cells(Electrode & Electrolyte),Construction of glass electrode.

**Batteries** – Classical batteries-dry/Leclanche cell, Modern batteries-zinc air, lithium cells-Li

MnO<sub>2</sub> cell- challenges of battery technology. Fuel cells- Introduction - classification of fuel cells – hydrogen and oxygen fuel cell, propane and oxygen fuel cell- Merits of fuel cell.

### UNIT-III:

#### Polymer Chemistry:

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation (Free radical mechanism for addition polymerization)

**Plastics** - Thermoplastics and Thermosetting, Preparation, properties and applications of – PE, PVC, Bakelite, Teflon and Nylon-6, 6.

Elastomers –Buna-S, Buna-N–preparation, properties and applications.

**Conducting polymers** – polyacetylene, polyaniline – mechanism of conduction and applications.

### UNIT-IV:

#### Energy Sources and Applications:

**Introduction-** sources of renewable energy –Hydro power, Biomass and Biofuels Solar energy

– Introduction - Physical and Chemical properties of Silicon- Preparation of Semi conductors - Doping of Silicon- p and n type semi conductors- PV cell / solar cell- Working & Manufacturing of Photovoltaic Cells using Chemical Vapor Deposition Technique- applications of solar energy.

Fuels: Introduction- classification- liquid fuels- Refining of petroleum-cracking-Reforming- Gaseous fuels-LPG & CNG Applications.

### UNIT-V:

#### Material Science and Engineering:

**Nanomaterials:** Introduction to nanomaterial: nanoparticles, nanocluster, carbon nanotube (CNT) and nanowires. Chemical synthesis of nanomaterials: sol-gel method. Characterization: Principle and applications of scanning electron microscope (SEM) and transmission electron microscope (TEM).

**Nano Tubes: Carbon** nano tubes- Types of CNT's-preparation methods –Arc discharge, Laser ablation and chemical vapour deposition –properties and applications.

**Green Chemistry:** Introduction, principles of green chemistry (Ex: Solvent, Catalyst, Reactant)

**Band Theory Of Solids:** Introduction –Explanation of conductors, semi conductors, Insulators by Band Theory- Super conductors-Types-Preparation-Properties and Applications.

**Appendix:** Introduction to Molecular Machines and Molecular Switches.

#### Text Books:

1. P.C. Jain and M. Jain, Engineering Chemistry, 16/e, Dhanapat Rai & Sons, (2014).
2. B.K. Sharma, Engineering Chemistry, Krishna Prakasham, (2014).
3. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

#### Reference Books:

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

**Web Links:**

1. <http://www.nptelvideos.in/2012/11/chemistry-of-materials>
2. <http://www.nptelvideos.com/lecture.php?id=2946>
3. <http://www.nptelvideos.com/lecture.php?id=2922>
4. <http://www.nptelvideos.com/lecture.php?id=2954>

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## ENGINEERING GRAPHICS AND DESIGN

(Common to CE, ME, ECE, CSE, IT, Min.E, PT & Ag.E)

**II Semester**

**Course Code: 191ES2T02**

**L T P C**  
**1 0 3 2.5**

**Course Objectives:**

- COB 1: To teach the practices for accuracy and clarity in presenting the technical information used in industry.
- COB 2: To train the students with graphical skills in design of mechanical engineering components.
- COB 3: To impart the knowledge of drawing machine components using AutoCAD.

**Course Outcomes:**

At the end of the Course, student will be able to:

- CO 1 : Make use of fundamentals of Engineering Drawing to sketch basic curves, conic sections, cycloid, epicycloid, hypocycloid and involute.
- CO 2 : Apply the principles of orthographic projections for points, lines and planes.
- CO 3 : Apply the principles of orthographic projections for solids.
- CO 4 : Apply the AutoCAD software for the orthographic projection of the machine parts.
- CO 5 : Apply the AutoCAD software for the isometric projection of the machine parts.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1(K3)	3	-	-	-	-	-	-	-	-	2	-	-
CO2(K3)	3	-	-	-	-	-	-	-	-	2	-	-
CO3(K3)	3	-	-	-	-	-	-	-	-	2	-	-
CO4(K3)	3	-	-	-	2	-	-	-	-	2	-	2
CO5(K3)	3	-	-	-	2	-	-	-	-	2	-	2

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	-	-
CO2 (K3)	-	-	-
CO3 (K3)	-	-	-
CO4 (K3)	-	-	-
CO5 (K3)	-	-	-

**CONVENTIONAL DRAFTING**

**UNIT-I**

**Introduction to Engineering graphics:** Principles of Engineering Graphics and their significance- conventions in drawing- lettering – BIS Conventions- - Conic sections - Cycloid, epicycloids and hypocycloid-Involutes.

**UNIT-II**

**Projection of points, lines and planes:** Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

**UNIT-III**

**Projections of solids:** Projections of regular solids inclined to one or both planes by

rotational or auxiliary views method.

## **COMPUTER AIDED DRAFTING**

### **UNIT-IV**

**Introduction to Computer Aided Drafting:** Basic drawing and editing commands- Dimensioning principles and conventional representations, Systems of projections, Conventions and application to orthographic projections.

### **UNIT-V**

**Isometric Projections:** Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids.

#### **Text Books:**

1. N.D.Bhatt, Engineering Drawing, 53<sup>rd</sup> Edition, Charotar Publishers, 2016.
2. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3<sup>rd</sup> Edition, Scitech Publishers, Chennai, 2012.

#### **Reference Books:**

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009.
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009.
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013.
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

#### **Note:**

1. Manual and Computer Aided Drafting classes can be held in alternative weeks for optimal utilization of computer facilities.
2. External examinations to be conducted both manual and computer mode with equal weightage of marks.

#### **Additional Sources:**

1. Youtube: <http://sewor.carleton.ca/kardos/88403/drawings.html> conic sections-online, red woods.edu

#### **Web Links:**

1. <https://www.wiziq.com/tutorials/engineering-drawing>
2. [www.me.umn.edu/courses](http://www.me.umn.edu/courses)

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## ESSENTIAL ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to CE, ME, CSE, IT, Min.E, PT & Ag.E)

**II Semester****Course Code: 191ES2T03**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To impart the principles of basic law's for electrical networks.
- COB 2: To explain the concepts of electrical machines and their characteristics.
- COB 3: To expose the principle of operation, construction details and testing methods of transformer.
- COB 4: To impart the adequate knowledge about the operation of AC rotating machines.
- COB 5: To describe the characteristics of diodes, transistors and their applications.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1 : Construct simple electrical circuits using basic laws.
- CO 2 : Explain the constructional features of DC Machines and working.
- CO 3 : Examine the performance of single phase transformer.
- CO 4 : Illustrate the principle of AC rotating machines.
- CO 5 : Analyze the device structure, operation and application of diode and BJT.

**Mapping of Course Outcomes with Program Outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	-	-	-	-	-	-	-	-	-	-	-
CO2 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO3 (K4)	3	3	2	-	-	-	-	-	-	-	-	-
CO4 (K3)	3	-	-	-	-	-	-	-	-	-	-	-
CO5 (K4)	3	3	2	-	-	-	-	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	3	-
CO2 (K2)	-	-	-
CO3 (K4)	-	-	-
CO4 (K3)	-	-	-
CO5 (K4)	-	-	-

**UNIT- I:**

**Basic laws and Theorems:** Electrical circuit elements (R-L and C), ac and dc independent sources and their V-I relationship, Ohms law, Kirchoff's Laws, mesh analysis, series and parallel circuits, delta-star and delta-star conversion, Network Theorems (with DC Excitation) superposition theorem, Thevenin's and Norton's theorem, maximum power transfer theorem with simple examples.

**UNIT- II:**

**DC Machines:** Constructional features, Principle of operation of DC generator, EMF equation, types of dc generators, OCC characteristics of dc shunt generator. Principle of operation of dc motor, torque expressions, 3-point starter, losses and efficiency, Swinburne's test, efficiency by direct loading. Speed control methods of dc motor.

**UNIT- III:**

**Transformers:** Principle of operation and construction of single phase transformer, EMF equation, voltage regulation, losses and efficiency, open/short- circuit tests and determination of efficiency.

**UNIT- IV:**

**AC Rotating Machines:** Principle of operation of alternators, Types of alternators, Principle of operation of synchronous motor, Principle of operation of 3-Phase induction motor, Slip-torque characteristics. Efficiency calculations from direct loading.

**UNIT- V:**

**Semiconductor Devices:** p-n Junction diode principle, V-I characteristics, rectifier circuits (half-wave, full-wave Descriptive treatment only), Zener diode as Voltage Regulator, Construction and working P-N-P and N-P-N Junction transistor, Transistor as an CE amplifier.

**Text Books:**

1. Electrical Technology by Surinder Pal Bali, Pearson Publications. Vol. I and Vol. II.
2. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 9<sup>th</sup> edition, PHI/PHI 2006.

**Reference Books:**

1. Basic Electrical Engineering by M. S. Naidu and S. Kamakshiah, TMH Publications.
2. D.P. Kothari, I.J. Nagrath, Basic Electrical and Electronics Engineering, 1<sup>st</sup> edition, McGraw Hill Education (India) Private Limited, 2017.
3. Basic Electrical Engineering by Sukhija and Nagsarkar, Oxford Publications, 2<sup>nd</sup> edition.
4. R.K. Rajput, Basic Electrical and Electronics Engineering, University Science Press, New Delhi, 2012.

**Web Links:**

1. <http://www.nptelvideos.in/2012/11/electrical-machines-i.html>.
2. [www.falstad.com/circuits](http://www.falstad.com/circuits).

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## DATA STRUCTURES THROUGH C++ (Common to CSE & IT)

**II Semester****Course Code: 191ES2T09****L T P C****3 0 0 3****Course Objectives:**

- COB 1: To enable the students to learn the common concepts of C & C++.
- COB 2: To illustrate the object oriented principles and their implementation in C++.
- COB 3: To impart the knowledge on classes, objects, member functions, constructors and destructors.
- COB 4: To make the students learn function overloading.
- COB 5: To demonstrate Generic Programming with Templates.
- COB 6: To Understand the Concepts of Data Structures.
- COB 7: To make the students learn implementation of linear data structures using linked lists.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1 : Compare and contrast object oriented programming and procedural oriented Programming.
- CO 2 : Make use of constructor and destructor to initialize and destroy class objects.
- CO 3 : Illustrate function overloading and constructor overloading.
- CO 4 : Develop programs using Templates & STL.
- CO 5 : Apply various searching and sorting techniques for computation problems.
- CO 6 : Model stacks and queues using different approaches.
- CO 7 : Describe various operations of linked lists.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K3)	PO6 (K3)	PO7 (K2)	PO8 (K3)	PO9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO2 (K3)	3	2	-	1	-	-	-	-	-	-	-	-
CO3 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO4 (K3)	3	2	-	-	3	-	-	-	-	-	-	3
CO5 (K3)	3	2	-	-	3	-	-	-	-	-	-	-
CO6 (K3)	3	2	-	-	3	-	-	-	-	-	-	3
CO7 (K2)	2	1	-	-	-	-	-	-	-	-	-	3

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	-	-	-
CO2 (K3)	-	-	2
CO3 (K2)	-	-	-
CO4 (K3)	3	-	-
CO5 (K3)	3	3	2
CO6 (K3)	-	-	-
CO7 (K2)	-	-	-

**UNIT I****An Overview of C++:**

Difference between C and C++, The Origin of C++, Key Concepts of Object Oriented Programming, namespaces, memory management operators, A Sample C++ Program.

**Classes and Objects:**

Classes, Declaring Objects, Access Specifiers and their Scope, Defining Member Functions, Friend functions, Inline Functions, Static Member Variable, Static Member Function,

**Constructors and Destructors.****UNIT II****Function Overloading:**

Function Overloading, Constructor Overloading, Constructor with Arguments, Copy Constructor, Default Function Arguments.

**Templates:**

Templates: Generic Functions, Applying Generic Functions, Generic Classes, An overview of STL, Container classes, vectors, Lists, Maps, Algorithms.

**UNIT III****Introduction:**

Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh.

**Searching:** Linear Search and Binary Search Methods.

**Sorting:** Bubble, Insertion, Selection, Quick, heap, Radix, Merge sort.

**UNIT IV****Introduction to Data Structures:**

Linear and non linear data structures, Stack ADT- array representation, Evaluation of expressions, Queue ADT-array representation, Circular queue-insertion and deletion.

**UNIT V****Linked lists:**

Singly linked lists -insertion, deletion, search operations, Doubly linked lists-insertion, deletion operations, circular lists.

**Text Books:**

1. The Complete Reference C++, Herbert Schildt, TMH, Fourth Edition, 2003.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, Sartaj Sahni, Dinesh Mehta.

**Reference Books:**

1. Object oriented programming in C++, Joycee Farrell, Cengage.
2. Data structures and algorithms in C++, 3<sup>rd</sup> edition, Adam Drozdek, Thomson.

**Web Links:**

1. [https://www.tutorialspoint.com/cplusplus/cpp\\_object\\_oriented.html/](https://www.tutorialspoint.com/cplusplus/cpp_object_oriented.html/)
2. <https://www.javatpoint.com/cpp-oops-concepts>
3. <http://www.studytonight.com/data-structures/>
4. <http://nptel.ac.in/courses/106102064/>
5. <http://www.geeksforgeeks.org/data-structures/>

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## COMMUNICATIVE ENGLISH LAB –II

(Common to all branches)

**II Semester****Course Code: 191HS2L02**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Objectives:**

- COB 1: To facilitate computer-aided multi-media instruction enabling individualized and independent language learning.
- COB 2: To improve the fluency in spoken English and neutralize mother tongue Influence.
- COB 3: To train students to use language appropriately

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1 : Illustrate interpersonal skills using language confidently and effectively for personal and profession growth.
- CO 2 : Make use of effective delivery strategies to select, compile, and synthesize information for an oral presentation.
- CO 3 : Demonstrate in mock interviews, mock group discussion and public speaking.
- CO 4 : Identify communicative competency to respond to others in different situations.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO2 (K3)	-	-	-	-	-	-	-	-	-	2	-	-
CO3 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO4 (K3)	-	-	-	-	-	-	-	-	-	2	-	-

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	-	-	-
CO2 (K3)	-	-	-
CO3 (K2)	-	-	-
CO4 (K3)	-	-	-

**PRACTICE 1:**

Body Language

**PRACTICE 2:**

Dialogues

**PRACTICE 3:**

Presentation Skills

**PRACTICE 4:**

Group Discussion

**PRACTICE 5:**

Interviews and Telephonic Interviews.

**PRACTICE 6:**

Debates

**Reference Books:**

1. Strengthen your Communication Skills by Dr.M.Hari Prasad, Dr.Salivendra J.Raju and Dr.G.Suvarna Lakshmi, Maruthi Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. A Handbook of English for Professionals by Prof Eliah, B.S Publications.
4. Effective Technical Communication by M. Ashraf Rizvi, Tata Mcraw – Hill Publishing Company.
5. Cornerstone, Developing soft skills, Pearson Education.

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**ENGINEERING CHEMISTRY LAB**  
(Common to CE, ME, ECE, CSE, Min.E, PT & Ag.E)

II Semester

Course Code: 191BS2L04

L	T	P	C
0	0	3	1.5

**Course Objectives:**

- COB 1: To acquaint the students with the basic concepts of Engineering Chemistry lab.
- COB 2: To demonstrate the digital instrument methods of analysis.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1 : Calculate the hardness of water.
- CO 2 : Calculate the strength of acids & bases by instrumental analysis.
- CO 3 : Prepare advanced polymer materials.
- CO 4 : Prepare alternative fuel like Bio-Diesel.

**Mapping of Course Outcomes with Program Outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	-	-	-	3	-	-	-	-	-	-	-
CO2 (K3)	3	-	-	-	3	-	-	-	-	-	-	-
CO3 (K3)	3	-	-	-	3	-	-	-	-	-	-	-
CO4 (K3)	3	-	-	-	3	-	-	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO/PSO	PSO1 (K3)	PSO2 (K3)	PSO3 (K2)
CO1 (K3)	-	-	-
CO2 (K3)	-	-	-
CO3 (K3)	-	-	-
CO4 (K3)	-	-	-

**Introduction to Chemistry laboratory** – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.

**Exercise 1:**

Determination of Total Hardness of a water sample.

**Exercise 2:**

Determination of Dissolved Oxygen in Water Sample.

**Exercise 3:**

Determination of Zinc by Complexometric method

**Exercise 4:**

$P^H$  metric titration of (i) strong acid vs. strong base.

**Exercise 5:**

Determination of Fe (II) in Mohr's salt by potentiometric method.

**Exercise 6:**

Potentiometry – Titration between strong acid – strong base

**Exercise 7:**

Conductometric titrations(Strong acid vs Strong base).

**Exercise 8:**

Preparation of Phenol- Formaldehyde resin.

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**Exercise 9:**

Preparation of Urea-Formaldehyde resin.

**Exercise 10:**

Preparation of bio diesel.

**Exercise 11:**

Determination of Vitamin – C.

**LIST OF AUGMENTED EXPERIMENTS**

**12 to 15 (Any two of the following experiments can be performed)**

**Exercise 12:**

Determination of percentage Moisture content in a coal sample.

**Exercise 13:**

Determination of acid value and saponification value of a given lubricant.

**Exercise 14:**

Determination of viscosity of a liquid.

**Exercise 15:**

Estimation of Calcium in port land Cement.

**Reference Books:**

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

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**DATA STRUCTURES THROUGH C++ LAB****(Common to CSE & IT)****II Semester****Course Code: 191ES2L10**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Objectives:**

- COB 1: To impart knowledge on classes, object constructor and destructor.
- COB 2: To illustrate how to overload functions in C++.
- COB 3: To implement C++ programs using template
- COB 4: To impart knowledge on linear and non-linear data structures
- COB 5: To make the students understand the applications of Data structures.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Apply object oriented techniques to solve computing problems.
- CO 2: Experiment with the key features of the object-oriented programming language.
- CO 3: Develop C++ programs using templates.
- CO 4: Analyze various searching and sorting techniques.
- CO 5: Make use of Linear Data Structures for solving complex problems.
- CO 6: Solve real time applications using linked lists.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K3)	PO6 (K3)	PO7 (K2)	PO8 (K3)	PO9 (K2)	PO10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	2	1	1	3	-	-	-	-	-	-	3
CO2 (K3)	3	2	1	1	3	-	-	-	-	-	-	3
CO3 (K3)	3	2	1	1	3	-	-	-	-	-	-	3
CO4 (K4)	3	3	2	2	3	-	-	-	-	-	-	3
CO5 (K3)	3	2	1	1	3	-	-	-	-	-	-	3
CO6 (K3)	3	2	1	1	3	-	-	-	-	-	-	3

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	3	-
CO2 (K3)	-	3	-
CO3 (K3)	3	3	-
CO4 (K4)	3	3	-
CO5 (K3)	-	3	-
CO6 (K3)	-	3	-

**List of Experiments:**

Develop a C++ Program to

**1. Variables, Scope**

- 1.1) Implement Call-by-reference
- 1.2) Illustrate name spaces.
- 1.3) Illustrate inline functions.

**2. Classes and Objects**

- 2.1) Demonstrating a Bank Account class with necessary data members and member functions.
- 2.2) For illustrating Access Specifiers public and private.

2.3) Illustrate the use of constructors and destructors.

### **3. Functions**

3.1) Illustrate friend function.

3.2) Illustrate function overloading.

### **4. Constructors and Constructor Overloading.**

4.1) Illustrating Constructor Overloading

4.2) For illustrating copy Constructor.

### **5. Templates & STL.**

5.1) Illustrating function template.

5.2) Illustrating template class.

5.3) Implement List, Vector and its operations.

### **6. Searching**

6.1) Implement Linear Search.

6.2) Implement Binary Search

### **7. Sorting**

7.1) Illustrate Bubble Sort.

7.2) Illustrate Insertion Sort.

7.3) Illustrate Selection sort.

### **8 .Sorting**

8.1) Illustrate Quick Sort.

8.2) Illustrate Heap Sort.

8.3) Illustrate Radix Sort.

### **9. Stacks**

9.1) That implements stack operations using Arrays

9.2) That implements stack operations using Linked List.

### **10. Queues**

10.1) That implements Queue operations using Arrays.

10.2) That implements Queue operations using Linked List.

11. That creates singly linked list and its operations.

12. That creates doubly linked list and its operations.

### **List of Augmented Experiments:**

**(Any 2 of the following experiments can be performed)**

13) Develop a C++ program for flight booking system.

14) Write a C++ program to implement balanced brackets problem using stack

A bracket is considered to be any one of the following characters:

(, ), {, }, [, or ].

Two brackets are considered to be a matched pair if the an opening bracket (i.e., (, [, or {) occurs to the left of a closing bracket (i.e., ), ], or }) of the exact same type.

15) Write a C++ program to implement bus reservation system using Queue.

16) Write a C++ program to represent Sparse Matrices using Linked Lists.

**Reference Books:**

1. C++ Primer Plus by Stephen Prata, Pearson, Sixth Edition, 2011.
2. C++ GUI Programming with Qt4, Jasmin Blanchette, Mark Summerfield, Prentice Hall Press, Second Edition, 2008.
3. C++ for Programmers, Paul J. Deitel, Harvey M. Deitel, Pearson, 2009.
4. The C++ Programming Language, Bjarne Stroustrup, Pearson, Fourth Edition, 2014.
5. Data structures and Algorithms in C++, 3<sup>rd</sup> Edition Adam Drozdek, Thomson.

**Web Links:**

1. <https://in.udacity.com/course/c-for-programmers--ud210>
2. <https://www.coursera.org/courses?query=c%2B%2B>
3. <http://nptel.ac.in/courses/106105151/>
4. <https://www.hackerrank.com/domains/cpp/cpp-introduction>.
5. <https://www.geeksforgeeks.org/stack-data-structure>
6. [https://www.tutorialspoint.com/data\\_structures\\_algorithms/linked\\_list\\_algorithms](https://www.tutorialspoint.com/data_structures_algorithms/linked_list_algorithms)

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## IT WORKSHOP (Common to CSE & IT)

II Semester

Course Code: 191ES2L11

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To make the students aware of the basic hardware components of a computer and installation of Operating system.
- COB 2: To illustrate the usage of network and internet
- COB 3: To impart adequate knowledge on Trouble Shooting
- COB 4: To demonstrate the use of Office tools
- COB 5: To make the students prepare presentation/document using LaTeX
- COB 6: To introduce programming through Visual programming tool - Scratch

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1 : Identify the components of a PC and Assemble & disassemble the same.
- CO 2 : Experiment with installation of Operating System and Secure a computer from Cyber threats.
- CO 3 : Create their own digital profile on social media.
- CO 4 : Develop presentation /documentation using Office tools and LaTeX.
- CO 5 : Build an interactive visual programs using Scratch.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	1	-	-	3	-	-	-	-	-	-	3
CO2 (K3)	3	2	1	1	3	-	-	-	-	-	-	3
CO3 (K3)	3	2	1	1	3	-	-	-	-	-	-	3
CO4 (K3)	2	1	-	-	3	-	-	-	-	-	-	3
CO5 (K3)	3	2	1	1	3	-	-	-	-	-	-	3

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	3	3	2
CO2 (K3)	3	3	2
CO3 (K3)	3	3	2
CO4 (K3)	3	3	2
CO5 (K3)	3	3	2

**LIST OF EXPERIMENTS****1. Identification of peripherals of a computer**

Block diagram of the CPU along with the configuration of the each peripheral and its functions.

**2. System Assembling and Disassembling**

2.1) Disassembling the components of a PC.

2.2) Assembling the components back to working condition.

**3. Installation of Softwares**

3.1) Installation of operating Systems: Windows, Linux along with necessary Device Drivers.

3.2) Installing and exploring various Productivity Tools.

**4. Troubleshooting**

- 4.1) Hardware Troubleshooting: Identification of a problem and fixing a defective PC.
- 4.2) Software Troubleshooting: Identification of a problem and fixing the PC for any software issues.

**5. Network Configuration and Internet**

- 5.1) Configuring TCP/IP.
- 5.2) Configuring Proxy and Firewall settings.
- 5.3) Exploring Internet and World Wide Web.
- 5.4) Exploring Search Engines, Cyber hygiene.

**6. Office Tools –I (Use any Cloud API like Google, Microsoft, AWS etc.)**

- 6.1) Store, sync, and share files with ease in the Cloud.
- 6.2) Document creation and editing text documents in your web browser.
- 6.3) Handle task lists, create project plans, analyze data with charts and filters.
- 6.4) Explore the globe by entering addresses and coordinates.
- 6.5) Keep track of important events, sharing one's schedule, and create multiple calendars.

**7. Office Tools –II ((Use any Cloud API like Google, Microsoft, AWS etc.)**

- 7.1) Build public sites, internal project hubs.
- 7.2) Create pitch decks, project presentations, training modules.
- 7.3) Manage event registrations, create quizzes, analyze responses.

**8. LaTeX-I**

- 8.1) Installation of LaTeX and related Softwares.
- 8.2) Basic formatting using LaTeX.
- 8.3) Handling the equations in LaTeX

**9. LaTeX-II**

- 9.1) Inserting the images in LaTeX
- 9.2) Inserting the Tables in LaTeX
- 9.3) Bibliography

**10. Visual Programming through Scratch -I**

- 10.1) Introduction to programming concepts with scratch, Scratch environment, sprites looks and motion, Angles and directions.
- 10.2) Repetition and variation, changing costumes, adding background, Input/output, variables and operators.
- 10.3) Working with sounds and sprite communication

**11. Visual Programming through Scratch –II**

- 11.1) Develop a program controlled by a loop.
- 11.2) Experiment with “costumes” to change the appearance of sprites.
- 11.3) Perform Input, Output Operations using scratch.

**12. Visual Programming through Scratch –III**

- 12.1) Perform computation using common mathematical formulas.
- 12.2) Develop programs by passing messages between sprites.

**LIST OF AUGMENTED EXPERIMENTS****13 to 16 (Any 2 of the following experiments can be performed)**

**13.** Build a website for any real time system using cloud API's.

**14.** Prepare IEEE document/Technical Paper using LaTeX.

**15.** Prepare your Resume using LaTeX.

**16.** Create an animation using Scratch for the given Scenario.

An Eagle is catching the Snake, the Snake is initially happy and once the eagle catches the snake it becomes sad and cries.

**Reference Books:**

1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
2. LATEX- User's Guide and Reference manual, Leslie Lamport, Pearson, LPE, 2/e.
3. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008.
4. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dream tech.
5. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

**Web Links:**

1. <https://assembleyourpc.net>
2. <https://lifehacker.com>
3. <https://www.latex-tutorial.com/tutorials>
4. <https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf>



## ENGINEERING EXPLORATION PROJECT

(Common to all branches)

**II Semester**

**Course Code: 191PR2P01**

L	T	P	C
0	0	2	1

### Course Objectives:

- Build mindsets & foundations essential for designers
- Learn about the Human-Centered Design methodology and understand their real-world applications
- Use Design Thinking for problem solving methodology for investigating illdefined problems.
- Undergo several design challenges and work towards the final design challenge

Apply Design Thinking on the following Streams to

- Project Stream 1: Electronics, Robotics, IOT and Sensors
- Project Stream 2: Computer Science and IT Applications
- Project Stream 3: Mechanical and Electrical tools
- Project Stream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

### HOW TO PURSUE THE PROJECT WORK?

- The first part will be learning-based-masking students to embrace the methodology by exploring all the phases of design thinking through the wallet/ bag challenge and podcasts.
- The second part will be more discussion-based and will focus on building some necessary skills as designers and learning about complementary material for human- centered design.
- The class will then divide into teams and they will be working with one another for about 2 – 3 weeks. These teams and design challenges will be the basis for the final project and final presentation to be presented.
- The teams start with **Design Challenge** and go through all the phases more in depth from coming up with the right question to empathizing to ideating to prototyping and to testing.
- Outside of class, students will also be gathering the requirements, identifying the challenges, usability, importance etc
- At the end, Students are required to submit the final reports, and will be evaluated by the faculty.

**TASKS TO BE DONE:****Task 1: Everyone is a Designer**

- Understand class objectives & harness the designer mindset

**Task 2: The Wallet/Bag Challenge and Podcast**

- Gain a quick introduction to the design thinking methodology
- Go through all stages of the methodology through a simple design challenge
- Podcast: Observe, Listen and Engage with the surrounding environment and identify a design challenge.

**Task 3: Teams & Problems**

- Start Design Challenge and learn about teams & problems through this
- Foster team collaboration, find inspiration from the environment and learn how to identify problems

**Task 4: Empathizing**

- Continue Design Challenge and learn empathy
- Learn techniques on how to empathize with users
- Go to the field and interview people in their environments
- Submit Activity Card

**Task 5: Ideating**

- Continue Design Challenge and learn how to brainstorm effectively
- Encourage exploration and foster spaces for brainstorming
- Submit Activity Card

**Task 6: Prototyping**

- Continue Design Challenge and learn how to create effective prototypes
- Build tangible models and use them as communication tools
- Start giving constructive feedback to classmates and teammates
- Submit Activity Card

**Task 7: Testing**

- Finish Design Challenge and iterate prototypes and ideas through user feedback
- Evolve ideas and prototypes through user feedback and constructive criticism
- Get peer feedback on individual and group performance
- Submit Activity Card

**Task 8:**

- Final Report Submission and Presentation

**Note:** The colleges may arrange for Guest Speakers from Various Design Fields: Graphic Design, Industrial Design, Architecture, Product Design, Organizational Design, etc to enrich the students with Design Thinking Concept.

**References Books:**

1. Tom Kelly, The Art of Innovation: Lessons in Creativity From IDEO, America's Leading Design Firm (Profile Books, 2002).
2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (Harper Business, 2009).
3. Jeanne Liedtka, Randy Salzman, and Daisy Azer, Design Thinking for the Greater Good: Innovation in the Social Sector (Columbia Business School Publishing, 2017).

**Web Links:**

1. Human-Centered Design Toolkit (IDEO); <https://www.ideo.com/post/design-kit>
  2. Design Thinking Boot Camp Bootleg (Stanford D-School); <https://dschool.stanford.edu/resources/the-bootcamp-bootleg>
  3. Collective Action Toolkit (frog design); [https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT\\_2.0\\_English.pdf](https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT_2.0_English.pdf)
- Design Thinking for Educators (IDEO); <https://designthinkingforeducators.com/>

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## DISCRETE MATHEMATICS

(Common to CSE & IT)

**III Semester**

**Course Code: 191BS3T14**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To introduce the concepts of mathematical logic, number theory, graph theory in order to develop critical thinking towards problem solving.
- COB 2: To relate the concepts of discrete mathematics to various domains of computer science.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 : Apply the principles of mathematical logic to statement calculus and predicate calculus.
- CO 2 : Compute Transitive Closure, Equivalence Classes of binary relations
- CO 3 : Solve recurrence relations using various methods
- CO 4 : Apply the concepts of graph theory to find euler paths, Hamiltonian paths.
- CO 5 : Apply the concepts of graph theory to trees.

### Mapping of course outcomes with program outcomes:

CO / PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO 1 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 2 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 3 (K3)	3	2	-	-	-	-	-	-	-	-	-	1
CO 4 (K3)	3	2	-	-	-	-	-	-	-	-	-	1
CO 5 (K3)	3	2	-	-	-	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO 1 (K3)	-	-	-
CO 2 (K3)	-	-	1
CO 3 (K3)	2	-	-
CO 4 (K3)	1	1	-
CO 5 (K3)	1	1	-

### UNIT-I:

**Mathematical Logic:** Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus.

**Predicate Calculus:** Predicate Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

### UNIT-II:

**Binary Relations and Properties:** Binary relations, Properties, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive, Closure, Warshall Algorithm, Equivalence relation, R-Equivalence class, Partial Ordering Relation, Partially ordered sets, Hasse Diagrams.

### UNIT-III:

**Recurrence Relations:** Recurrence Relations, Formation of Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots.

**UNIT-IV:**

**Graph Theory:** Basic Concepts of Graphs, Matrix Representation of Graphs: Adjacency Matrix, Incidence Matrix, Isomorphic Graphs, Paths and Circuits, Euler and Hamilton Graphs, Planar Graphs and Euler's Formula.

**UNIT-V:**

**Trees:** Trees-Properties, Spanning trees, BFS Algorithm, DFS Algorithm, Minimal Spanning Trees and Kruskal's Algorithm, Graph Colouring, Chromatic Number.

**Text Books:**

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory.
2. K. H. Rosen, 7<sup>th</sup> Edition, Tata McGraw Hill.
3. Discrete Mathematical Structures with Applications to Computer Science,

**Reference Books:**

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

**Web Links:**

1. [https://en.wikipedia.org/wiki/Discrete\\_mathematics](https://en.wikipedia.org/wiki/Discrete_mathematics)
2. <http://nptel.ac.in/courses/106106094/>
3. <http://mathworld.wolfram.com/classroom/classes/DiscreteMathematics.html>
4. <http://mathworld.wolfram.com/topics/GeneralLogic.html>

## DIGITAL LOGIC DESIGN

(Common to CSE & IT)

### III Semester

Course Code: 191ES3T13

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To make the students interpret various number systems and operations in binary number system.
- COB 2: To familiarize the students make use of minimization techniques of logical expression.
- COB 3: To make the students design combinational logic circuits.
- COB 4: To impart the knowledge of the sequential circuits.
- COB 5: To make the students learn Registers and Counters.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Interpret numeric information in different base representations.
- CO 2: Simplify logic expressions using minimization techniques.
- CO 3: Design combinational logic circuits as per the given specifications.
- CO 4: Design sequential logic circuits as per the given specifications.
- CO 5: Develop Registers and Counters using flip-flops

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	2	-	-	-	-	-	-	-	-	-	1
CO2 (K4)	3	3	2	-	-	-	-	-	-	-	-	1
CO3 (K4)	3	-	2	-	-	-	-	-	-	-	-	-
CO4 (K4)	3	3	2	-	-	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	-	-	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1(K2)	2	-	-
CO2(K4)	3	-	-
CO3(K4)	3	-	-
CO4(K4)	3	-	-
CO5(K3)	3	-	-

### UNIT-I:

**Digital Systems and Binary Numbers:** Digital Systems, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Signed Binary Numbers, Arithmetic addition and subtraction.

### UNIT-II:

**Concept of Boolean algebra and minimization techniques:** Basic logic operations- NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR Gates, Standard SOP and POS, Boolean theorems, principle of complementation & duality, De-Morgan theorems, minimization of switching functions using K-Map.

### UNIT-III:

**Combinational Logic:** Design procedure, half adder, full adder, half subtractor, full subtractor, applications of full adders, decoders, encoders, multiplexers, demultiplexer, Realization of Boolean functions using decoders and multiplexers.

**UNIT-IV:**

**Sequential Logic:** Introduction to Sequential Circuits, Storage Elements: Latches, Flip-Flops, RS flip-flop, JK flip-flop, T-flip-flop, D-flip-flop. Conversion from one flip-flop to another flip-flop.

**UNIT-V:**

**Registers and Counters:** Registers, Shift Registers, Asynchronous Counters: Ripple Counters, Mod counters, Synchronous Counters: Ring Counter, Johnson Counter.

**Text Books:**

1. Modern Digital Electronics, RP Jain, Tata Mc Graw Hill, 4<sup>th</sup> Edition, 2010.
2. Switching Theory and Logic Design, A. Anand Kumar, Pearson, 3<sup>rd</sup> Edition, 2013.
3. Switching and Finite Automata Theory, Zvi Kohavi & Niraj K. Jha, 3<sup>rd</sup> Edition, 2010.

**Reference Books:**

1. Introduction to Switching Theory and Logic Design, Fredriac J. Hill, Gerald R. Peterson, 3<sup>rd</sup> Edition, John Wiley & Sons Inc., 1982.
2. Fundamentals of Logic Design, Charles H. Roth Jr., Jaico Publishers, 2004.
3. Digital Design, Morris Mano, Pearson, 3<sup>rd</sup> Edition, 2002.

**Web Links:**

1. <https://www.nptel.ac.in/courses/117106086/1>.
2. [www.nptelvideos.in/2012/12/digital-circuits-and-systems.html](http://www.nptelvideos.in/2012/12/digital-circuits-and-systems.html).
3. <https://www.smartworld.com/notes/switching-theory-and-logic-design-stld/>.

## MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common To CE, EEE, ME, ECE, CSE, IT, Ag.E., & PT)

**III Semester**
**Course Code: 191HS3T02**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

**Course Objectives:**

- COB 1: To equip the students with the basic inputs of managerial economics and demand concepts.
- COB 2: To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- COB 3: To impart the knowledge on production theories, its factors and cost analysis.
- COB 4: To make the students take optimal decisions and acquiring the knowledge on financial accounting and its analysis.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Explain the Managerial Economic concepts for decision making and forward planning.
- CO 2: Illustrate the law of demand and its exceptions by using different forecasting methods.
- CO 3: Identify the cost behavior for managerial decision making and Break Even Point (BEP) of an enterprise.
- CO 4: Classify the different types of business organizations along with basic knowledge on business cycle.
- CO 5: Make use of the process & principles of accounting for the preparation of final accounts.
- CO 6: Utilize various techniques on investment project proposals with the help of capital budgeting techniques for decision making.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO10 (K2)	PO11 (K3)	PO12 (K1)
CO 1(K2)	-	-	-	-	-	-	-	-	1	-	-	-
CO 2(K2)	-	-	-	-	-	-	-	-	-	2	-	-
CO 3(K3)	-	-	-	-	-	-	-	-	-	-	3	-
CO 4(K2)	-	-	-	-	-	-	-	-	-	-	1	-
CO 5(K3)	-	-	-	-	-	-	-	-	-	3	-	-
CO 6(K3)	-	-	-	-	-	-	-	-	-	-	2	-

**Mapping of course outcomes with program Specific Outcomes:**

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO 1(K2)	-	-	-
CO 2(K2)	-	-	-
CO 3(K3)	-	-	1
CO 4(K2)	-	-	-
CO 5(K3)	-	-	-
CO 6(K3)	-	-	1

**UNIT-I:**

**Introduction to Managerial Economics and demand Analysis:** Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types and Measurement-Demand forecasting and its Methods.



**UNIT-II:**

**Production and Cost Analyses:** Concept of Production function- Cobb-Douglas Production function – Law of Variable proportions-Isoquants and Iso costs and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven Point (simple problems)- Managerial significance and limitations of Breakeven point.

**UNIT-III:**

Introduction to Markets, Pricing Policies & Types of Business Organization and Business Cycles: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, and Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – Business Cycles : Phases of Business Cycles.

**UNIT-IV:**

**Introduction to Accounting & Financing Analysis:** Introduction to Double Entry Systems – Journal entries – Ledger – Trail Balance – Trading and Profit and Loss Account -Preparation of Financial Statements - Introduction to Ratio Analysis.

**UNIT-V:**

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital- Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value. method, Internal Rate of Return Method and Profitability Index).

**Text Books:**

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

**Reference Books:**

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.

**Web Links:**

1. [www.managementstudyguide.com](http://www.managementstudyguide.com)
2. [www.tutorialspoint.com](http://www.tutorialspoint.com)

## SOFTWARE ENGINEERING (Common to CSE & IT)

### III Semester

Course Code: 191CS3T01

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To impart the knowledge on the Software Engineering Principles, Applications and Process models.
- COB 2: To help the students to learn the Requirement Engineering Process.
- COB 3: To create awareness on the basic activities of software project management.
- COB 4: To interpret the various design models with software requirements.
- COB 5: To discuss about Coding principles, various testing techniques and debugging techniques.
- COB 6: To teach the basic concepts of software reliability, quality management, software maintenance and reusability.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Explain the key facts, concepts, principles, and theories of software & Software Engineering.
- CO 2: Compare various software development process models with respective to advantages, disadvantages and applicability.
- CO 3: Describe the various responsibilities and activities of Software Project Management.
- CO 4: Prepare SRS Document for any real time scenario.
- CO 5: Apply various Design, Coding and testing Principles for developing the software products.
- CO 6: Discuss the importance of software reliability, quality management, software maintenance and reusability in Software development.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO2 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO3 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO4 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO6 (K3)	3	2	1	1	3	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	2	2	1
CO2 (K4)	3	3	3
CO3 (K4)	3	3	3
CO4 (K2)	2	2	1
CO5 (K3)	3	3	2
CO6 (K3)	3	-	-

### UNIT-I:

**Introduction to Software Engineering:** Software, Software Crisis, Software Engineering Definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges

**Software Process:** Software Process, Process Classification, Phased Development Life Cycle, Software Development Process Models.

**Case Study:** Survey on different process models including.

- i. Advantages and Disadvantages of the models.
- ii. Applicability of the model.
- iii. Projects developed using the various models.

#### **UNIT-II:**

**Software Project Management:** Project Management Essentials, What is Project Management, Software Configuration Management, Risk management.

**Project Planning and Estimation:** Project Planning Activities, Software Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques.

**Case Study:** Estimate the effort of the software development using Functional Points for the real time problem.

#### **UNIT-III:**

**Requirements Engineering:** Software Requirements, Requirements Engineering Process, Requirements Elicitation and Analysis, Requirements Specification, Requirements Validation, Requirements Management, Case Study: Create a SRS document for a real time scenario.

#### **UNIT-IV:**

**Software Design:** Software Design Process, Characteristics of Good Software Design, Design Principles, Modular Design, Software Architecture, Design Methodologies,

**Implementation:** Coding Principles, Coding Process, Code Verification, Code Documentation. Case Study: Construct the HLD and LLD using SRS created

#### **UNIT-V:**

**Software Testing:** Testing Fundamentals, Test Planning, Black-Box Testing, White- Box Testing, Levels of Testing, Usability Testing, Regression Testing, Debugging Approaches.

**Software Quality and Reliability:** Software Quality factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model, Software Reliability.

**Case Study:** Write the test cases for the real time scenario considered using White Box & Black Box Testing Techniques.

#### **Text Books:**

1. Software Engineering – Concepts and Practices: Ugrasen Suman, Cengage Learning.
2. Fundamentals of Software Engineering, Rajib Mall, Prentice Hall India.

#### **Reference Books:**

1. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008.
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
3. Pankaj Jalote, An integrated approach to Software Engineering, Springer/ Narosa.
4. Software Engineering: A practitioner's approach, Roger S. Pressman, McGrawHill.

#### **Web Links:**

1. [https://www.tutorialspoint.com/software\\_engineering/](https://www.tutorialspoint.com/software_engineering/)
2. <http://nptel.ac.in/courses/106101061/>
3. <https://www.coursera.org/learn/software-processes-and-agile-practices>
4. <http://www.geeksforgeeks.org/software-engineering-gg/>
5. <https://www.coursera.org/browse/computer-science/software-development>

## OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(Common to CSE & IT)

III Semester

Course Code: 191CS3T02

L	T	P	C
3	0	0	3

**Course Objectives:**

- COB 1: To make students understand object oriented programming concepts, and apply them in solving problems.
- COB 2: To provide knowledge on classes, inheritance, interfaces and packages.
- COB 3: To facilitate students in handling exceptions and multithreading.
- COB 4: To impart the knowledge on Input/ Output concepts and applets.
- COB 5: To enable the students develop standalone applications using AWT and Swings.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Apply object oriented programming features and concepts for solving given problem.
- CO 2: Solve real time problems using the concepts of class, inheritance, interface and packages.
- CO 3: Test for runtime exceptions arise in java applications.
- CO 4: Develop real time applications using multithreading and I/O streams.
- CO 5: Develop GUI applications using event handlers, adapter classes, AWT and Swing components.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO 11 (K3)	PO 12 (K1)
CO1 (K3)	2	2	2	-	1	-	-	-	-	-	-	-
CO2 (K3)	2	2	3	-	2	-	-	-	-	-	-	-
CO3 (K4)	2	2	3	-	3	-	-	-	-	-	-	-
CO4 (K3)	2	2	3	2	3	-	-	-	-	-	-	-
CO5 (K3)	2	2	3	2	3	-	-	-	-	-	-	-

**Mapping of course outcomes with program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	-	1
CO2 (K3)	-	-	2
CO3 (K4)	-	-	-
CO4 (K3)	3	3	-
CO5 (K3)	3	3	2

**UNIT-I:**

**Introduction to Java:** History of Java, Java features, JVM architecture, Classes and objects, Program structure, methods, Passing arguments through command line.

**Building Blocks of Java:** Variables, primitive data types, identifiers, literals, Operators, expressions, primitive type conversion and casting, flow of control.

**UNIT-II:**

**Introduction to Classes:** Class declaration, creating objects, constructors, Method Overloading, constructor overloading, garbage collector, importance of static keyword and examples, this keyword, Arrays, Strings, nested classes.

**Inheritance & Interfaces:** Inheritance- types of inheritance, super keyword, final keyword, overriding. Interfaces- Defining an interface, Implementing interfaces. through classes, Multiple inheritance through interfaces, abstract class.

**Packages:** Creating the packages, using packages, importance of CLASSPATH, Access Specifiers, java. lang package.

### UNIT-III:

**Exception Handling:** Exception handling, importance of try, catch, throw throws and finally block, user defined exceptions.

**Multithreading:** Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads.

### UNIT-IV:

**Input / Output:** Byte Streams and Character Streams, Predefined Streams, Reading Console inputs- Reading characters, Reading Strings, Reading and writing Files.

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

### UNIT-V:

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

**Swing:** Introduction, Swing Components- J Frame, J Panel, Layout Managers, J List, J Table, J Tree, Dialog Box.

### Text Books:

1. The Complete Reference Java, Herbert Schildt, Ninth Edition, TMH, 2014.
2. Introduction to java programming, by Y Daniel Liang, Seventh Edition, Pearson, 2017.
3. Java one step ahead, Anita seth, B.L.Juneja, First Edition, Oxford, 2017.

### Reference Books:

1. Core Java: An Integrated Approach, R.Nageswara Rao, Dream tech press, 2008.
2. Thinking in Java – Bruce Eckel, Fourth Edition, Prentice Hall, 2002.
3. Beginning Programming with Java for Dummies, Barry Burd, John Wiley & Sons Inc., 2014.

### Web Links:

1. <http://math.hws.edu/javanotes/>
2. <http://java.sun.com/docs/books/tutorial/>
3. <http://www.tutorialspoint.com/java>
4. <http://www.javatpoint.com>
5. <http://www.w3schools.com/java>

## ADVANCED DATA STRUCTURES

(Common to CSE & IT)

### III Semester

Course Code: 191CS3T03

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To impart the knowledge on Dictionaries and Hashing Techniques.
- COB 2: To provide knowledge on Trees and Priority Queues.
- COB 3: To demonstrate the students on the operations of Efficient Binary Search Trees.
- COB 4: To facilitate the students learn the basic concepts and Applications of Graphs.
- COB 5: To make the students learn the Pattern Matching Techniques and Tries.

### Course Objectives:

At the end of the Course, Student will be able to:

- CO 1: Demonstrate the Dictionaries and Hashing Techniques.
- CO 2: Illustrate the concepts of Trees and Priority queues.
- CO 3: Demonstrate the operations of Efficient and Multiway Search Trees.
- CO 4: Discuss the various Traversing Techniques and spanning trees.
- CO 5: Apply Pattern Matching Techniques and Tries to real time applications.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	2	3	-	-	-	-	-	-	-	-	1
CO2 (K3)	3	-	3	-	3	-	-	-	-	-	-	-
CO3 (K3)	3	-	3	-	-	-	-	-	-	-	-	-
CO4 (K2)	3	2	3	-	-	-	-	-	-	-	-	-
CO5 (K3)	3	-	3	-	3	-	-	-	-	-	-	1

### Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	3	1
CO2 (K3)	-	3	-
CO3 (K3)	-	3	-
CO4 (K2)	-	2	-
CO5 (K3)	-	3	1

### UNIT-I:

**Dictionaries and Hashing:** Sets, Dictionaries, Hash Tables, Open Hashing, Closed Hashing (Rehashing Methods), Different Hash Functions(Division Method, Multiplication Method, Mid-Square Method, Folding Method), Secure Hash Functions, Collision Resolution Techniques - Open Addressing and Closed Addressing, Dynamic Hashing.

### UNIT-II:

**Introduction to Non linear Data Structures: Trees:** Introduction, Types of Trees, Creating a Binary tree, Traversing a Binary Tree, Applications of Binary Tree.

**Priority Queues:** Introduction, Binary Heaps, Basic Heap Operations, Applications of Priority Queues.

### UNIT-III:

**Efficient Binary Search Trees:** Binary Search Trees, Operations on Binary Search Trees, Self-balancing Binary Search Trees, AVL Trees- Operations on AVL Trees Multi-way Search Trees: B-Trees, B+ Trees.

**UNIT-IV:**

**Graphs:** Graph Terminology, Representations of Graphs, Graph Traversal Algorithms, Minimum Cost Spanning Tree- Kruskal's and Prim's algorithms, Shortest Path Algorithm- Dijkstra's Algorithm, Applications of Graphs.

**UNIT-V:**

**Pattern matching algorithms:** The Boyer –Moore algorithm, The Knuth-Morris- Pratt algorithm

**Tries:** Definition, Digital Search Tree-Operations on Digital Search Tree, Binary trie and Patricia.

**Text Books:**

1. Fundamentals of data structures in C++, Ellis Horowitz, Sartaj Sahni, Dinesh Mehta.
2. Advanced Data Structures, Reema Thereja, S. RamaSree, Oxford University press, 2017.
3. Data Structures and Algorithms in C++, Michael T. Goodrich, Roberto Tamassia, David Mount, 2<sup>nd</sup> edition, wiley.

**Reference Books:**

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, 2<sup>nd</sup> edition, Pearson.
2. How to Solve it By Computer, R.G.Dromey, 1<sup>st</sup> edition Paperback – 2006, Pearson.
3. Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.
4. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, and J. D. Ullman, Pearson, 2002.
5. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, 3<sup>rd</sup> edition., The MIT Press.

**Web Links:**

1. [https://ocw.mit.edu/courses/...and...data-structures...notes/MIT6\\_851S12\\_L1.pdf](https://ocw.mit.edu/courses/...and...data-structures...notes/MIT6_851S12_L1.pdf)
2. <http://nptel.ac.in/courses/106103069/26>
3. <https://csd.cs.cmu.edu/course-profiles/15-121-Introduction-to-Data-Structures>
4. <https://www.hackerearth.com/practice/algorithms/graphs/graph-representation/tutorial/>
5. <https://www.cs.purdue.edu/cgvlab/courses/251/lectures/slides/04.03-PatternatchingAndTries.pdf>
6. <https://www.csie.ntu.edu.tw/~ds/ppt/ch5/chapter5.PPT>

## OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB (Common to CSE & IT)

III Semester

Course Code: 191CS3L01

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Objectives:**

- COB 1: To impart knowledge on concepts of Object-Oriented Programming.
- COB 2: To enable students to implement classes, inheritance, interface and package concepts.
- COB 3: To demonstrate exception handling and multithreading.
- COB 4: To make the students develop programs using applet concepts.
- COB 5: To train the students for designing GUI applications using AWT and Swing components.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Make use of class, inheritance, interface and packages to develop solutions for complex problems.
- CO 2: Develop error-handling techniques using exception handling.
- CO 3: Build java applications using Threads.
- CO 4: Apply event handling to create interactive applications.
- CO 5: Design GUI using AWT and Swing Components.
- CO 6: Organize all the laboratory experiments in the form of report

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	2	1	1	3	-	-	-	-	-	-	1
CO2 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	-	1	3	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	-	3	3	-	-	-	-	-	-
CO6 (K2)	3	3	-	3	3	3	-	-	-	3	-	-

**Mapping of course outcomes with program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3(K2)
CO1 (K3)	-	-	2
CO2 (K3)	-	-	2
CO3 (K3)	-	-	-
CO4 (K3)	3	-	-
CO5 (K3)	3	3	-
CO6 (K2)	-	-	-

**List of Experiments:****1) Basic Programs**

- 1.1) Write a Java program to find the discriminant value D and find out the roots of the quadratic equation of the form  $ax^2+bx+c=0$ .
- 1.2) Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.



**2) Control Flow Statements**

- 2.1) Write a Java program to select all the prime numbers within the range of 1 to 100.
- 2.2) Write a Java program to Find the sum of all even terms in the Fibonacci sequence up to the given range N.
- 2.3) Write a Java program to check whether a given number is Armstrong or not.

**3) Class Mechanism**

- 3.1) Write a Java program to display the details of a person. Personal details should be given in one method and the qualification details in another method.
- 3.2) Write a Java program to implement constructor.
- 3.3) Write a Java program to implement method overloading.

**4) Arrays**

- 4.1) Write a Java program to perform addition and multiplication of two matrices.
- 4.2) Write a Java program to implement binary search.

**5) Strings**

- 5.1) Write a Java program to sort given set of strings.
- 5.2) Write a Java program for using String Buffer to remove or delete a character.
- 5.3) Write a Java program to find the number of tokens in a given string without using count Tokens() method but by using other methods of String Tokenizer class.

**6) Inheritance, Interface & Abstract Class**

- 6.1) Write a Java program to find the available balance in a customer account. Customer's account details should be taken as input in one class, Transaction details should be taken in another class. (Note: Make use of Multi-Level Inheritance.)
- 6.2) Take the details of internal exam marks in one Interface. Take the details of external exam marks in another interface. Write a Java program to find the total marks obtained in each subject by a student. (Note: Make use of Multiple Inheritance using interfaces.)
- 6.3) Write a Java program to find the areas of different shapes using abstract classes.

**7) Packages**

- 7.1) Write a Java program that import and use user defined package.
- 7.2) Write a Java program to illustrate the use of protected members in a package.

**8) Exception Handling**

- 8.1) Write a Java program to illustrate exception handling mechanism using multiple catch clauses.
- 8.2) Write a Java program to make use of Built-in and user-defined Exceptions in handling a run time exception.

**9) Multithreading**

- 9.1) Write a Java program to demonstrate the use of demon thread.
- 9.2) Write a Java program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds, (Repeat the same by implementing Runnable).
- 9.3) Write a Java program to solve Producer-Consumer problem using synchronization.

**10) Event Handling**

- 10.1) Write a Java program to illustrate the Keyboard Events by using an applet code.
- 10.2) Write a Java program to illustrate the Mouse Events by using an applet code.

**11) AWT**

11.1) Write a Java program to generate a simple calculator using AWT components.

**12) Swings**

12.1) Write a Java program to create a single ball bouncing inside a JPanel.

**List of Augmented Experiments:**

**(Any 2 of the following experiments can be performed)**

- 13) Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color
- 14) Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.
- 15) Write a Java program to create a menu of a restaurant which includes starters, veggies, delights etc. Ask the user to select the items from the menu and generate bill for those items which he has chosen. (Make use of Swing Components).
- 16) Write a Java program to display all drives in our system as a tree structure using JTree.

**Reference Books:**

1. Java How to Program, H.M.Dietel and P.J.Dietel, Pearson Education/PHI, Sixth Edition 2007.
2. Core Java: An Integrated Approach – R. Nageswara Rao, First Edition, John Wiley and Sons Inc., 2015.
3. Java Tutorial: A Short Note on Basics - Sharon Biocca Zakhour, Soumya Kannan, Raymond Gallardo – Fifth Edition, Oracle Corp, 2012.
4. Object Oriented Programming using Java – Simon Kendal, First Edition, 2009.
5. Java: The fundamentals of Objects and Classes–David Etheridge, First Edition, 2009.

**Web Links:**

1. <http://www.programmingtutorials.com/java.aspx>
2. <http://www.javacodegeeks.com>
3. <http://java.sun.com/developer/onlineTraining/>
4. <http://java.sun.com/learning>
5. <http://www.kodejava.org>

## ADVANCED DATA STRUCTURES LAB

(Common to CSE & IT)

### III Semester

Course Code: 191CS3L02

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

### Course Objectives:

- COB 1: To impart knowledge on Dictionaries using hashing techniques.
- COB 2: To demonstrate the basic operations on Binary Tree and Binary Search Tree.
- COB 3: To enable the students to learn about AVL tree, B-tree and Binary heap.
- COB 4: To make students to learn Graphs and Pattern Matching Techniques.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Identify the appropriate data structure for a given problem.
- CO 2: Implement Dictionary by using hashing techniques.
- CO 3: Analyze the efficiency of basic operations of AVL tree and B-Tree.
- CO 4: Build a Binary Heap using Priority queues.
- CO 5: Apply the concepts of graphs and pattern matching in real world applications.
- CO 6: Organize all the laboratory experiments in the form of report.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	3	3	-	-	-	-	-	-	-	-	-
CO2 (K3)	3	3	3	-	3	-	-	-	-	-	-	-
CO3 (K4)	3	3	3	-	3	-	-	-	-	-	-	-
CO4 (K3)	3	3	3	-	-	-	-	-	-	-	-	-
CO5 (K3)	3	3	3	-	-	3	-	-	-	-	-	1
CO6 (K2)	-	-	-	-	-	-	-	-	-	3	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	3	-
CO2 (K3)	2	-	3
CO3 (K4)	-	-	-
CO4 (K3)	-	-	-
CO5 (K3)	2	3	3
CO6 (K2)	-	--	-

### List of Experiments:

- Develop a Program to implement Functions of Dictionary using Hashing (division method, digit folding and mid square method).
- Develop a Program to implement Collision Resolution Techniques (Linear Probing, Quadratic Probing and Double Hashing) in Hash Table.
- Develop a Program to implement Binary Tree traversals.
- Develop a Program to insert into and delete an element from Binary Search Tree.
- Develop a Program to perform binary heap operations.
- Develop a Program to perform AVL tree operations.
- Develop a Program to perform B-tree operations.
- Develop a non recursive Program to implement Depth First Search.
- Develop a non recursive Program to implement Breadth First Search.

10. Develop a Program to generate a min-cost spanning tree using Kruskal's algorithm.
11. Develop a Program to generate a min-cost spanning tree using Prim's algorithm.
12. Develop a Program to implement Knuth-Morris-Pratt Algorithm for Pattern Matching.

### List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

13. Bheem promised all his friends that if he won the tournament so he will give ladoos. But he knew that he can afford only one laddoo per day. If he is unable to give laddoo to any of his friend he will loose his friendship with them (if more than one his friend demanded for laddoo on same day). As he has won the tournament now he has to give ladoos to his friends. Now your task is to tell how many friends he will be able to save.

#### INPUT:

The first line consists of number of friends of Bheem.

The second line consists of an array A, which represents the which friend asked for laddoo on which day.

#### Example:

5

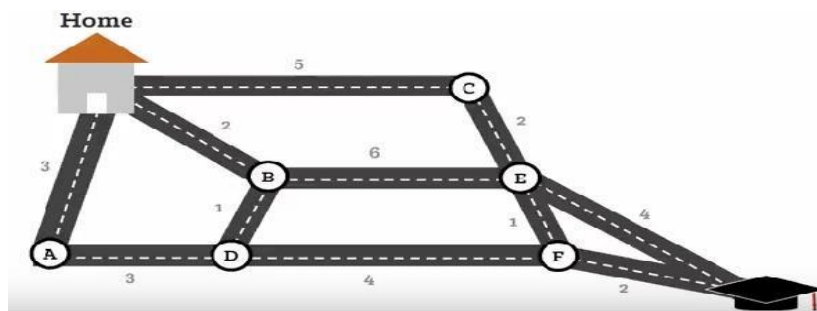
3 3 1 2 4

#### OUTPUT:

4

14. Suppose a student wants to go from home to school in the shortest possible way. She knows some roads are heavily congested and difficult to use, this means the edge has a large weight--the shortest path tree found by the algorithm will try to avoid edges with larger weights.

Find the shortest path from home to school in the following graph.



15. Write a program to design a priority queue which is maintained as a set of queue (assume a maximum of 3 queues). The elements are inserted based upon the given priority. The deletion of an element is to be done starting from the 1st queue, if it is not empty. If it is empty, the elements from the 2nd queue will be deleted & so on.
16. Write a program to count number of occurrences of a word in a given text.

### Reference Books:

1. Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.
2. How to Solve it By Computer, R.G.Dromey, 1<sup>st</sup> edition Paperback – 2006, Pearson.
3. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, and J. D. Ullman, Pearson, 2002.
4. Advanced Data Structures: An Algorithmic Approach with C++, 1<sup>st</sup> edition (English, Paperback, Ikvinderpal Singh).
5. Data structures and algorithms in C++, 3<sup>rd</sup> edition, Adam Drozdek, Cengage Learning, 2008.

**Web Links:**

1. <https://ocw.mit.edu/courses/...and.../6-006-introduction-to-algorithms-spring-2008/>
2. <https://www.hackerearth.com/practice/algorithms/graphs/graph-representation/tutorial/>
3. <https://www.cs.purdue.edu/cgvlab/courses/251/lectures/slides/04.03-PatternMatchingAndTries.pdf>
4. <https://www.csie.ntu.edu.tw/~ds/ppt/ch5/chapter5.PPT>
5. <https://www.coursera.org/specializations/data-structures-algorithm>
6. <https://in.udacity.com/course/intro-to-algorithms--cs215>

**EMPLOYABILITY SKILLS-I**

(Common to all branches)

**III Semester****Course Code: 191MC3A03**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

**Course Objectives:**

- COB 1: To provide necessary training to impart employability skills.  
 COB 2: To Prepare Students for Campus Placements.  
 COB 3: To Improve Confidence, Decision Making in Career planning.  
 COB 4: To Achieve Life Goals with Proper Time Management.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Analyze the number and letter series techniques in different models.  
 CO 2: Differentiate Career Objectives & Goals.  
 CO 3: Compare the different types of number and letter analogy models.  
 CO 4: Transfer the different models of coded elements to decoded elements  
 CO 5: Illustrate Out Of Box thinking in Students.  
 CO 6: Solve L.C.M & H.C.F, Simple Equations by using simple logics.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO 1(K4)	-	-	-	-	-	-	-	-	-	-	-	2
CO 2(K2)	-	-	-	-	-	-	-	-	-	2	-	2
CO 3(K2)	-	-	-	-	-	-	-	-	-	-	-	2
CO 4(K3)	-	-	-	-	-	-	-	-	-	-	-	2
CO 5(K3)	-	-	-	-	-	-	-	-	-	2	-	2
CO 6(K3)	-	-	-	-	-	-	-	-	-	-	-	2

**Mapping of course outcomes with program Specific Outcomes:**

CO/ PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO 1(K4)	-	-	-
CO 2(K2)	-	-	-
CO 3(K2)	-	-	-
CO 4(K3)	-	-	-
CO 5(K3)	-	-	-
CO 6(K3)	-	-	-

**UNIT-I:****Aptitude:** Number series.**Soft Skills:** Attitude, SWOT analysis, self-confidence, self esteem.**UNIT-II:****Aptitude:** Number Analogy.**Soft Skills:** Decision Making, Situation Reaction Test.**UNIT-III:****Aptitude:** Letter series, Letter Analogy, Coding & Decoding.**Soft Skills:** Verbal Aptitude-I, synonyms, Antonyms, Spotting of errors.**UNIT-IV:****Aptitude:** Divisibility Rules, L.C.M&H.C.F.**Soft Skills:** Creativity, Out of box thinking, lateral thinking.

**UNIT-V:**

**Aptitude:** Simple Equations.

**Soft Skills:** Goal setting, Smart goals, Time Management.

**Text Books:**

1. A Modern Approach to Verbal & Non-Verbal Reasoning- Dr. R.S. Aggarwal, S CHAND.
2. Quantitative Aptitude - Dr. R.S. Aggarwal, S CHAND.
3. Quick Learning Objective General English – Dr. R.S. Aggarwal, S CHAND.

**Reference Books:**

1. General Intelligence and Test of Reasoning- S CHAND.
2. Logical Reasoning –Arun Sharma, Mc Graw Hill Publications.
3. Quantitative Aptitude - Abhijit Guha Mc Graw Hill Publications.
4. Quantitative Aptitude–Arun Sharma, Mc Graw Hill Publications.
5. A New Approach to Objective English -R.S. Dhillon DGP Publications.

**Web Links:**

1. [www.indiabix.com](http://www.indiabix.com)
2. [www.bankersadda.com](http://www.bankersadda.com)

## ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

(Common to all branches)

**III Semester**
**Course Code: 191MC3A04**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

### Course Objectives:

- COB 1: To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
- COB 2: To make the students understand the traditional knowledge and analyse it and apply it to their day to day life.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Identify the concept of Traditional knowledge and its importance.
- CO 2: Explain the need and importance of protecting traditional knowledge.
- CO 3: Illustrate the various enactments related to the protection of traditional knowledge.
- CO 4: Interpret the concepts of Intellectual property to protect the traditional knowledge.
- CO 5: Explain the importance of Traditional knowledge in Agriculture and Medicine.

### Mapping of course outcomes with program outcomes:

CO / PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO 1 (K3)	-	-	-	-	-	-	-	-	-	-	-	-
CO 2 (K3)	-	-	-	-	-	-	-	-	-	-	-	-
CO 3 (K3)	-	-	-	-	-	-	-	-	-	-	-	-
CO 4 (K3)	-	-	-	-	-	-	-	-	-	-	-	-
CO 5 (K3)	-	-	-	-	-	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO1 (K3)	PSO2 (K3)	PSO3 (K2)
CO 1 (K3)	-	-	-
CO 2 (K3)	-	-	-
CO 3 (K3)	-	-	-
CO 4 (K3)	-	-	-
CO 5 (K3)	-	-	-

### UNIT-I:

**Introduction to traditional knowledge:** Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge.

### UNIT-II:

**Protection of traditional knowledge:** The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

### UNIT-III:

#### Legal framework and TK:

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill,



**UNIT-IV:**

**Traditional knowledge and intellectual property:** Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge.

**UNIT-V:**

**Traditional Knowledge in Different Sectors:**

Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

**Text Books:**

1. Traditional Knowledge System in India, by Amit Jha, 2009.

**Reference Books:**

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.
2. "Knowledge Traditions and Practices of India" Kapil Kapoor<sup>1</sup>, Michel Danino<sup>2</sup>.

**Web Links:**

1. <https://www.youtube.com/watch?v=LZP1StpYEPM>
2. <http://nptel.ac.in/courses/121106003/>

## PROBABILITY AND STATISTICS

(Common to CSE & IT)

IV Semester

Course Code: 191BS4T18

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To familiarize the students with the foundations of probability and statistical methods.
- COB 2: To help the student acquire a necessary base to develop analytical and design skills.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Compute mean, median, mode, standard deviation and variance.
- CO 2: Apply various Probability distributions for both discrete and continuous random variables.
- CO 3: Compute mean and variance of sample means with replacement and without replacement and estimating maximum errors.
- CO 4: Apply various tests to test the hypothesis concerning mean, Proportion, variance.
- CO 5: Apply the concepts of correlation and regression to the given statistical data.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO2 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO3 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO4 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	3	2	-	-	-	-	-	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes**

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	-	-
CO2 (K3)	-	-	-
CO3 (K3)	-	-	-
CO4 (K3)	-	-	-
CO5 (K3)	-	-	-

**UNIT -I****Descriptive statistics and methods for data science:**

Data science – Statistics Introduction – Population vs Sample – Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability (spread or variance).

**UNIT- II****Probability and Distributions:**

Probability – Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

**UNIT- III****Sampling Theory:**

Aditya Engineering College (A)

Introduction – Population and samples – Sampling distribution of Means and Variance – Central limit theorem (without proof)-Point and Interval estimations – Maximum error of estimate.

#### **UNIT-IV**

##### **Tests of Hypothesis:**

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Tests concerning one mean and two means (Large and Small samples) – Tests on proportions,  $\chi^2$  and F distributions.

#### **UNIT-V**

##### **Correlation and Regression:**

Method of least squares – Straight line - nonlinear curves– parabola -Exponential – Power curves-Correlation – Karl pearson's correlation coefficient – rank correlation – regression-- regression coefficients and properties (without proof) –regression lines.

##### **Text Books:**

1. Probability and Statistics for Engineers, Miller and Freund's, 7/e, Pearson,2008.
2. Fundamentals of Mathematical Statistics, S. C. Gupta and V.K. Kapoor, 11/e, Sultan Chand & Sons Publications, 2012.
3. Probability, Statistics and Random Processes, Murugesan, Anuradha Publishers, Chennai

##### **Reference Books:**

1. Probability, Statistics and Random processes, T.B. Veeraju, TMH.
2. Probability and statistics by T.K.V. Iyengar, S. Chand publishers.
3. Higher engineering mathematics by John Bird, 5<sup>th</sup> edition Elsevier Limited, 2006.

##### **Web Links:**

1. [https://en.wikipedia.org/wiki/Probability\\_and\\_statistics](https://en.wikipedia.org/wiki/Probability_and_statistics)
2. <http://mathworld.wolfram.com/topics/ProbabilityandStatistics.html>
3. <http://nptel.ac.in/courses/111105041/1>

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## THEORY OF COMPUTATION

### IV Semester

Course Code: 191IT4T01

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To create awareness on the need and importance of automata theory.
- COB 2: To impart knowledge on regular expressions.
- COB 3: To discuss the concept of grammar.
- COB 4: To demonstrate the working and design of various kinds of automaton.
- COB 5: To illustrate the concepts of decidability and undecidability.

### Course Outcomes:

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

- CO 1: Illustrate the concepts of Finite Automaton.
- CO 2: Construct Regular expressions for various problems.
- CO 3: Classify Chomsky Hierarchy of languages.
- CO 4: Compare the powers of different kinds of automaton.
- CO 5: Analyze decidability and undecidability concepts.
- CO 6: Make use of automaton for solving problems in computing.

### Mapping of course outcomes with program outcomes

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO2 (K3)	2	1	-	-	-	2	-	-	-	-	-	-
CO3 (K4)	-	1	-	-	-	-	3	-	-	-	-	-
CO4 (K4)	3	-	-	2	-	3	-	-	-	-	-	-
CO5 (K4)	2	-	-	-	-	2	-	-	-	-	-	-
CO6 (K3)	3	-	1	-	3	-	-	-	-	-	-	-

### Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	2	2	1
CO2 (K3)	2	2	1
CO3 (K4)	2	2	1
CO4 (K4)	3	3	3
CO5 (K4)	2	2	1
CO6 (K3)	3	3	2

### UNIT –I

**Finite Automata:** Motivation for studying Automata Theory. Finite Automaton, various representations of a finite Automaton, Acceptance of a String by a Finite Automaton, DFA, Design of DFAs, Equivalence of finite automata, Minimization of Finite Automaton, Mealy and Moore Machines.

NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transitions, conversion of Finite Automata with E-Transitions to NFA, Applications and Limitation of Finite Automata.

**UNIT -II**

**Regular Expressions:** Operators on Regular expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closure Properties of Regular sets, Applications of Regular Expressions.

**UNIT-III**

**Grammars:** Formal Languages, Classification of Grammars, Chomsky classification, Grammar and Language Inter conversion. Regular Grammar, LLG and RLG, Inter conversion, Finite Automata and Regular Grammars, Inter conversion. Regular Expressions and Regular Grammars, Inter conversion. 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:** 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 , Application of Pushdown Automata.

**UNIT-V**

**Turning Machine:** Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Language of a Turing Machine, Design of Turing Machines, Types of Turing Machines (Generalized and Restricted), Universal Turing Machine, Church's Thesis. Decidable and Un-decidable Problems, Halting Problem of Turing Machines, Post's Correspondence Problem, Modified Post's Correspondence Problem, Closure properties of Recursive and Recursively enumerable Languages, 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, Third Edition, Person, 2008.

**Reference Books:**

1. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekharan, Third Edition, PHI, 2007.
2. Elements of Theory of Computation, H.R. Leis and C.H. Papadimeteru, Prentice Hall Publishers.
3. Introduction to Languages and Theory of Computation, John C Martin, TMH.
4. Automata and Computability, Dexter C. Kohen, Springer Publishers.
5. Introduction to the theory of computation, Michael Sipser, PWS Publishing.

**Web Links:**

1. <http://nptel.ac.in/courses/111103016/>
2. <http://nptel.ac.in/courses/106104148/>
3. <http://www.geeksforgeeks.org/toc-finite-automata-introduction/>
4. <https://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf>
5. <http://www.ics.uci.edu/~goodrich/teach/cs162/notes/>

## PYTHON PROGRAMMING

### (Common to CSE & IT)

IV Semester

Course Code: 191CS4T05

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To facilitate the students, apply control statements and functions in Python Scripts.
- COB 2: To make the students learn lists, tuples and dictionaries in Python
- COB 3: To impart the knowledge on handling functions, modules and standard libraries.
- COB 4: To demonstrate the Object Oriented Concepts.
- COB 5: To enable the students design and develop applications using database connectivity.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Develop programs using fundamental concepts and control statements in python.
- CO 2: Utilize data structures in Python to solve various problems.
- CO 3: Develop programs using functions and Standard libraries like math, turtle, tkinter, re etc. in building real time applications.
- CO 4: Apply Object Oriented Programming concepts and exceptions.
- CO 5: Build various applications using files and database connectivity.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO 11 (K3)	PO 12 (K1)
CO1 (K3)	3	2	2	-	3	-	-	-	-	-	-	-
CO2 (K3)	3	2	2	-	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	2	-	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	2	-	3	-	-	-	-	-	-	-
CO5 (K3)	3	2	2	-	3	-	-	-	-	-	-	-

**Mapping of course outcomes with program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	3	3	-
CO2 (K3)	3	3	-
CO3 (K3)	3	3	-
CO4 (K3)	3	3	-
CO5 (K3)	3	3	-

**UNIT-I:**

**Introduction to Python:** Introduction to Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output. Data Types, and Expression

**Decision Structures and Boolean Logic:** if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops, else clauses in loops.

**UNIT-II:**

**Working with Strings:** Basic string operations, String Formatting, String Methods.

**Lists and Tuples:** Common sequence Operations, Lists, Tuples, Immutable sequences, the tuple function, basic tuple operations.

**Sets:** set methods, comprehensions.

**Dictionaries:** When Indices won't do: dictionary uses, creating and using dictionaries, basic dictionary operations, string formatting with dictionaries, dictionary methods.

**UNIT-III:**

**Functions:** Function Parameters, Local variables, the global statement, Default Argument values, Keyword Arguments, varArgs parameters, the return statement. Anonymous Functions (lambda), Doc strings.

**Modules:** The from import statement, A module's name, Making your own modules, The dir function, packages. Brief Tour of the Standard Library: re, math, date time, random

**UNIT-IV:**

**Object Oriented Programming:** The self, Classes, Methods, The init Method, class and object variables, Inheritance, overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using OOps support.

**Exceptions:** Errors, Exceptions, Handling exceptions, Raising exceptions, Try ... finally, User Defined Exceptions.

**UNIT-V:**

**Files and stuff:** opening files, The basic file methods: reading and writing, piping output, reading and writing lines, closing files, using the basic file methods, Iterating over file contents.

**Graphical User Interfaces:** The Behavior of Terminal Based Programs and GUI – Based, Programs, Coding Simple GUI-Based Programs, Other Useful GUI Resources, turtle, tkinter.

**Database Support:** Working with a Database, Python and SQLite, creating an SQLite DB, creating a table, inserting a record, pulling the data from DB, using where, Update and Delete records.

**Text Books:**

1. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage, 2018.
2. Beginning Python: from Novice to Professional, Lie Hetland, Magnus, 2<sup>nd</sup> Edition, 2005.

**Reference Books:**

1. Introduction to Programming Using Python, Y. Daniel Liang, Pearson, 2017.
2. Think Python, Allen Downey, Green Tea Press, 2012.
3. Learning Python, Mark Lutz, Orielly, 2013.
4. Python for Everybody Exploring Data in Python 3, Charles Russell Severance, SueBlumenberg, 2016.
5. Python Programming: A Modern Approach, Vamsi Kurama, Pearson, 2018.

**Web Links:**

1. <https://www.python.org>
2. <https://www.coursera.org/courses?query=Python%20programming>
3. <https://www.learnPython.org/>
4. [https://www.tutorialspoint.com/python3/python\\_tutorial.pdf](https://www.tutorialspoint.com/python3/python_tutorial.pdf)
5. <http://www.geeksforgeeks.org/Python/>

## DESIGN AND ANALYSIS OF ALGORITHMS

### (Common to CSE & IT)

IV Semester

Course Code: 191CS4T06

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To enable the students know the importance of algorithm and pseudocode.
- COB 2: To make the students learn about recursive and non-recursive paradigms of an algorithm.
- COB 3: To facilitate the students in measuring the performance of an algorithm in terms of space and time complexity.
- COB 4: To create awareness on different problem solving strategies.
- COB 5: To impart the knowledge on principle of optimality.
- COB 6: To make the students learn select the optimal solution for a set of problems

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Develop algorithms for various computational problems
- CO 2: Apply important algorithmic design paradigms and methods of analysis.
- CO 3: Construct sorting and searching algorithms using Divide and Conquer approach.
- CO 4: Compare the benefits of using Dynamic programming over Greedy method.
- CO 5: Solve problems using Backtracking and Branch & Bound techniques

**Mapping of course outcomes with Program Outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	2	1	1	3	-	-	-	3	-	-	-
CO2 (K3)	3	2	1	2	-	3	-	-	-	3	-	-
CO3 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO4 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO5 (K4)	3	3	2	2	3	-	-	-	-	-	-	-

**Mapping of course outcomes with Program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	3	3	2
CO2 (K3)	3	3	-
CO3 (K3)	3	3	3
CO4 (K4)	-	-	-
CO5 (K4)	-	-	-

**UNIT-I**

**Introduction:** What is an Algorithm, Algorithm Specification, Performance Analysis, Space Complexity, Time Complexity, Amortized analysis, Asymptotic Notations, Performance measurement.

**UNIT-II**

**Divide and Conquer:** General Method, Defective chess board, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort.

**UNIT-III**

**The Greedy Method:** The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithms, An Optimal Randomized Algorithm, Optimal Merge Patterns, Single Source Shortest Paths.



**UNIT-IV**

**Dynamic Programming:** General method, Applications- Matrix chain multiplication, Single – Source Shortest Path Problem with general weights, All - Pairs Shortest Paths, String Editing, 0/1-Knapsack, Reliability Design, Travelling Sales Person problem.

**UNIT-V**

**Backtracking:** The General Method, 8-Queens Problem, Sum of Subsets, Graph coloring problem, Hamiltonian Cycles.

**Branch and Bound:** The Method, Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem, LC Branch-and Bound Solution, Traveling Sales Person.

**Text Books:**

1. Fundamentals of computer algorithms, E. Horowitz, S. Sahni, 2nd Edition, University Press, 2015.
2. Introduction to Algorithms, Thomas H. Cormen, 3rd Edition, PHI Learning, 2009.

**Reference Books:**

1. The Algorithm Design Manual, Steven S. Skeina, 2nd Edition, Springer, 2008.
2. Introduction to the Design & Analysis of Algorithms, Anany Levitin, 2nd Edition, Pearson Education, 2007.
3. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, 1st Edition, Pearson Education, 1974.
4. Algorithm Design, Jon Kleinberg, 1st Edition, Pearson Education, 2005.
5. The Design and Analysis of Algorithms, Dexter C. Kozen, 1st Edition, Springer-Verlag, 1990.

**Web Links:**

1. [https://onlinecourses.nptel.ac.in/noc20\\_cs71/preview](https://onlinecourses.nptel.ac.in/noc20_cs71/preview)
2. [https://onlinecourses.nptel.ac.in/noc20\\_cs93/preview](https://onlinecourses.nptel.ac.in/noc20_cs93/preview)
3. <https://www.coursera.org/lecture/delivery-problem/branch-and-bound-UyBJC>
4. <https://www.coursera.org/lecture/advanced-algorithms-and-complexity/3-sat-backtracking-2fbII>
5. <http://anh.cs.luc.edu/363/references.html>

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## INTERNET OF THINGS (Common to CSE & IT)

**IV Semester**  
**Course Code: 191ES4T15**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To present interconnection and integration of the physical world and the cyber space.
- COB 2: To demonstrate Communication and Connectivity in Internet of Things.
- COB 3: To introduce communication protocols used in Internet of Things
- COB 4: To impart knowledge of analytics and computing in Internet of Things.

### Course Outcomes:

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

- CO 1: Describe the usage of the term 'the internet of things' in different contexts.
- CO 2: Illustrate diversified layered architectures and design principles for IoT/M2M.
- CO 3: Discover the various network protocols used in IoT.
- CO 4: Define the role of big data, cloud computing and data analytics in a typical IoT system.

### Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K4)	2	2	1	-	-	1	1	-	-	-	-	-
CO2 (K2)	2	2	1	-	-	-	-	-	-	-	-	-
CO3 (K4)	1	2	-	-	-	-	-	-	-	-	-	-
CO4 (K3)	1	2	-	-	-	-	-	-	-	-	-	-

### Mapping of Course Outcomes with Program Outcomes:

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K4)	1	1	-
CO2 (K2)	1	-	-
CO3 (K4)	-	-	1
CO4 (K3)	-	1	1

### 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, Design Principles For Connected Devices

### UNIT-II

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.

### UNIT-IV

Data link layer of IoT, Wireless Communication Technologies, Wired Communication Technologies, Manet Networks: Network Layer of IoT, 6lowPAN adaptation layer for devices with limited resources, Dynamic routing protocols for wireless adhoc networks Communication protocols for IoT, Service oriented protocol(COAP), Communication protocols based on the exchange of messages(MQTT), Service discovery protocols.

**UNIT-V**

Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/ Services/ Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

**Text Books:**

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education.
2. Vijay Madiseti, Arshdeep Bahga, Internet of Things A Hands-On- Approach, 2014.

**References Books:**

1. An Introduction to Internet of Things, Connecting devices, Edge Gateway and Cloud with Applications, Rahul Dubey, Cengage, 2019. Adrian McEwen, Designing the Internet of Things, Wiley Publishers, 2013.
2. IoT Fundamentals, Networking Technologies, Protocols and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetette, rob Barton, Jerome Henry, CISCO, Pearson, 2018.
3. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley.

**Web Links:**

1. [https://onlinecourses.nptel.ac.in/noc18\\_cs46/preview](https://onlinecourses.nptel.ac.in/noc18_cs46/preview)
2. <https://swayam.gov.in/courses/public?keyword=Introduction%20to%20internet%20of%20things>
3. <https://swayam.gov.in/courses/public?keyword=Design%20for%20internet%20of%20things>
4. <https://www.coursera.org/specializations/iot>

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## COMPUTER ORGANIZATION

(Common to CSE & IT)

IV Semester

Course Code:191CS4T07

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To make the students understand the Principles and the Implementation of Computer Arithmetic
- COB 2: To discuss the Operation of CPUs including RTL, ALU, Instruction Cycle and Buses
- COB 3: To make the students aware of the Fundamentals of different Instruction Set Architectures and their relationship to the CPU Design
- COB 4: To describe Memory System and I/O Organization
- COB 5: To illustrate the Principles of Operation of Multiprocessor Systems and Pipelining.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Describe the basic structure of a computer system, various number systems and arithmetic operations.
- CO 2: Explain the Operation of CPUs including RTL, ALU, Instruction Cycle and Buses
- CO 3: Demonstrate the architecture and functionality of central processing unit
- CO 4: Illustrate the I/O and memory organization in an efficient way.
- CO 5: Make use of multi processors and pipelining to improve the efficiency of computer system.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO 11 (K3)	PO 12 (K1)
CO1 (K2)	2	3	3	-	2	-	-	-	-	-	-	-
CO2 (K2)	2	3	-	-	2	-	-	-	-	-	-	-
CO3 (K2)	3	2	1	-	2	-	-	-	-	-	-	-
CO4 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO5 (K3)	3	2	-	-	3	-	-	-	-	-	-	-

**Mapping of course outcomes with program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	2	2	3
CO2 (K2)	2	2	3
CO3 (K2)	2	2	3
CO4 (K2)	2	2	3
CO5 (K3)	3	3	2

**UNIT-I**

**Basic Structure of Computers:** Basic Organization of Computers, Historical Perspective, Bus Structures. Data Representation: Data types, Complements, Fixed Point Representation. Floating – Point Representation. Other Binary Codes, Error Detection Codes. Computer **Arithmetic:** Addition and Subtraction, Multiplication Algorithms, Division Algorithms.

**UNIT-II**

**Register Transfer Language and Microoperations:** 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, Complete Computer Description,

### UNIT-III

**Central Processing Unit:** General Register Organization, STACK Organization. Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

**Microprogrammed Control:** Control Memory, Address Sequencing, Micro Program example, Design of Control Unit.

### UNIT-IV

**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

**Input-Output Organization:** Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct Memory Access.

### UNIT-V

**Multi Processors:** Introduction, Characteristics of Multiprocessors, Interconnection Structures, Inter Processor Arbitration.

**Pipeline:** Parallel Processing, Pipelining, Instruction Pipeline, RISC Pipeline, Array Processor.

### Text Books:

1. Computer System Architecture, M. Morris Mano, Third Edition, Pearson, 2008.
2. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 5/e, McGraw Hill, 2002.

### Reference Books:

1. Computer Organization and Architecture, William Stallings, 6/e, Pearson, 2006.
2. Structured Computer Organization, Andrew S. Tanenbaum, 4/e, Pearson, 2005.
3. Fundamentals of Computer Organization and Design, Sivarama P. Dandamudi, Springer, 2006

### Web Links:

1. <https://nptel.ac.in/courses/106/105/106105163/>
2. <https://nptel.ac.in/courses/106/106/106106092/>
3. <https://www.udemy.com/course/computer-architecture-computer-organization-course/>
4. <http://www.cuc.ucc.ie/CS1101/David%20Tarnoff.pdf>

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## PYTHON PROGRAMMING LAB

### (Common to CSE & IT)

**IV Semester**  
**Course Code: 191CS4L03**

**L T P C**  
**0 0 3 1.5**

#### Course Objectives:

- COB 1: To enable the students apply basic concepts and Control Structures in python.
- COB 2: To train students utilize data structures and associated methods in Python.
- COB 3: To make the students learn the fundamentals of standard Python libraries.
- COB 4: To impart the knowledge on Object Oriented Concepts.
- COB 5: To illustrate the concepts of files and database connectivity.

#### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Develop python programs using conditional and iterative statements.
- CO 2: Make use of different data structures in solving problems.
- CO 3: Apply standard libraries in building real time applications.
- CO 4: Implement the Object Oriented concepts in Python for solving problems.
- CO 5: Design an application using database connectivity.

#### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	2	1	-	3	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	-	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	-	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO5 (K5)	3	3	3	-	3	-	-	-	-	-	-	-

#### Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	3	3	-
CO2 (K3)	3	3	-
CO3 (K3)	3	3	-
CO4 (K3)	3	3	-
CO5 (K5)	3	3	-

#### List of Experiments:

##### 1) Basic Programs

- 1.1) Running instructions in Interactive interpreter and a Python Script
- 1.2) Implement a python script to purposefully raise Indentation Error and Correct it.

##### 2) Operations

- 2.1) Implement a python script to compute distance between two points taking inp from the user (Pythagorean Theorem).
- 2.2) Implement a python script add.py that takes 2 numbers as command line arguments and perform arithmetic operations on them.

##### 3) Control Flow

- 3.1) Implement a python script for checking whether the citizen is eligible for vote or not.
- 3.2) Implement a python script using for loop that loops over a sequence.
- 3.3) Implement a python script that prompts the user for a number, and prints that number in words. Example: Input :453 Output :Four Five Three  
 Input :1000 Output :One Zero ZeroZero.

**4) Control Flow Continued**

- 4.1) Find the sum of all the prime numbers up to two million.
- 4.2) 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.

**5) Data Structure**

- 5.1) Implement a python script to count frequency of characters in a given string.
- 5.2) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.
- 5.3) Implement a python script to count number of words in a string and reverse each word in a string at the same location. Example:  
Input :Honesty is the best policy  
Output :5 ytseno Hsiehttsebycilop.

**6) Data Structure -Continued**

- 6.1) Write a program combine\_lists that combines these lists into a dictionary.
- 6.2) Implement a Python script to rotate list of elements towards right up to given number of times. Example: Input: [23,34,9,45,19] and 2 (Hint: 2 indicates No. of times to rotate) Output: [45,19,23,34,9]
- 6.3) Write a python script to perform following operations:
  - i. Create a matrix and print it.
  - ii. Perform Addition of 2 matrices.
  - iii. Perform multiplication of 2 matrices.

**7) Functions**

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

**8) Functions Continued**

- 8.1) Write a function cumulative\_product to compute cumulative product of a list of numbers.
- 8.2) Write a function reverse to reverse a list, without using the reverse function.
- 8.3) Write a function to compute GCD, LCM of two numbers. Each function shouldn't exceed one line.

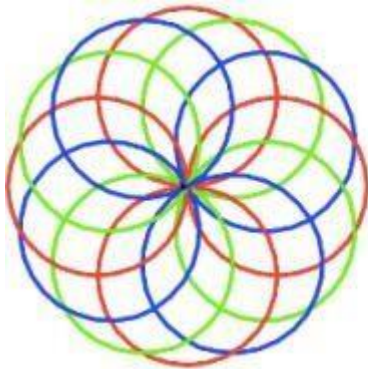
**9) OOP & Exception Handling**

- 9.1) Implement a Python script to illustrate constructor.
- 9.2) Implement a Python script on Class variables, instance variable and illustration of the self variable for
  - i) Robot ii) ATM Machine
- 9.3) Implement a Python script to handle exceptions.

## 10) GUI Graphics

10.1) Write a GUI for an Expression Calculator using tk.

10.2) Implement a python script to implement the following figures using turtle



## 11) Files

11.1) Implement a python script to print each line of a file in reverse order.

11.2) Implement a python script to compute the number of characters, words and lines in a file.

11.3) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

## 12) Database Connectivity

Implement a Python script to.

12.1) create table in database

12.2) insert record into a table in database.

12.3) select records from the table in a database.

12.4) update data in a database table.

## List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

13. Write a recursive python function which returns True if the input is well- formatted with respect to the list labels. Else it should return False. An input is a well-formatted with respect to the labels, if it follows below conditions:

- (a) input item is a list
- (b) input item has length at least two
- (c) input's first item is in the list labels
- (d) each of the remaining items in input is either a string or a well- formatted list

Refer the below table for possible of input items

Sample input		Expected output
input item	list label	
['VP', ['V', 'eat']]	['VP', 'V']	TRUE
['NP', ['N', 'a', 'or', 'b'], 'c']	['NP', 'V', 'N']	TRUE
[1, [2, 'oui', [1, 'no']], 'no']	[1,2]	TRUE
['VP', ['V', 'eat']]	['VP']	FALSE
['VP', ['V']]	['VP', 'V']	FALSE

14. Write a program to find sum of digits of a number till you get single digit sum. Example: Input :142 (Hint: 1+4+2=7) Ouput :7 Input :4683 (Hint: 4+6+8+3=21 =>2+1=3) Ouput :3.

15. Write a program to count how many times each word present in a file.



16. Write a python program to connect to mysql database and perform the following operations.
  - i. create table in database.
  - ii. insert record into a table in database.
  - iii. select records from the table in a database.
  - iv update data in a database table.

**Reference Books:**

1. Python for Everybody Exploring Data in Python 3, Charles Russell Severance, Sue Blumenberg.
2. Learning Python, Mark Lutz, Orielly..

**Web Links:**

1. <https://www.hackerrank.com/>
2. <https://www.codechef.com/>
3. <https://www.topcoder.com/>
4. <https://code-cracker.github.io/> \*
5. <https://www.coursera.org/specializations/python>

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## INTERNET OF THINGS LAB

(Common to CSE & IT)

IV Semester

Course Code:191ES4L17

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Objectives:**

- COB 1: To facilitate students the knowledge of various development boards.
- COB 2: To demonstrate working of analog and digital sensors to control actuators.
- COB 3: To introduce communication protocols used in Internet of Things.
- COB 4: To impart knowledge of analytics and computing, develop applications in Internet of Things.
- COB 5: To make students familiar designing the various prototypes in IoT.

**Course Outcomes:**

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

- CO 1: Choose the sensors and actuators for an IoT application.
- CO 2: Select protocols for a specific IoT application.
- CO 3: Utilize the cloud platform and APIs for IoT application.
- CO 4: Experiment with embedded boards for creating IoT prototypes.
- CO 5: Design a solution for a given IoT application.

**Mapping of Course Outcomes with Program Outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K1)	3	-	2	-	2	1	-	-	-	-	-	-
CO2 (K1)	2	-	2	-	2	1	-	-	-	-	-	-
CO3 (K2)	2	-	3	1	2	1	-	-	-	-	-	-
CO4 (K3)	2	1	3	1	2	1	-	-	-	-	-	2
CO5 (K6)	2	1	3	1	2	1	2	-	-	-	-	2

**Mapping of Course Outcomes with Program Outcomes:**

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K1)	2	-	-
CO2 (K1)	2	-	-
CO3 (K2)	2	-	2
CO4 (K3)	1	-	2
CO5 (K6)	1	1	2

**List of Experiments:**

- Study of active and passive sensors: Light, Temperature and Humidity, Force, Pressure, Speed, Sound etc.
- Study of Arduino, Raspberry Pi, Beagle Bone.
- Select any one development board (Ex. Arduino or Raspberry Pi) to control LED and motor.
- Demonstrate the working of temperature and humidity sensor, level sensor, moisture sensor, distance sensor.
- Using the same board as in (3), read data from a sensor. Experiment with both analog and digital sensors.
- Write a program to Control any two actuators connected to the development board using Bluetooth.
- Implement Socket communication to Read data from sensor and send it to a requesting client.

Note: The client and server should be connected to same local area network.

8. Create any cloud platform account, explore IoT services and register a thing on the platform.
9. Write a program to push sensor data to cloud.
10. Write a program to Control an actuator through cloud.
11. Access the data pushed from sensor to cloud and applies any data analytics or visualization services.
12. Identify a problem in your local area or college which can be solved by integrating the things you learned so far and create a prototype to solve it (Mini Project).

### List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

13. **Lighting as a service:** Smart Lightening for smart homes and smart cities helps in saving energy by adapting the lighting to ambient conditions and switching on/off or dimming the lights when needed.  
Simulate the energy savings environment with LED lights or IP enabled lights or any other variants by monitoring human movements and their environments and controlling the lights accordingly.
14. **Intelligent Traffic systems:** Smart cities have vital aspects in relation with sub domains like smart parking, surveillance, emergency response and many more. Among all, smart traffic systems or intelligent traffic systems are one such critical infrastructure needed. Design an automated environment that controls vehicle traffic on busy roads. Also include the emergency control and response mechanisms (like ambulance) at signal posts.
15. **Smart Parking:** Finding a parking space during rush hours in crowded cities can be time consuming and frustrating.  
Design a prototype smart parking system based on sensor technology with anyone of the following features: Space allocation or remote parking monitoring or automated guidance.
16. **Air Pollution Monitoring:** IoT based air pollution monitoring systems can monitor emission of harmful gases like CO<sub>2</sub>, CO, NO etc by factories and automobiles.  
Simulate an environment with help of any gaseous or meteorological sensors that checks level of gases in the air and specify whether it is dangerous or not.

### Reference Books:

1. An Introduction to Internet of Things, Connecting devices, Edge Gateway and Cloud with Applications, Rahul Dubey, Cengage, 2019. Adrian McEwen, Designing the Internet of Things, Wiley Publishers, 2013
2. IoT Fundamentals, Networking Technologies, Protocols and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetette, rob Barton, Jerome Henry, CISCO, Pearson, 2018.
3. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley.

### Web Links:

1. <https://iotify.io/iot-virtual-lab/>
2. [https://onlinecourses.nptel.ac.in/noc18\\_cs46/preview](https://onlinecourses.nptel.ac.in/noc18_cs46/preview)
3. <https://www.electronicsforu.com/electronics-projects/internet-of-things-iot>
4. <https://www.coursera.org/specializations/iot>
5. <http://ledworldmag.com/issue/iot-lighting-ecosystem-making/>
6. <https://www.edureka.co/iot-certification-training>

## EMPLOYABILITY SKILLS-II

(Common to all branches)

**IV Semester**  
**Course Code: 191MC4A05**

**L T P C**  
**0 0 2 0**

### Course Objectives:

- COB 1: To Teach Empathy For Solving Complex Problems.
- COB 2: To Inculcate Reading Skills.
- COB 3: To Teach Competitive Written English
- COB 4: To Teach Team Building & Leadership Skills.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Examine the symbols, notations and Venn -diagrams.
- CO 2: Explain Empathy to Create Positive.
- CO 3: Observe Different Types Of Number Systems.
- CO 4: Deduct the logics in the puzzles and arrangements.
- CO 5: Solve Ratio & Proportion, Ages, and Averages By Using Simple Logics.
- CO 6: Correlate Teambuilding & Leadership Skills.

### Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO 1(K4)	-	-	-	-	-	-	-	-	-	-	-	2
CO 2(K3)	-	-	-	-	-	-	-	-	-	2	-	2
CO 3(K2)	-	-	-	-	-	-	-	-	-	-	-	2
CO 4(K5)	-	-	-	-	-	-	-	-	-	-	-	2
CO 5(K3)	-	-	-	-	-	-	-	-	-	2	-	2
CO 6(K4)	-	-	-	-	-	-	-	-	-	-	-	2

### Mapping of Course Outcomes with Program Specific Outcomes

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO 1(K4)	-	-	-
CO 2(K3)	-	-	-
CO 3(K2)	-	-	-
CO 4(K5)	-	-	-
CO 5(K3)	-	-	-
CO 6(K4)	-	-	-

### UNIT-I

**Aptitude:** Symbols & Notations, Direction test.

**Soft Skills:** Team work, leadership skills.

### UNIT-II

**Aptitude:** Venn Diagrams, Blood Relations.

**Soft Skills:** Negotiation skills, persuasion & Negotiation, stages of Negotiation.

### UNIT-III

**Aptitude:** Problems on Numbers.

**Soft Skills:** Listening skills, types of listening, Active listening.

### UNIT-IV

**Aptitude:** Ratio & proportion.

**Soft Skills:** Verbal Aptitude -II, Idioms & phrases.

**UNIT-V**

**Aptitude:** Average and Ages.

**Soft Skills:** Verbal Aptitude -III, sentence Anagram, Reading Comprehension.

**Text Books:**

1. A Modern Approach to Verbal & Non-Verbal Reasoning- Dr. R.S. Aggarwal , S CHAND.
2. Quantitative Aptitude - Dr. R.S. Aggarwal , S CHAND.
3. Quick Learning Objective General English – Dr. R.S. Aggarwal , S CHAND.

**Reference Books:**

1. General Intelligence and Test of Reasoning- S CHAND.
2. Logical Reasoning –Arun Sharma, Mc Graw Hill Publications.
3. Quantitative Aptitude - Abhijit Guha Mc Graw Hill Publications
4. Quantitative Aptitude–Arun Sharma, Mc Graw Hill Publications.
5. A New Approach to Objective English -R.S. Dhillon DGP Publications.

**Web Links:**

1. [www.indiabix.com](http://www.indiabix.com)
2. [www.bankersadda.com](http://www.bankersadda.com)

**BIOLOGY FOR ENGINEERS**

(Common to all branches)

**V Semester****Course Code: 191MC4A06**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To introduce students to modern biology with an emphasis on evolution of biology as a multi-disciplinary field.
- COB 2: To make them aware of application of engineering principles in biology, and engineering robust solutions inspired by biological examples

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Apply biological engineering principles, procedures needed to solve real-world problems.
- CO 2: Demonstrate the fundamentals of living things, their classification, cell structure and biochemical constituents.
- CO 3: Apply the concept of plant, animal and microbial systems and growth in real life situations.
- CO 4: Explain genetics and the immune system to know the cause, symptoms, diagnosis and treatment of common diseases.
- CO 5: Demonstrate basic knowledge of the applications of biological systems in relevant industries.

**Mapping of Course Outcomes with Program Outcomes**

CO / PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO 1 (K3)	-	-	-	-	-	-	-	-	-	-	-	-
CO 2 (K2)	-	-	-	-	-	-	-	-	-	-	-	-
CO 3 (K3)	-	-	-	-	-	-	-	-	-	-	-	-
CO 4 (K2)	-	-	-	-	-	-	-	-	-	-	-	-
CO 5 (K2)	-	-	-	-	-	-	-	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes**

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO 1 (K3)	-	-	-
CO 2 (K2)	-	-	-
CO 3 (K3)	-	-	-
CO 4 (K2)	-	-	-
CO 5 (K2)	-	-	-

**UNIT-I****Introduction to life**

Characteristics of living organisms-Basic classification-cell theory-structure of prokaryotic and eukaryotic cell-Introduction to biomolecules: definition-general classification and important functions of carbohydrates-lipids-proteins-nucleic acids vitamins and enzymes-genes and chromosome

**UNIT-II****Biodiversity**

Plant System: basic concepts of plant growth-nutrition-photosynthesis and nitrogen fixation-Animal System: elementary study of digestive-respiratory-circulatory-excretory systems and their functions Microbial System: history-types of microbes-economic importance and control of microbes.

**UNIT-III**

**Genetics and immune system**

Evolution: theories of evolution-Mendel's cell division-mitosis and meiosis-evidence of e laws of inheritance-variation and speciation- nucleic acids as a genetic material-central dogma immunity antigens-antibody-immune response.

**UNIT-IV****Human diseases**

Definition- causes, symptoms, diagnosis, treatment and prevention of diabetes, cancer, hypertension, influenza, AIDS and Hepatitis.

**UNIT-V****Biology and its industrial application**

Transgenic plants and animals-stem cell and tissue engineering-bioreactors- biopharming-recombinant vaccines-cloning-drug discovery-biological neural networks-bioremediation-biofertilizer-biocontrolbiofilters-biosensors-biopolymers-bioenergy-biomaterials-biochips-basic biomedical instrumentation.

**Text Books:**

1. A Text book of Biotechnology, R.C.Dubey, S. Chand Higher Academic Publications, 2013.
2. Diseases of the Human Body, Carol D. Tamparo and Marcia A. Lewis, F.A. Davis Company, 2011.
3. Biomedical instrumentation, Technology and applications, R. Khandpur, McGraw Hill Professional, 2004.

**Reference Books:**

1. Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2011.
2. Cell Biology and Genetics (Biology: The unity and diversity of life Volume I), Cecie Starr, Ralph Taggart, Christine Evers and Lisa Starr, Cengage Learning, 2008.
3. Biotechnology Expanding horizon, B.D. Singh, Kalyani Publishers, 2012.

**Web Links:**

1. <https://www.biology-online.org/>
2. <http://www.biologyreference.com/>
3. <http://www.allexperts.com/browse.cgi?catLvl=2&catID=229>
4. <https://www.library.qmul.ac.uk/subject-guides/biological-sciences>

## COMPILER DESIGN (Common to CSE & IT)

**V Semester****Course Code: 191CS5T08**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To Illustrate different phases of compilation.  
 COB 2: To make the students, learn lexical analysis using finite automata.  
 COB 3: To make the students, learn different parsing techniques.  
 COB 4: To impart the knowledge on semantic analysis and intermediate code generation.  
 COB 5: To discuss on various storage allocation schemes.  
 COB 6: To enable the students to optimize and effectively generate machine code.

**Course Outcomes:**

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

- CO 1: Analyze the different phases in compilation process.  
 CO 2: Identify the similarities and differences among various parsing techniques.  
 CO 3: Construct various forms of intermediate code.  
 CO 4: Explain the role of different types of runtime environments.  
 CO 5: Apply various optimization techniques on intermediate code.  
 CO 6: Develop target optimized code for given intermediate code.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K4)	3	3	-	2	3	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	-	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	-	1	-	-	-	-	-	-	-	-
CO4 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	3	2	-	-	3	-	-	-	-	-	-	-
CO6 (K3)	3	2	-	1	-	-	-	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K4)	-	-	-
CO2 (K3)	-	-	-
CO3 (K3)	-	-	-
CO4 (K2)	2	2	-
CO5 (K3)	3	3	2
CO6 (K3)	3	3	2

**UNIT I:**

**Overview of Language Processing:** Language Processors, Structure of a Compiler.

**Lexical Analysis:** The Role of the Lexical Analyzer - Lexical Analysis Vs. Parsing, Tokens, Patterns and Lexemes, Lexical Errors, Regular Expressions, Regular Definitions, Recognition of Tokens, The Lexical-Analyzer Generator Lex.

**UNIT II:****Syntax Analysis:**

The Role of the Parser, Context Free Grammars- Derivations, Parse Trees, Ambiguity, Left Recursion, Left Factoring, Classification of Parsing Techniques.

**Top-Down Parsing:** Brute-Force Parsing, Recursive-Descent Parsing, First and Follow, LL(1) Grammars, Non recursive Predictive Parsing, Error Recovery in Predictive Parsing.



**UNIT III:****Bottom-Up Parsing:**

Reductions, Handle Pruning, Shift-Reduce Parsing, Why LR Parsers, The LR-Parsing Algorithm, Constructing SLR-Parsing Tables, More Powerful LR Parses - Construction of CLR(1), LALR Parsing Tables, Using Ambiguous Grammars.

**UNIT IV:**

**Semantic Analysis:** Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax Directed Translation.

**Intermediate Code Generation:** Three Address Code – Addresses and Instructions, Quadruples, Triples, Abstract Syntax Trees, Type Checker - Type Expressions, Type Conversion.

**Runtime Environments:** Storage Organization, Stack Allocation of Space, Storage Allocation Strategies – Static Allocation, Stack Allocation and Heap Allocation.

**UNIT V:**

**Code Optimization:** Basic Blocks & Flow Graphs, Machine-Independent Optimizations – The Principal Sources of Optimization: Common Sub expression Elimination, Copy Propagation, Dead-Code Elimination, Code Motion, Induction Variables and Reduction in Strength, DAG Representation.

**Code Generation:** Issues in the Design of a Code Generator, Object Code Forms, The Target Language, A Simple Code Generator, Machine-dependent Optimizations: Peephole Optimization, Register Allocation and Assignment.

**Text Books:**

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, Second Edition, Pearson.

**Reference Books:**

1. Compiler Construction-Principles and Practice, Kenneth C Loudon, Cengage Learning.
2. Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
3. Principles of Compiler Design, Nandhini Prasad, K.S, 3rd Edition, CENGAGE.

**Web Links:**

1. <https://nptel.ac.in/courses/106/108/106108113/>
2. <https://nptel.ac.in/courses/106/104/106104123/>
3. <https://nptel.ac.in/courses/106/104/106104072/>
4. <http://www.cse.iitd.ernet.in/~sak/courses/cdp/slides.pdf>
5. <https://in.udacity.com/course/compilers-theory-and-practice--ud168>

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## COMPUTER NETWORKS (Common to CSE & IT)

**V Semester****Course Code: 191CS5T09**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To make students understand basic concepts of the computer networks, topologies and different reference models (OSI/TCP).
- COB 2: To discuss the design issues of Data link layer.
- COB 3: To impart the knowledge on various medium access techniques
- COB 4: To illustrate the basic concepts of Routing, various routing algorithms and Congestion control techniques
- COB 5: To enable the students learn services of transport layer and application layer.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Explain the computer network fundamentals and various topologies.
- CO 2: Compare the OSI with TCP/IP reference model.
- CO 3: Classify MAC layer protocols and LAN technologies.
- CO 4: Analyze various routing algorithms and Congestion control techniques.
- CO 5: Utilize the services provided by the transport layer and application layer.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO 11 (K3)	PO 12 (K1)
CO1 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO2 (K2)	3	3	2	-	3	-	-	-	-	-	-	-
CO3 (K2)	2	1	1	1	3	-	-	-	-	-	-	-
CO4 (K4)	3	3	-	2	3	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	1	3	-	-	-	-	-	-	-

**Mapping of course outcomes with Program Specific Outcomes:**

CO / PSO	PSO1 (K3)	PSO2 (K3)	PSO3 (K2)
CO1 (K2)	2	2	1
CO2 (K2)	3	3	3
CO3 (K2)	2	2	1
CO4 (K4)	3	3	2
CO5 (K3)	3	3	2

**UNIT-I:**

**Introduction:** Applications of Computer Network, Reference Models: OSI overview and TCP, Example Networks-The Internet, Network Topologies, LAN, WAN, ARPANET, Novel Network.

**Physical Layer:** Fourier Analysis-Bandwidth Limited Signals – The Maximum Data Rate of a Channel – Transmission Media: Guided Media, Unguided Media, Digital Modulation **and** **Multiplexing:** FDM, TDM, SDM, CDM, introduction to switching: Circuit Switched Networks, Packet Switching.

**UNIT-II:**

**Data Link Layer:** Data Link Layer Design Issues-Services Provided to the Network Layer-Framing-Error Control-Flow Control, Error Detection and Correction-Error Correcting Codes-Error Detecting Codes, CRC, Checksum, Elementary Data Link protocols, Sliding Window protocols, Data Link Layer in HDLC.

**UNIT-III:**

**Medium Access Control Sublayer:** ALOHA, CSMA, CSMA/CD, CSMA/CA, Controlled Access: Reservation, Polling, Token Passing, Channelization: frequency division multiple access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA), **IEEE Standards:** Standard Ethernet, Fast Ethernet. IEEE-802.11: Architecture, MAC sub layer, addressing mechanism, frame structure.

**UNIT-IV:**

**Network Layer:** Virtual circuit and Datagram subnet-Network Layer Design Issues, Routing Algorithms: Static routing algorithms-Shortest Path Algorithm- Flooding-Dynamic Routing Algorithms-Distance Vector Routing-Hierarchical Routing-Broadcast Routing-Multicast Routing, Congestion Control Algorithms- General Principles of Congestion prevention policies, Quality of services, Internetworking, Network Layer in the Internet

**UNIT-V:**

**Transport Layer:** Elements of Transport Protocols, Internet Transport Protocols: UDP, TCP.

**Application Layer:** Network Security, DNS, HTTP, SNMP, E-Mail, WWW, Multi Media, Telephony, Satellite Networks, Virtual LANS.

**Text Books:**

1. Computer Networks — Andrew S Tanenbaum and David J Wetherall, 5<sup>th</sup> Edition, Pearson Education, 2011..
2. Data Communications and Networking – Behrouz A.Forouzan, 5<sup>th</sup> Edition, McGraw Hill Education, 2012.

**Reference Books:**

1. An Engineering Approach to Computer Networks-S. Keshav, 2<sup>nd</sup> Edition, Pearson Education.
2. Understanding communications and Networks, W.A. Shay, Thomson, 3<sup>rd</sup> Edition.
3. Computer Networks - A Systems Approach, Larry L. Peterson and Bruce S.Davie, 5<sup>th</sup> Edition, Morgan Kaufmann/ Elsevier.
4. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 6<sup>th</sup> Edition, Pearson Education, 2013.
5. Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press, 2013.

**Web Links:**

1. <https://nptel.ac.in/courses/106/105/106105081/>
2. <https://www.coursera.org/learn/fundamentals-network-communications>
3. <https://nptel.ac.in/courses/106/106/106106091/>
4. <http://www.scribd.com/doc/58478622/Computer-Networks-Forouzan>.
5. <https://in.udacity.com/course/computer-networking--ud436>.

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## DATABASE MANAGEMENT SYSTEMS

### (Common to CSE & IT)

**V Semester****Course Code: 191CS5T10**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To discuss the basic concepts of database systems and its architectures.
- COB 2: To enable the students, learn various data models.
- COB 3: To illustrate the mechanisms involved in normalization of relational databases.
- COB 4: To make use of SQL statements for performing operations on databases.
- COB 5: To impart knowledge on transaction management and concurrency controls.

**Course Outcomes:**

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

- CO 1: Identify the database characteristics and various database architectures.
- CO 2: Interpret relational database using SQL.
- CO 3: Examine issues in data storage and query processing for appropriate solutions.
- CO 4: Make use of normalization techniques to build database system for real world problems.
- CO 5: Illustrate the mechanisms of transaction management.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO 1 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO 2 (K2)	2	1	-	-	-	-	3	-	-	-	-	-
CO 3 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO 4 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO 5 (K2)	2	1	-	-	2	-	3	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO 1 (K3)	3	2	2
CO 2 (K2)	2	2	1
CO 3 (K3)	3	3	2
CO 4 (K3)	3	-	2
CO 5 (K2)	2	2	1

**UNIT-I:**

**Introduction to Databases:** Characteristics of database approach, advantages of using the DBMS approach.

**Overview of Database Languages and Architectures:** Data models, schemas and instances, three schema architecture and data independence, database system environment, centralized and client/server architectures for DBMSs, classification of database management system. SQL: Data Definition,

**Constraints and Basic Queries and Updates:** SQL data definition – DDL commands and data types, specifying constraints in SQL, INSERT, DELETE and UPDATE statements in SQL, basic retrieval queries in SQL.

**UNIT-II:**

**Introduction to Database Design:** Database Design and ER Diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of the E-R Model, Conceptual Design with the ER-Model.

**The Relational Model:** Introduction to the relational model, Integrity constraints over relations, enforcing integrity constraints, querying relational data, Nested Queries, Correlated Queries, logical database design-ER to Relational.

### **UNIT-III:**

**Relational Algebra and Calculus:** Preliminaries, relational algebra, relational calculus, expressive power of algebra and calculus.

**Schema Refinement and Normal Forms:** Introduction to schema refinement, functional dependencies, reasoning about FDs, Normal forms (1NF, 2NF, 3NF and BCNF), properties of decompositions, normalization (decomposition into BCNF and 3NF), schema refinement in database design, other kinds of dependencies.

### **UNIT-IV:**

**Overview of Transaction Management & Concurrency Control: Transaction Management:**

The ACID properties, transactions and schedules, concurrent execution of transactions, lock based concurrency control, performance of locking, and transaction support in SQL, introduction to crash recovery.

**Concurrency Control:**

2PL, serializability and recoverability, introduction to lock management, lock conversions, dealing with deadlocks, specialized locking techniques, concurrency control without locking.

### **UNIT-V:**

**Storage:** Overview of Storages and Indexing, Data on External Storage- File Organization and Indexing –Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based Indexing – Tree-Based Indexing, Comparison of File Organization.

### **Text Books:**

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, 3/e, TMH.

### **Reference Books:**

1. Introduction to Database Systems, CJ Date, Eighth Edition, Pearson Education, 2004.
2. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom Second Edition, Pearson Education, 2009.
3. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel, Seventh Edition, Cengage, 2006.
4. Fundamentals of Database Systems, Elmasri Navathe, Pearson Education, 2015.
5. Database System Concepts, Silberschatz, Korth, Fifth Edition, TMH, 2006.

### **Web Links:**

1. <http://www.nptelvideos.in/2012/11/database-management-system.html>
2. <http://www.geeksforgeeks.org/dbms/>
3. <http://www.oracle.com/technetwork/database/features/plsql/index.html>
4. <http://www.cs.wisc.edu/~dbbook>
5. <https://beginnersbook.com/2015/05/normalization-in-dbms/>

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## OPERATING SYSTEMS (Common to CSE & IT)

V Semester

Course Code: 191CS5T11

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To impart the knowledge on the Operating System structure, services and System calls.
- COB 2: To enable the student learn Process management.
- COB 3: To inculcate the knowledge on process synchronization and deadlocks.
- COB 4: To illustrate the concept of Memory management.
- COB 5: To make the students understand the concepts of Storage management.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Illustrate the basic structure, services, system calls and architectural components of Operating Systems.
- CO 2: Analyze various Process Scheduling algorithms.
- CO 3: Explain Inter Process Communication between the processes and Multi Threading models.
- CO 4: Discuss the Process Synchronization and the principles of deadlock.
- CO 5: Make use of paging and segmentation strategies to allocate memory for the process.
- CO 6: Describe the concepts of file system interface, implementation and disk management.

**Mapping of Course Outcomes with Program Outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO2 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO3 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO4 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	-	-	-	-	-	-	-	-	-
CO6 (K2)	2	1	-	-	2	-	-	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	2	2	1
CO2 (K4)	3	3	3
CO3 (K2)	2	2	1
CO4 (K4)	3	3	3
CO5 (K3)	3	3	2
CO6 (K2)	2	2	1

**UNIT-I:**

**Introduction to Operating System Concepts:** What Operating System do, Operating System Structure, Operating System Operations, Process Management, Memory management, Storage Management, Protection and Security, Computing Environments, Open-Source Operating systems, Operating systems services, System call, Types of System call.

**UNIT-II:**

**Process Management:** Process Concept: The process, Process State, Process control block, Threads, Process Scheduling: Scheduling Queues, Schedulers, Context switch, Operations on Processes, Inter process Communication.

**Process Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

**Multithread Programming:** Overview, Benefits, Multithreading Models.

### **UNIT-III:**

**Synchronization:** Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

**Deadlocks:** System Model, Deadlock Characterization, Methods for handling Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

### **UNIT-IV:**

**Memory Management:** Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory Management: Background, Demand Paging, Page Replacement, Thrashing.

### **UNIT-V:**

**File System Interface:** File concept, Access Methods, Directory and Disk structure, File system mounting, File sharing, protection.

**Implementing File-Systems:** File system structure, File System implementation, Directory Implementation, allocation methods, free-space management.

**Mass-storage structure:** Overview of Mass-storage structure, Disk scheduling.

### **Text Books:**

1. Operating System Concepts, Abraham Silber schatz, Peter B Galvin and Greg Gagne, 9<sup>th</sup> Edition, John Wiley and Sons Inc.,2016.

### **Reference Books:**

1. Modern Operating Systems, Andrew S. Tanenbaum, 2<sup>nd</sup> Edition, Addison Wesley.
2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata McGrawHill Education, 1996.
3. Operating Systems: A Concept-Based Approach, DMD hamd here, 2<sup>nd</sup> Edition, Tata McGraw-Hill Education.
4. Operating Systems-Internals and Design Principles, William Stallings, 6<sup>th</sup> Edition, Prentice Hall.

### **Web Links:**

1. <http://nptel.ac.in/downloads/106108101/>
2. <https://www.coursera.org/learn/iot/lecture/MrgxS/lecture-3-1-operating-systems>
3. <http://www.geeksforgeeks.org/operating-systems/>
4. <https://in.udacity.com/auth?next=/course/introduction-to-operating-systems--ud923>

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## FUNCTIONAL AND LOGIC PROGRAMMING

(Professional Elective-I)

(Common to CSE & IT)

**V Semester**

**Course Code: 191CS5E01**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To make students understand functional programming concepts, and apply them in solving problems.
- COB 2: To provide knowledge on lambda notation, Lambda calculus.
- COB 3: To facilitate students in learning Reduction strategies and Lazy Evaluation.
- COB 4: To impart the knowledge on Haskell Programming.
- COB 5: To provide the knowledge on Prolog Programming.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Apply functional and logic programming features and concepts for solving given problem.
- CO 2: Solve Whiteboard problems in pure Lambda Calculus.
- CO 3: Make Use of Reduction strategies to reduce expressions in lambda calculus and to combinatory logic.
- CO 4: Explain the principles of advanced functional programming techniques including recursion, data types, higher-order functions, functional data structures and algorithms.
- CO 5: Explain the concepts of Logic Programming.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO 11 (K3)	PO 12 (K1)
CO1 (K3)	2	2	2	-	1	-	-	-	-	-	-	-
CO2 (K3)	2	2	3	-	2	-	-	-	-	-	-	-
CO3 (K3)	2	2	3	-	3	-	-	-	-	-	-	-
CO4 (K2)	2	2	3	2	3	-	-	-	-	-	-	-
CO5 (K2)	2	2	3	2	3	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	3	2	2
CO2 (K3)	3	3	2
CO3 (K3)	3	2	2
CO4 (K2)	3	2	1
CO5 (K2)	3	3	2

### UNIT-I:

**Functional Programming and Mathematical Functions:** Principles of FP, History, Varieties of FP languages, Declarative style of programming,

Declarative style of programming, Why functional programming. Mathematical functions: definition, lambda expression,

**Functional Forms or a higher-order Function:** Function Composition, Construction, Apply-to-all, Disadvantages of FP.



**UNIT-II:**

**Introduction to Lambda Calculus:** Introduction, The benefits of lambda notation, Lambda calculus as a formal system - Lambda terms (Variables, Constants, Combinations, Abstractions), Free and bound variables, Substitution, Conversions (Alpha conversion, Beta conversion, Eta conversion), Lambda equality, Lambda reduction, Reduction strategies, Combinators.

**UNIT-III:**

**Haskell Programming:** Introduction to Haskell and the ghci interpreter,  
**Defining functions:** guards, pattern matching and recursion, Types and polymorphism, Conditional polymorphism and type classes.

**UNIT-IV:**

**Lists, strings and tuples, Higher order functions on lists:** map, filter, list comprehension, Computation as rewriting, lazy evaluation and infinite data structures, Arrays, User defined data types: lists, queues, trees, Abstract data types, modules, Recursive data types, search trees.

**UNIT-V:**

**Logic Programming:** Logic and Reasoning, Logic programs, Prolog syntax and its principal primitives. Some important techniques: tail recursion, accumulators, difference lists. Some applications such as simple theorem proving, Natural Language Processing, Expert Systems. Implementation of logic programs. Constraint Logic Programming: constraint satisfaction, constraint propagation- rationale, methodology and examples.

**Text Books:**

1. "Functional Programming: Practice and Theory" by Bruce J. MacLennan.
2. "Get Programming with Haskell" by Will Kurt, Manning Publisher.
3. "Introduction to Logic Programming" by Christopher John Hogger, Academic Press, 1984.

**Reference Books:**

1. "An Introduction to Functional Programming Through Lambda Calculus" by Greg Michaelson.
2. "Computational Semantics with Functional Programming" by Jan van Eijck, Christina Unger.
3. "Programming Languages: Principles and Practice" by Kenneth C. Louden.
4. Programming in Prolog, W.F. Clocksin and C.S. Mellish, Springer-Verlag, 1987.
5. "Foundations of Logic Programming." - JW Lloyd, Springer Verlag, 1987.

**Web Links:**

1. <https://nptel.ac.in/courses/106/106/106106137/>
2. <https://nptel.ac.in/noc/courses/noc15/SEM2/noc15-cs13/>
3. <https://www-ps.informatik.uni-kiel.de/currywiki/>
4. <http://www.nptelvideos.com/video.php?id=1208>
5. <http://www.doc.ic.ac.uk/~cclw05/topics1/index.html>
6. <http://www.infocobuild.com/education/audio-video-courses/computer-science/PrinciplesOfPL-IIT-Delhi/lecture-32.html>

## ADVANCED COMPUTER ARCHITECTURE

(Professional Elective- I)  
(Common to CSE & IT)

**V Semester**  
**Course Code: 191CS5E02**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To discuss the basic concepts and developments of various advanced computer architectures
- COB 2: To enable the students know about memory hierarchy design in high performance systems.
- COB 3: To impart the knowledge on RISC and CISC Processors.
- COB 4: To illustrate various arbitration techniques of multiprocessor and Multi vector computers.
- COB 5: To create awareness on Cache Coherence and Message Passing Mechanisms using protocols and routing algorithms.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Summarize classes of computers, new trends and developments in computer architecture.
- CO 2: Compare several advanced optimizations to achieve cache performance, virtual memory and virtual machines to achieve memory consistency.
- CO 3: Distinguish CISC & RISC instructions in high performance computing.
- CO 4: Evaluate various multiprocessing configurations.
- CO 5: Examine performance benefits of integrating message passing in cache coherent multiprocessor.

### Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO2 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO3 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO4 (K5)	3	3	3	3	3	-	-	-	-	-	-	-
CO5 (K4)	3	3	2	2	3	-	-	-	-	-	-	-

### Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	-	2	-
CO2 (K4)	-	3	3
CO3 (K2)	-	-	-
CO4 (K5)	-	3	3
CO5 (K4)	-	-	3

### UNIT-I:

**Parallel Computer Models:** The state of computing- Computer Development Milestones, Elements of Modern Computers, Evolution of Computer Architecture, System Attributes to performance Multiprocessors and Multicomputer-Shared Memory Multiprocessors, Distributed Memory Multicomputer, A Taxonomy of MIMD Computers; Multivector and SIMD Computers-Vector Super computers, SIMD Supercomputers.

**UNIT-II:**

**Memory Hierarchy Design:** Introduction- Basic Memory Hierarchy, Optimization of Cache Performance- Small and Simple First-Level Caches to Reduce Hit Time and Power, Way Prediction to Reduce Hit Time, Pipelined Cache Access to Increase Cache Bandwidth, Non blocking Caches to Increase Cache Bandwidth,

**Protection:** Virtual Memory and Virtual Machines- Protection Via Virtual Memory, Protection via Virtual Machines.

**UNIT-III:**

**Processors and Memory Hierarchy:** Design space of processors, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Hierarchical Memory Technology, Inclusion, Coherence and Locality.

**UNIT-IV:**

**Multiprocessor and Multivector Computers:** Hierarchical Bus Systems, Crossbar Switch and Multiport Memory; Multistage and Combining Networks-The Hot-Spot Problem, Applications and Drawbacks, Multistage Networks in Real Systems; Multivector Computers: Vector Processing Principles- Vector Instruction Types, Vector Access Memory Schemes, Cray Y-MP Multivector Multiprocessors- Cray Y-MP 816 System Organization, Multistage Crossbar Network in the Cray Y-MP 816.

**UNIT-V:**

**Cache Coherence and Message Passing Mechanisms:** Cache Coherence problem-Two protocol approaches, Snoopy Bus Protocols, Directory based Protocols; Message Passing Mechanisms- Message-Routing Schemes, Deadlock Virtual Channels, Flow Control Strategies, Multicast Routing Algorithms. VSIMD and MIMD Computer Organizations- Implementation models, The CM-2 Architecture, A Synchronized MIMD Machine, Control Processors and Processing Nodes, Inter processor Communications.

**Text Books:**

1. Advanced Computer Architecture: Parallelism, Scalability, and Programmability, Kai Hwang, Naresh Jotwani, 2nd Edition, TMH, 2010.
2. Computer Architecture- A Quantitative Approach, Hennessy Patterson, 5<sup>th</sup> Edition, Elsevier, 2011.

**Reference Books:**

1. Parallel Computer Architecture, Culler, Singh, Gupta, Morgan Kauffman, 2<sup>nd</sup> Edition, 1997.
2. Computer Systems Design and Architecture, Vincent P. Heuring, Harry F. Jordan, 2<sup>nd</sup> Edition, PHI, 2003.
3. Computer Organization and Architecture: Designing for Performance, William Stallings, 8<sup>th</sup> Edition, PHI, 2010.

**Web Links:**

1. <https://nptel.ac.in/courses/106102062>.
2. <https://freevideolectures.com> > Computer Science > IIT Delhi
3. <https://www.coursera.org/learn/comparch>.
4. <https://www.udemy.com/topic/computer-architecture>
5. <https://in.udacity.com/course/high-performance-computer-architecture--ud007>

## ARTIFICIAL INTELLIGENCE

(Professional Elective-I)  
(Common to CSE & IT)

V Semester

Course Code: 191CS5E03

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To teach the basic concepts of Artificial Intelligence and its applications.
- COB 2: To make the students, learn various AI techniques.
- COB 3: To discuss with students about the state space representation, exhaustive search, and heuristic search.
- COB 4: To facilitate students, aware of various knowledge representation techniques.
- COB 5: To demonstrate the Expert System and its applications.
- COB 6: To create awareness on fuzzy logic operations.

**Course Outcomes:**

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

- CO 1: Explain the fundamentals of Artificial Intelligence and its applications.
- CO 2: Describe various problems solving techniques and searching techniques.
- CO 3: Apply various logical systems to inference the different logical problems.
- CO 4: Demonstrate the concept of Knowledge Representation Techniques.
- CO 5: Develop Expert System and applications.
- CO 6: Identify various interpretations of probability theory, basic knowledge of fuzzy sets and fuzzy logic.

**Mapping of Course Outcomes with Program Outcomes**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	3	3	-	3	3	-	-	-	-	-	-	3
CO2 (K2)	3	3	-	3	3	-	-	-	-	-	-	3
CO3 (K3)	2	2	-	3	2	-	-	-	-	-	-	2
CO4 (K2)	3	3	-	3	3	-	-	-	-	-	-	2
CO5 (K3)	3	3	-	3	2	-	-	-	-	-	-	2
CO6 (K3)	3	3	-	3	2	-	-	-	-	-	-	3

**Mapping of Course Outcomes with Program Specific Outcomes**

CO / PSO	PSO1 (K3)	PSO2 (K3)	PSO3 (K2)
CO1 (K2)	2	3	-
CO2 (K2)	-	2	-
CO3 (K3)	3	2	3
CO4 (K2)	3	2	2
CO5 (K3)	3	3	-
CO6 (K3)	3	2	-

**UNIT I:**

**Introduction to Artificial Intelligence:** Introduction, Brief History, Intelligent Systems, Foundations of AI, Applications, Tic-Tac-Toe Game Playing, Development of AI Languages, 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.

**Problem Reduction and Game Playing:** Introduction, Problem Reduction, Game Playing, Alpha-Beta Pruning, Two-Player Perfect Information Games.

### UNIT-III:

**Logic Concepts:** Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic.

### UNIT-IV:

**Knowledge representation:** Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames.

**Advanced knowledge representation techniques:** Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web.

### UNIT-V:

**Expert system and Applications:** Introduction, phases in building expert systems, expert system architecture, expert system versus traditional systems, rule-based expert systems, application of expert systems, list of shells and tools.

**Uncertainty measure: probability theory:** Introduction, probability theory, Bayesian belief networks, certainty factor theory, Dempster-Shafer theory.

**Fuzzy sets and fuzzy logic:** Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

### Text Books:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning.
2. Artificial intelligence, A Modern Approach, 2<sup>nd</sup> ed, Stuart Russel, Peter Norvig, PEA.

### Reference Books:

1. Artificial Intelligence-Rich, Kevin Knight, Shiy Shankar B Nair, 3<sup>rd</sup> ed, TMH.
2. Artificial intelligence, structures and Strategies for Complex problem solving, - George F Luger, 5<sup>th</sup> ed, PEA.
3. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer.
4. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier.
5. Introduction to Artificial Intelligence, Patterson, PHI.

### Web Links:

1. <https://nptel.ac.in/courses/106/105/106105079/>
2. [https://www.tutorialspoint.com/artificial\\_intelligence/](https://www.tutorialspoint.com/artificial_intelligence/)
3. [https://onlinecourses.nptel.ac.in/noc17\\_cs30/](https://onlinecourses.nptel.ac.in/noc17_cs30/)
4. <https://www.slideshare.net/girishnaik/artificial-intelligence-3638681/>
5. <https://www.mindmeister.com/44054594/expert-systems/>

## SOFTWARE REQUIREMENT AND ESTIMATION

(Professional Elective-I)  
(Common to CSE & IT)

**V Semester****Course Code: 191CS5E04**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To impart knowledge on critical and non- critical systems.  
 COB 2: To make students understand the contents of a software requirements document.  
 COB 3: To enable the students to learn formal specification for a software system.  
 COB 4: To explain the concepts of distributed system architectures and application architectures.

**Course Outcomes:**

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

- CO 1: Illustrate requirements elicitation techniques.  
 CO 2: Identify the software requirements for a given project.  
 CO 3: Explain software estimation.  
 CO 4: Estimate the software in terms of effort, schedule and cost.  
 CO 5: Describe the tools for requirements management and estimation.

**Mapping of Course Outcomes with Program Outcomes:**

CO/PO	PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K3)	PO6 (K3)	PO7 (K2)	PO8 (K3)	PO9 (K2)	PO10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	-	-	-	2	-	-	-	-	-	-	-
CO2 (K2)	2	-	-	-	2	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	-	-	-	-	-	-	-	-	-
CO4 (K4)	-	3	2	2	-	-	-	-	-	-	-	-
CO5 (K2)	1	-	-	-	2	-	-	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes**

CO / PSO	PSO1 (K3)	PSO2 (K3)	PSO3 (K2)
CO1 (K2)	2	2	1
CO2 (K2)	2	2	-
CO3 (K3)	-	3	2
CO4 (K4)	3	-	3
CO5 (K2)	2	2	1

**UNIT-I:**

**Software Requirements:** Essential Software requirement, Good practices for requirements engineering, Improving requirements processes, Software requirements and risk management.

**Software Requirements Engineering:** Requirements elicitation, requirements analysis documentation, review, elicitation techniques, analysis models, Software quality attributes, risk reduction through prototyping, setting requirements priorities, verifying requirements quality.

**UNIT-II:**

**Software Requirements Management:** Requirements management Principles and practices, Requirements attributes, Change Management Process, Requirements Traceability Matrix, Links in requirements chain.

**Software Requirements Modeling:** Use Case Modeling, Analysis Models, Dataflow diagram, state transition diagram, class diagrams, Object analysis, Problem Frames.

**UNIT-III:**

**Software Estimation:** Components of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation.

**Size Estimation:** Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, Conversion between size measures.

**UNIT-IV:**

**Effort, Schedule and Cost Estimation:** What is Productivity? Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Algorithmic models, Cost Estimation.

**UNIT-V:**

**Tools for Requirements Management and Estimation:**

**Requirements Management Tools:** Benefits of using a requirements management tool, commercial requirements management tool, Rational Requisite pro, Caliber – RM, implementing requirements management automation.

**Software Estimation Tools:** Desirable features in software estimation tools, IFPUG, USC's COCOMO II, SLIM (Software Life Cycle Management) Tools.

**Text Books:**

1. Software Requirements and Estimation by Rajesh Naik and Swapna Kishore, Tata McGraw Hill.

**Reference Books:**

1. Karl E. Weigers, *Software Requirements*, 2<sup>nd</sup> Edition, Microsoft Press, 2003.
2. Managing Software Requirements, Dean Leffingwell & Don Widrig, Pearson Education, 2003.
3. Mastering the requirements process, second edition, Suzanne Robertson & James Robertson, Pearson Education, 2006.
4. Estimating Software Costs, Second edition, Capers Jones, TMH, 2007.
5. Practical Software Estimation, M.A. Parthasarathy, Pearson Education, 2007.

**Web Links:**

1. [www.searchofsoftwarequality.techtarget.com](http://www.searchofsoftwarequality.techtarget.com)
2. <http://nptel.ac.in/courses/106102064/>

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## COMPUTER GRAPHICS

(Professional Elective-I)  
(Common to CSE & IT)

**V Semester****Course Code: 191CS5E05**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To discuss the basic principles of computer graphics primitives.
- COB 2: To demonstrate transformation, clipping and viewing in 2D graphics.
- COB 3: To make the students learn projections, transformations and visible surface detections in 3D graphics.
- COB 4: To introduce the concepts of 3D primitives using OpenGL (Open Graphics Library).
- COB 5: To outline the Fractal geometry and Texturing in computer Graphics.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Identify the applications of computer graphics and Video Display devices for implementing Graphical user interface.
- CO 2: Analyze output primitives and filled area primitives in implementing various algorithms.
- CO 3: Make use of Geometric Transformations, Viewing and Clipping in 2D & 3D Graphics.
- CO 4: Illustrate various Visual Surface detection Methods in 3D Graphics.
- CO 5: Apply OpenGL for General Computer Animations.
- CO 6: Classify different object color modeling techniques, Fractals and Ray tracing concepts.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO 11 (K3)	PO 12 (K1)
CO1 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO2 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO6 (K2)	2	1	-	-	2	-	-	-	-	-	-	-

**Mapping of course outcomes with program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	-	2
CO2 (K4)	3	-	3
CO3 (K3)	-	3	2
CO4 (K2)	2	-	-
CO5 (K3)	3	3	2
CO6 (K2)	-	-	1



**UNIT-I:**

**Introduction:** Applications of Computer Graphics, Video Display Devices-CRT, Raster-Scan and Random-Scan systems. graphics monitors and work stations and input devices

**Output Primitives:** Line Drawing Algorithms- Bresenham's and DDA Line Drawing Algorithms, Mid-point circle and Ellipse algorithms.

Filled Area Primitives: Scan Line Polygon fill algorithm, Boundary fill and Flood fill algorithms.

**UNIT-II:**

**2-D Geometrical Transformations:** Translation, rotation, scaling, reflection and shear transformations.

**2-D viewing:** The viewing pipeline, Window to viewport coordinate transformation.

**2-D Clipping:** Cohen-Sutherland line clipping algorithm, Sutherland-Hodgeman polygon clipping algorithm and other clipping models: Text & Curve clipping models.

**UNIT-III:**

**3-D Geometrical Transformations:** Translation, rotation, scaling, reflection and shear transformations, 3-D Viewing pipeline.

**Concepts:** Parallel and perspective projections and visible surface detection methods.

**UNIT-IV:**

**Animations:** General computer animation, Raster, Key-frame.

**Color models:** RGB, YIQ, CMY, HSV.

**Graphics programming using OpenGL:** basic graphics primitives-Generating three dimensional objects.

**UNIT-V:**

**Fractals:** Fractals and self similarity, Mandelbrot sets- Julia sets – Random Fractals.

**Overview of Ray Tracing:** Intersecting rays with other primitives-Adding surface texture-Reflections and transparency-Boolean operations on objects.

**Text Books:**

1. Computer Graphics C Version, Donald D. Hearn, M. Pauline Baker, 2nd Edition, Pearson.
2. Computer Graphics using OpenGL, Stephen M. Kelley, Francis S. Hill, 2nd Edition, Pearson.

**Reference Books:**

1. Computer Graphics- Principles and practices in C, James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, 2nd Edition, Pearson Education, 2007.
2. Computer Graphics, Samit Bhattacharya, OXFORD Higher Education.
3. Computer Graphics, Peter, Shirley, CENGAGE.
4. Principles of Interactive Computer Graphics, Neuman, Sproul, TMH.
5. The Computer Graphics manual, Vol 2, David, Soloman, Springer.

**Web Links:**

1. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-837-computer-graphics-fall-2012/>
2. <http://nptel.ac.in/courses/106106090/>
3. <https://in.udacity.com/course/interactive-3d-graphics--s291>
4. [http://www.cse.iitm.ac.in/~vplab/computer\\_graphics.html](http://www.cse.iitm.ac.in/~vplab/computer_graphics.html)
5. <http://www.graphics.cornell.edu/online/links.html>

## BASIC CONCRETE TECHNOLOGY

### (Open Elective - I)

V Semester

Course Code: 191CE5001

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To teach the students about the properties of ingredients in concrete.
- COB 2: To enable the student, understand different types and properties of aggregate
- COB 3: To make the students to study the behaviour of concrete as its fresh and hardened state.
- COB 4: To impart the students with the knowledge on quality control of concrete.
- COB 5: To illustrate the concept of special concrete and their use.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Demonstrate the basic concepts of concrete.
- CO 2: Explain the properties of ingredients of concrete.
- CO 3: Select the suitability of different types of aggregate for their use
- CO 4: Explain about fresh Concrete, hardened concrete.
- CO 5: Illustrate the concept of special concrete and their use.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO3 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	-	-	-	-	-	-	-	-	-	-	-	-
CO5 (K2)	-	-	-	-	-	-	-	-	-	-	-	-

**Mapping of course outcomes with program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	-	-	-
CO2 (K2)	-	-	-
CO3 (K2)	-	-	-
CO4 (K2)	-	-	-
CO5 (K2)	-	-	-

**UNIT I**

**Cement & Admixtures:** Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement– Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume.

**UNIT II**

**Aggregates:** Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate– Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size. Quality of mixing water.

**UNIT III**

**Fresh Concrete:** Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, Effect of time and temperature on workability – Segregation & bleeding.

**UNIT IV**

**Hardened Concrete:** Nature of strength of concrete– Factors affecting strength – Relation between compression & tensile strength –Testing of Hardened Concrete: Compression tests – Tension tests – Flexure tests –Splitting tests – Non-destructive testing methods.

**UNIT V**

**Special Concretes:** Light weight aggregate concrete, Cellular concrete, No-fines concrete, High density concrete, Fiber reinforced concrete, Different types of fibers, Factors affecting properties of F.R.C, Polymer concrete, Types of Polymer concrete, Properties of polymer concrete, High performance concrete – Self consolidating concrete, SIFCON, self healing concrete, Recycled concrete, Shotcrete.

**Text Books:**

1. Concrete Technology, M.S.Shetty, Chand Publication, 6th Edition, 2010.
2. Concrete Technology: Theory and Practice, M.L. Gambhir, McGraw Hill, 4th Edition, 2009.
3. Concrete: Microstructure, Properties and Materials, Kumar Mehta and Paulo J.M. Monteiro, McGraw Hill, 3rd Edition, 2006.

**Reference Books:**

1. Properties of Concrete, A.M. Neville, Pearson, 2004.
2. Concrete Technology, A.M. Neville and J.J. Brooks, Pearson, 2004.
3. Concrete, S. Mindess and J.F. Young, Prentice-Hall, 1981
4. Concrete Technology, A.R. Santhakumar, Oxford, 2007.

**Web Links:**

1. <https://nptel.ac.in/courses/105102012>
2. [www.brighthubengineering.com](http://www.brighthubengineering.com) › Concrete Technology
3. <https://www.materialsworldmodules.org/index.php/.../web-links-sumitted-by-members>
4. <https://www.fhwa.dot.gov/resourcecenter/teams/construction/links.cfm>
5. [www.almahroos.com/index.php/fr/component/tags/tag/17-concrete-technology](http://www.almahroos.com/index.php/fr/component/tags/tag/17-concrete-technology)

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## ELECTRICAL SAFETY

### (Open Elective - I)

**V Semester****Course Code: 191EE5001**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To help the students to know about electrical hazards.
- COB 2: To help the students to know about various grounding techniques.
- COB 3: To help the students to know about safety procedures.
- COB 4: To help the students to know about various electrical maintenance techniques.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Describe electrical hazards and safety equipment.
- CO 2: Analyze and apply various grounding and bonding techniques.
- CO 3: Select appropriate safety method for low, medium and high voltage equipment.
- CO 4: Participate in a safety team.
- CO 5: Carry out proper maintenance of electrical equipment by understanding various Standards.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K4)	-	-	-	-	-	-	-	-	-	-	-	-
CO3 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO4 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO5 (K2)	-	-	-	-	-	-	-	-	-	-	-	-

**Mapping of course outcomes with program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	-	-	-
CO2 (K4)	-	-	-
CO3 (K3)	-	-	-
CO4 (K3)	-	-	-
CO5 (K2)	-	-	-

**UNIT-I****Hazards of Electricity and Electrical Safety Equipment:**

Primary and secondary hazards- arc, blast, shocks-causes and effects-safety equipment- flash and thermal protection, head and eye protection-rubber insulating equipment, hot sticks, insulated tools, barriers and signs, safety tags, locking devices- voltage measuring instruments- proximity and contact testers-safety electrical one line diagram- electrician's safety kit.

**UNIT-II****Grounding of Electrical Systems and Equipment:**

General requirements for grounding and bonding- definitions- grounding of electrical equipment-bonding of electrically conducting materials and other equipment-connection of grounding and bonding equipment- system grounding- purpose of system grounding-grounding electrode system- grounding conductor connection to electrodes-use of grounded circuit conductor for grounding equipment- grounding of low voltage and high voltage systems.

**UNIT-III****Safety Procedures and Methods:**

The six step safety methods- pre job briefings - hot-work decision tree-safe switching of power system- lockout-tag out- flash hazard calculation and approach distances- calculating the required level of arc protection-safety equipment , procedure for low, medium and high voltage systems- the one minute safety audit.

**UNIT-IV****Safety Management and Organizing Structure:**

Electrical safety program structure, development- company safety team- safety policy program implementation- employee electrical safety teams- safety meetings- safety audit accident prevention- first aid- rescue techniques-accident investigation.

**UNIT-V****Electrical Maintenance and Legal Safety Requirements and Standards:**

Safety related case for electrical maintenance- reliability centered maintenance (RCM) - eight step maintenance program- frequency of maintenance- maintenance requirement for specific equipment and location- regulatory bodies- national electrical safety code- standard for electrical safety in work place- occupational safety and health administration standards, Indian Electricity Acts related to Electrical Safety.

**Text Books:**

1. Electrical Safety Handbook by John Cadick, Mary Capelli-Schellpfeffer, Dennis Neitzel, Al Winfield, , McGraw-Hill Education, 4<sup>th</sup> Edition.

**Reference Books:**

1. Computer Graphics- Principles and practices in C, James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, 2nd Edition, Pearson Education, 2007.
2. Computer Graphics, Samit Bhattacharya, OXFORD Higher Education.

**Web Links:**

1. <http://nptel.ac.in/courses/103106071/5>
2. <https://www.electricalsafetyfirst.org.uk>
3. <https://nptel.ac.in/courses/113/107/1131070/>
4. <https://nptel.ac.in/courses/122/102/1221020/>

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## ELECTRICAL MATERIALS

### (Open Elective - I)

V Semester

Course Code: 191EE5002

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To enable the students study various types of dielectric materials, their properties in various conditions.
- COB 2: To assist the students to Know the magnetic materials and their behaviour.
- COB 3: To assist the students to Know the semiconductor materials and technologies.
- COB 4: To help the students acquire the Knowledge on Materials used in electrical engineering and applications.
- COB 5: To help the students acquire the Knowledge on special purpose Materials used in electrical engineering.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Identify various types of dielectric materials, their properties in various conditions
- CO 2: Analyze magnetic materials and their behaviour
- CO 3: Evaluate semiconductor materials and technologies
- CO 4: Develop Knowledge on Materials used in electrical engineering and applications
- CO 5: Acquire Knowledge on special purpose Materials used in electrical engineering

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K4)	1	-	-	-	-	-	-	-	-	-	-	-
CO3 (K5)	1	-	-	-	-	-	-	-	-	-	-	-
CO4 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	1	-	-	-	-	-	-	-	-	-	-	-

**Mapping of course outcomes with program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	1	-
CO2 (K4)	-	1	-
CO3 (K5)	1	1	-
CO4 (K3)	-	-	-
CO5 (K3)	-	-	-

**UNIT-I****Dielectric Materials:**

Dielectric as Electric Field Medium, leakage currents, dielectric loss, dielectric strength, breakdown voltage, breakdown in solid dielectrics, flashover, liquid dielectrics, electric conductivity in solid, liquid and gaseous dielectrics, Ferromagnetic materials, properties of ferromagnetic materials in static fields, spontaneous, polarization, curie point, anti-ferromagnetic materials, piezoelectric materials, pyro electric materials.

**UNIT-II****Magnetic Materials:**

Classification of magnetic materials, spontaneous magnetization in ferromagnetic materials, magnetic Anisotropy, Magnetostriction, diamagnetism, magnetically soft and hard materials, special purpose materials, feebly magnetic materials, Ferrites, cast and cermet permanent magnets, ageing of magnets. Factors effecting permeability and hysteresis.

**UNIT-III****Semiconductor Materials:**

Properties of semiconductors, Silicon wafers, integration techniques, Large and very large scale integration techniques (VLSI)

**UNIT-IV****Materials for Electrical Applications:**

Materials used for Resistors, rheostats, heaters, transmission line structures, stranded conductors, bimetallic fuses, soft and hard solders, electric contact materials, electric carbon materials, thermocouple materials. Solid, Liquid and Gaseous insulating materials, Effect of moisture on insulation.

**UNIT-V****Special Purpose Materials:**

Refractory Materials, Structural Materials, Radioactive Materials, Galvanization and Impregnation of materials, Processing of electronic materials, Insulating varnishes and coolants, Properties and applications of mineral oils, Testing of Transformer oil as per ISI.

**Text Books:**

1. A course in Electrical Engineering Materials by R K Rajput, Laxmi Publications.
2. A course in Electrical Engineering Materials by T K Basak, New Age Science Publications.

**Reference Books:**

1. Electrical Engineering Materials by TTTI Madras, McGraw Hill Education.
2. Electrical Engineering Materials by Adrianus J. Dekker, PHI Publication.
3. A course in Electrical Engineering Materials by S. P. Seth, P. V. Gupta, Dhanpat Rai & Sons.

**Web Links:**

1. <https://nptel.ac.in/courses/113/102/113102080/>
2. <https://nptel.ac.in/courses/113/107/113107078/>
3. <https://nptel.ac.in/courses/122/102/122102008/>

## BASIC ELECTRICAL MEASUREMENTS

### (Open Elective - I)

V Semester

Course Code: 191EE5003

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To equip the student with the knowledge of different types of instruments.
- COB 2: To equip the student with the knowledge of different types of instruments for measurements of voltage, current, power & energy.
- COB 3: To make the student understand various types of bridges for measurement of parameters-resistance, inductance, capacitance and frequency.
- COB 4: To help the students learn the knowledge of the Transducers and Sensors.
- COB 5: To help student acquire knowledge on applications of CRO for measurement of frequency, phase difference and hysteresis loop using Lissajous patterns.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1: Analyze the behaviour of different types of torques in instruments.
- CO 2: Apply the right type of instrument for measurement of voltage, current, power & energy.
- CO 3: Develop the suitable bridge for the measurement of electrical parameters.
- CO 4: Analyze the behaviour of different types of Transducers and Sensors.
- CO 5: Explain frequency and phase difference between signals using CRO.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K4)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K5)	1	-	-	-	-	-	-	-	-	-	-	-
CO3 (K4)	1	-	-	-	-	-	-	-	-	-	-	-
CO4 (K4)	1	-	-	-	-	-	-	-	-	-	-	-
CO5 (K5)	1	-	-	-	-	-	-	-	-	-	-	-

**Mapping of course outcomes with program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K4)	-	-	-
CO2 (K5)	-	1	-
CO3 (K4)	-	1	-
CO4 (K4)	-	1	-
CO5 (K5)	-	-	-

**UNIT-I****Basics of Measuring instruments:**

List of important electrical quantities to be measured, their units and the names of the instruments to measure them- Classification of instruments - different types of torques (Deflection, Controlling and Damping torques) in the indicating instruments-definitions of accuracy, precision, error, resolution and sensitivity-types of error.

**UNIT-II****Electromechanical Measuring Instruments:**

M.C. and M.I types of Ammeters and Voltmeters - their Construction and working- shunts and multipliers for M.C instruments - Dynamometer type Ammeter, Voltmeter and



Wattmeter–construction, working, errors- Measurement of energy –single phase Induction type energy meter- Construction and working.

### **UNIT-III**

#### **Measurements of Parameters:**

Classification of resistance- List of methods of measurement of resistance-Wheat stone's bridge– Kelvin's double bridge for measuring low resistance- Loss of charge method for measurement of inductance –Quality Factor –Maxwell's bridge-Hay's bridge- Measurement of capacitance and loss angle – Desauty Bridge – Schering Bridge.(elementary treatment only).

### **UNIT-IV**

#### **Transducers:**

Definition of transducer-need of transducer-Classification of Transducers – Factor influencing while its selection -Applications of Transducers –Thermocouple- Thermister- working principle and use of Strain Gauge- construction, working and use of LVDT Basic Concept of Sensors and its applications.

### **UNIT-V**

#### **Electronic & Digital Instruments:**

Digital voltmeter – Successive approximation – Frequency – Hysteresis loop using lissajous patterns in CRO – Ramp and integrating type –Digital multimeter –Digital Tachometer.

#### **Text Books:**

1. A course in Electrical Measurements Electronic Measurements Instrumentation A. K. Sawhney:, 11<sup>th</sup> Edition, Dhanpat Rai and Sons.
2. A course in Electrical and Electronic Measurements and Instrumentation. J .B. Gupta:, 13<sup>th</sup> Edition, S.K. Kataria and Sons.

#### **Reference Books:**

1. Electrical Measurements – by Buckingham and Price, Prentice – Hall Electrical Measurements by Forest K. Harris. John Wiley and Sons.
2. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, Publishers.
3. Electrical and Electronic Measurements –by G.K.Banerjee, PHI Learning Private Ltd, New Delhi,

#### **Web Links:**

1. <http://nptel.ac.in/courses/108105053/42>
2. <http://nptel.ac.in/syllabus/108106070/>
3. <http://nptel.ac.in/courses/108106070/>

## RENEWABLE ENERGY SOURCES

(Open Elective - I)

**V Semester**

**Course Code: 191ME5001**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To address the need for renewable energy resources and technologies.
- COB 2: To impart the knowledge of solar energy with its applications.
- COB 3: To instil the knowledge of geothermal energy along with its applications.
- COB 4: To discuss the direct energy conversion systems.
- COB 5: To impart the knowledge of the bio-energy theory and applications.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Discuss about renewable energy and solar energy with its applications.
- CO 2: Explain about geothermal energy and its applications.
- CO 3: Classify the direct energy conversion systems.
- CO 4: Summarize the bio-energy and its applications.
- CO 5: Illustrate the theory and applications of wind energy and oceanic energy sources.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K4)	1	-	-	-	-	-	-	-	-	-	-	-
CO3 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	1	-	-	-	-	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	-	-	-
CO2 (K4)	-	-	-
CO3 (K2)	-	-	-
CO4 (K2)	-	-	-
CO5 (K3)	-	-	-

### UNIT-I

Introduction, Energy Scenario, and Survey of energy resources. Classification and need for non-conventional energy resources.

**Solar Energy:** The Sun-sun-Earth relationship, Basic matter to waste heat energy circuit, Solar Radiation, Attenuation, Radiation measuring instruments.

**Solar Energy Applications:** Solar water heating. Space heating, Active and passive heating. Energy storage. Selective surface. Solar stills and ponds, solar refrigeration, Photovoltaic generation.

### UNIT-II

**Geothermal Energy:** Structure of earth, Geothermal Regions, Hot springs. Hot Rocks, Hot Aquifers. Analytical methods to estimate thermal potential. Harnessing techniques, Electricity generating systems.

**UNIT-III**

**Direct Energy Conversion:** Nuclear Fusion: Fusion, Fusion reaction, P-P cycle, Carbon cycle, Deuterium cycle, Condition for controlled fusion, Fuel cells and photovoltaic. Thermionic & thermoelectric generation, MHD generator.

**Hydrogen Gas as Fuel:** Production methods, Properties, I.C. Engines applications, Utilization strategy, Performances.

**UNIT-IV**

**Bio-Energy:** Biomass energy sources. Plant productivity, Biomass wastes, aerobic and anaerobic bioconversion processes, Raw material and properties of bio-gas, Bio-gas plant technology and status, the energetic and economics of biomass systems, Biomass gasification.

**UNIT-V**

**Wind Energy:** Wind, Beaufort number, Characteristics, Wind energy conversion systems, Types, Betz model. Interference factor. Power coefficient, Torque coefficient and Thrust coefficient, Lift machines and Drag machines. Matching, Electricity generation.

**Energy from Oceans:** Tidal energy. Tides. Diurnal and semi-diurnal nature, Power from tides, Wave Energy, Waves, Theoretical energy available. Calculation of period and phase velocity of waves, Wave power systems, submerged devices. Ocean thermal Energy, Principles, Heat exchangers, Pumping requirements, Practical considerations.

**Text Books:**

1. Non - conventional energy sources, G.D.Rai, Khanna Publications, 1<sup>st</sup> edition.
2. Fundamentals of Renewable Energy Sources, N.S. Rathore & Khobragade Chetan, Himanshu Publications, 1<sup>st</sup> edition.

**Reference Books:**

1. Renewable Energy Resources- Basic Principles and Applications, G.N.Tiwari and M.K.Ghosal, Narosa publications, 1<sup>st</sup> edition.
2. Renewable Energy: Power for a Sustainable Future/ Godfrey Boyle/ Oxford University Press; 3<sup>rd</sup> edition.
3. Renewable Energy Resources, John Twidell & Tony Weir, Taylor & Francis, 2<sup>nd</sup> edition.

**Web Links:**

1. <http://nptel.ac.in/courses/108108078/>
2. <http://www.nptelvideos.in/2012/11/energy-resources-and-technology.html>
3. [http://www.vssut.ac.in/lecture\\_notes/lecture1428910296.pdf](http://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf)
4. [http://www.ener-supply.eu/downloads/ENER\\_handbook\\_en.pdf](http://www.ener-supply.eu/downloads/ENER_handbook_en.pdf)

# FUNDAMENTALS OF MECHANICAL ENGINEERING

(Open Elective - I)

**V Semester**

**Course Code: 191ME5002**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

## Course Objectives:

COB 1: To define the Basic concepts of various mechanical systems and the manufacturing systems.

COB 2: To demonstrate the concepts of boilers, IC engines, compressors and transmission systems.

## Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Compare the different types of boilers.

CO 2: Interpret different manufacturing methods.

CO 3: Explain the working of air compressors and the concept of refrigeration.

CO 4: Explain the working principle of Internal Combustion Engines and their performance.

CO 5: Compute the parameters of mechanical components for power transmission.

## Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO3 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	1	-	-	-	-	-	-	-	-	-	-	-

## Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	-	-	-
CO2 (K2)	-	-	-
CO3 (K2)	-	-	-
CO4 (K2)	-	-	-
CO5 (K3)	-	-	-

## UNIT-I

**Steam boilers:** Classification of boilers, essentialities of boilers, selection of different types of boilers, (Babcock and Wilcox, locomotive, lamont) study of boilers, boiler mountings and accessories.

## UNIT-II

**Metal joining:** arc welding, gas welding, brazing and soldering.

**Metal forming:** forging – operations, rolling and extrusion principles.

**Machine tools:** lathe classification, specifications, and operations.

**Casting:** Steps involved in making a casting – Advantages and applications. –Patterns and Pattern making.

## UNIT-III

**Reciprocating and rotary air compressors:** uses of compressed air, types, working principle, work done, simple problems. Refrigeration: concepts, principle of refrigeration and types of refrigeration.

**UNIT-IV**

**Internal combustion engines:** classification of IC engines, basic engine components and nomenclature, working principle of engines, Four strokes and two stroke petrol and diesel engines, comparison of CI and SI engines, comparison of four stroke and two stroke engines, simple problems such as indicated power, brake power, friction power, specific fuel consumption, brake thermal efficiency, indicated thermal efficiency and mechanical efficiency.

**UNIT-V**

**Power transmission devices:** Belt and ropes drives, velocity ratio, slip, length of belt , open belt and cross belt drives, ratio of friction tensions, centrifugal tension in a belt, power transmitted by belts and ropes, initial tensions in the belt, simple problems. Comparison of belt drives with gear drives.

**Text Books:**

1. Mechanical Engineering Science K R Gopala Krishna, Subhas publications.
2. Thermal Engineering, Ballaney, P. L. Khanna Publishers, 2003.
3. Elements of Mechanical Engineering, A. R. Asrani, S. M. Bhatt and P. K. Shah, B.S. Publications.
4. Elements of Mechanical Engineering, M. L. Mathur, F. S. Metha & R. P. Tiwari Jain Brothers Publications.2009.

**Reference Books:**

1. Theory of Machines, S. S. Rattan, Tata McGraw Hil, 2004 &2009.
2. Production Technology by P. N. Rao by I & II McGraw-Hill publications.

**Web Links:**

1. <http://nptel.ac.in/courses/112107216/9>
2. <https://www.electrical4u.com/steam-boiler-working-principle-and-types-of-boile>
3. <http://www.nptelvideos.in/2012/12/manufacturing-processes-i.html>
4. <http://nptel.ac.in/courses/112105128/20>
5. <http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR /machine /ui / Coursehome-lect.htm>
6. <http://www.nptelvideos.in/2012/12/design-of-machine-elements.html>
7. <https://www.youtube.com/watch?v=zKA4TYMgiqU>

## SUPPLY CHAIN MANAGEMENT

(Open Elective - I)

**V Semester**

**Course Code: 191ME5003**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To provide an insight on the fundamentals of supply chain networks, tools and techniques.
- COB 2: To train the students in Design options for Distribution Network in supply chain design.
- COB 3: To equip how Logistics, Supply Chain, Operations, Channels of Distribution fit in to various types of Business viz., Manufacturing, Service and Project.
- COB 4: To nurture the students how Warehouse Management, internal supply chain management and, other functions in Logistics fits into Supply Chain Management.
- COB 5: To enable the student develop supplier relationship management and E-Business in supply chain.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Explain the framework and scope of supply chain network and functions.
- CO 2: Appraise the importance of the design and redesign of a supply chain as key components of an organization's strategic plan.
- CO 3: Explain the strategic importance of logistic elements and describe how they affect supply chain management.
- CO 4: Analyze the creation of new value in the supply chain for customers, society and the environment.
- CO 5: Develop coordinated and collaborative processes and activities among the business partners in a supply chain, leveraging current and emerging technologies.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K5)	1	-	-	-	-	-	-	-	-	-	-	-
CO3 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO4 (K4)	1	-	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	1	-	-	-	-	-	-	-	-	1	1	-

### Mapping of course outcomes with program Specific Outcomes:

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	-	-	-
CO2 (K5)	-	-	-
CO3 (K2)	-	-	-
CO4 (K4)	-	-	-
CO5 (K3)	-	-	-

### UNIT-I

**Introduction:** Role of Supply chain Management: Scope and Importance- Evolution of Supply Chain -Decision Phases in Supply Chain – Competitive and Supply chain Strategies – Drivers of Supply Chain Performance and Obstacles.

**UNIT-II**

**Supply Chain Network Design:** Role of Distribution in Supply Chain – Factors influencing Distribution network design – Design options for Distribution Network in Practice-Role of network Design in Supply Chain – Framework for network Decisions.

**UNIT-III**

**Logistics and Supply Chain Relationships:** Benchmarking the logistics process and SCM operations –Mapping the supply chain processes – Supplier and distributor benchmarking – setting benchmarking priorities –identifying logistics performance indicators –Channel structure – Economics of distribution –channel relationships –logistics service alliances.

**UNIT-IV**

**Sourcing, Transporting and Pricing Products:** Sourcing decisions and Role of transportation in supply chain – factors affecting transportations decision -infrastructure suppliers of transport services – transportation economics and pricing – documentation - pricing and revenue management Lack of coordination and Bullwhip Effect - Impact of lack of coordination. - CRM –Internal supply chain management.

**UNIT-V**

**Supply Chain and Information Technology:** The role IT in supply chain- The supply chain IT frame work Customer Relationship Management – Internal supply chain management – supplier relationship management -future of IT in supply chain – E-Business in supply chain.

**Text Books:**

1. Sunil Chopra, Peter Meindl and Kalra, Supply Chain Management, Strategy, Planning, and Operation, Pearson Education, 2010.
2. Bowersox Donald J, Logistical Management – The Integrated Supply Chain Process Tata McGraw Hill, 2000.

**Reference Books:**

1. Jeremy F.Shapiro, Modeling the Supply Chain, Thomson Duxbury, 2002.
2. Srinivasan G.S, Quantitative models in Operations and Supply Chain management, PHI, 2010.
3. David J.Bloomberg , Stephen Lemay and Joe B.Hanna, Logistics, PHI 2002.
4. D.K.Agrawal: “Distribution and Logistics Management”, MacMillan Publishers, 2011.
5. Rahul V Altekari: Supply Chain Management, PHI Learning Ltd, New Delhi, 2009.

**Web Links:**

1. <http://www.cscmp.org/>
2. <http://www.manufacturing.net/scl/>
3. <http://www.informationweek.com/>

## 3D PRINTING

### (Open Elective - I)

V Semester

Course Code: 191ME5004

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To introduce the basic knowledge of 3D Printing
- COB 2: To induce the knowledge of vat photo polymerization, material jetting and binder jetting Additive Manufacturing (AM) technologies
- COB 3: To discuss the material extrusion and sheet lamination AM technologies
- COB 4: To impart the knowledge on powder bed fusion and directed energy deposition AM technologies
- COB 5: To discuss the applications of additive manufacturing and selection of AM technologies

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1 : Summarize the basics of AM technologies.
- CO 2 : Explain about vat photo polymerization, material jetting and binder jetting AM technologies.
- CO 3 : Explain material extrusion and sheet lamination AM technologies.
- CO 4 : Illustrate powder bed fusion and directed energy deposition AM technologies.
- CO 5 : Apply the AM techniques in different industries
- CO 6 : Select AM technologies using decision methods

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	1	-	-	-	-	2	-	-	-	-	-	-
CO2 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO3 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO6 (K3)	1	-	-	-	-	-	-	-	-	-	-	-

**Mapping of course outcomes with program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	1	-	-
CO2 (K2)	-	-	-
CO3 (K2)	-	-	-
CO4 (K2)	-	-	-
CO5 (K3)	1	-	-
CO6 (K3)	-	-	-

**UNIT-I****Introduction:**

Basic principle of 3D printing (3DP), need and advantages of 3DP or additive manufacturing (AM), AM Process chain - CAD Model - Input file formats - Generation and Conversion of STL file - File Verification and Repair - Build File Creation - Part Construction - Part Cleaning and finishing, Classification of additive manufacturing processes-Baseline approach, Raw material-based approach and ASTM classification, Materials used in additive manufacturing, Challenges in Additive Manufacturing.



**UNIT-II****VAT Photo Polymerization, Material Jetting and Binder Jetting AM technologies:**

Stereo lithography Apparatus (SLA), Digital Light Projection (DLP), Continuous Liquid Interface Production (CLIP), Material Jetting (MJ), Solid Ground Curing (SGC) or Drop on Demand (DoD), Nano Particle Jetting (NPJ), Binder Jetting and Multi Jet Fusion (MJF) processes – Working principle, Materials, Applications, Advantages and Disadvantages.

**UNIT-III****Material Extrusion and Sheet Lamination AM technologies:**

Fused Deposition Modelling (FDM), Contour Crafting (CC), Laminated Object Manufacturing (LOM), Ultrasonic Consolidation (UC), Composite Based AM (CBAM), processes – Working principle, Materials, Applications, Advantages and Disadvantages.

Do It Yourself (DIY) 3D printers – Mechanical Structure, Control mechanism, Arduino Programming.

**UNIT-IV****Material Extrusion and Sheet Lamination AM technologies:**

Selective Laser Sintering (SLS), Direct Metal Laser Sintering (DMLS) or Selective Laser Melting (SLM), Electron Beam Melting (EBM), Laser Engineered Net Shaping (LENS), Electron Beam Additive Manufacturing (EBAM), Wire Arc Additive Manufacturing (WAAM) - Working principle, Materials, Applications, Advantages and Disadvantages.

**UNIT-V****Methods of Selection and Industrial Application of AM:**

Selection of AM technologies using decision methods, AM process plan, Monitoring and control of defects in AM, post-processing methods in AM.

**3D Printing Applications:** Applications in prototyping, concept models, visualization aids, replacement parts, tooling, jigs & fixtures, moulds, casting, and end-use parts, Industrial Applications in aerospace, automobile, medical, jewelry, sports, electronics, food, construction and architectural.

**Text Books:**

1. Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping and Direct Digital Manufacturing, Ian Gibson, David W. Rosen, Brent Stucker, Springer, 2<sup>nd</sup> Edition.
2. 3D Printing and Additive Manufacturing: Principles and Applications, Chua C.K., and Leong K.F., World Scientific publications, 4<sup>th</sup> Edition.

**Reference Books:**

1. Additive Manufacturing, Amit Bandyopadhyay, Susmita Bose, CRC Press, 1<sup>st</sup> Edition.
2. Rapid Prototyping & Manufacturing, Paul F.Jacobs, ASME Press, 1<sup>st</sup> Edition.
3. Additive Manufacturing of Metals: From Fundamental Technology to Rocket Nozzles, Medical Implants and Custom Jewelry, John O. Milewski, Springer, 1<sup>st</sup> Edition.
4. Additive Manufacturing: Design, Methods and Processes, Steinar Western Killi, Pan Stanford, 1<sup>st</sup> Edition.
5. Additive Manufacturing of Metals: The Technology, Materials, Design and Production, Yang, L., Hsu, K., Baughman, B., Godfrey, D., Medina, F., Menon, M., Wiener, S., Springer, 1<sup>st</sup> Edition.

**Web Links:**

1. <https://www.reprap.org>
2. <https://www.thingiverse.com>
3. <https://www.3dprintingindustry.com>
4. <https://www.all3dp.com>

## ENTREPRENEURSHIP DEVELOPMENT AND INCUBATION

(Open Elective – I)

**V Semester**

**Course Code: 191ME5005**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To make aware of the various concepts of entrepreneurship.
- COB 2: To help in understanding and apply the business plan of entrepreneurship development.
- COB 3: To help in analyzing and apply the Institutions that are supporting to Entrepreneurship Development.
- COB 4: To helps in understanding of entrepreneurship opportunities internationally.
- COB 5: To understand and apply the student's capital investments in association with business incubations.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 : Describe the meaning and concepts of entrepreneurship development.
- CO 2 : Helps to understand and apply the business plan for preparation and evaluation of project.
- CO 3 : Research on Institutional Support to Entrepreneur and MSMEs.
- CO 4 : Understand & apply the Opportunities of Entrepreneurship Internationally.
- CO 5 : Research on Venture capital & Risk for entrepreneurship socially incubations.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO3 (K4)	1	-	-	-	-	-	-	-	-	-	-	-
CO4 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	1	-	-	-	-	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO/PSO	PSO 1(K3)	PSO 2(K3)	PSO 3(K2)
CO1 (K3)	-	-	-
CO2 (K3)	-	-	-
CO3 (K4)	-	-	-
CO4 (K3)	-	-	-
CO5 (K3)	-	-	1

### UNIT-I

**Entrepreneur & Entrepreneurship:** Meaning of entrepreneur - Evolution of the concept - Functions of an Entrepreneur - Types of Entrepreneur - Intrapreneur- an emerging class - Concept of Entrepreneurship - Evolution of Entrepreneurship - Development of Entrepreneurship - Entrepreneurial Culture - Stages in entrepreneurial process.

### UNIT-II

**Business Planning Process:** Meaning of business plan - Business plan process - Advantages of business planning - Marketing plan - Production/operations plan - Organization plan - Financial plan - Final Project Report with Feasibility Study - preparing a model project report for starting a new venture.

**UNIT-III**

**Institutions supporting Entrepreneurs:** Small industry financing developing countries - A brief overview of financial institutions in India - Central level and state level institutions - SIDBI - NABARD - IDBI - SIDCO - Indian Institute of Entrepreneurship - DIC - Single Window - Latest Industrial Policy of Government of India.

**UNIT-IV**

**International Entrepreneurship Opportunities:** The nature of international entrepreneurship - Importance of international business to the firm - International versus domestic entrepreneurship - Stages of economic development - Entrepreneurship entry into international business - exporting - Direct foreign investment - barriers to international trade.

**UNIT-V**

**Informal Risk Capital and Venture Capital:** Informal risk capital market - venture capital - nature and overview - venture capital process - locating venture capitalists - approaching venture capitalists. Social Entrepreneurship: Social enterprise-need - types - characteristics and benefits of social enterprises-**Social entrepreneurship** - Rural entrepreneurship, MSME Policies. Make-In India, Start-Up India, Stand-Up India.

**Text Books:**

1. Arya Kumar: "Entrepreneurship", Pearson, Publishing House, New Delhi, 2012.
2. VSP Rao, Kuratko: "Entrepreneurship", Cengage Learning, New Delhi, 2011.
3. K.Ramachandran: "Entrepreneurship Development", TMH, New Delhi, 2012.

**Reference Books:**

1. B.Janakiram, M Rizwana: "Entrepreneurship Development" Excel Books, New Delhi, 2011.
2. Rajeev Roy: "Entrepreneurship", Oxford University Press, New Delhi, 2012
3. P.C.Shejwalkar: "Entrepreneurship Development", Everest Publishing House, New Delhi, 2011.
4. R.H. Hisrich, M.P. Peters and D.A. Shepherd: "Entrepreneurship" Mc Graw Hill Irwin, 8<sup>th</sup> Edition, 2010.
5. Ryszard Praszkie & Andrzej Nowak: "Social Entrepreneurship: Theory and Practice Paperback – Illustrated", Cambridge University Press, New York-February 2, 2012.

**Web Links:**

1. <http://nptel.ac.in/courses>
2. <https://www.tutorialspoint.com/>
3. <https://www.ediindia.org/>
4. <http://www.quickmba.com/entre/>
5. <https://www.scribd.com/document/150087992/Entrepreneurship-Chapter-12-Informal-Risk-Capital>

## SIGNALS AND SYSTEMS

(Open Elective – I)

**V Semester**

**Course Code: 191EC5001**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To introduce the concepts associated with signals and systems.
- COB 2: To familiarize the concepts of transform based continuous time and discrete time analysis of signals and systems.
- COB 3: To prepare the students to analyze the characteristics of LTI systems using different mathematical tools.
- COB 4: To create awareness on frequency transformation techniques.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 : Categorize signals and systems based on their characteristics.
- CO 2 : Demonstrate the spectral characteristics of signals using Fourier series
- CO 3 : Demonstrate the spectral characteristics of signals using Fourier Transform
- CO 4 : Identify system characteristics in time domain and frequency domain.
- CO 5 : Apply Laplace transform techniques for the analysis of continuous time signals and Systems.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO 1(K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO 2(K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO 3(K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO 4(K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO 5(K4)	1	-	-	-	-	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO 1(K2)	-	1	-
CO 2(K2)	-	-	-
CO 3(K3)	-	-	-
CO 4(K3)	-	1	-
CO 5(K4)	-	-	-

### UNIT-I

**Introduction to Signals:** Classification of Signals, Different deterministic signals: impulse, step, ramp, gate, signum, sinc, sinusoidal, exponential, complex exponential, Basic Operations on signals,

### UNIT-II

**Fourier Series:** Representation of Fourier series for continuous time periodic signals, Trigonometric Fourier series and Exponential Fourier series, Dirichlet's conditions, properties of Fourier series, Complex Fourier spectrum. Applications of Fourier series.

### UNIT-III

**Fourier Transform:** Deriving Fourier Transform (FT) from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Applications of Fourier Transforms. Convolution and its properties.

**UNIT-IV**

**Signal Transmission Through LTI Systems:** Classification of Systems, Impulse response and step response of LTI systems, Transfer function of an LTI system. Filter characteristics of LTI systems. Distortion less transmission through a system, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Signal bandwidth, system bandwidth, relationship between bandwidth and rise time.

**UNIT-V**

**Laplace Transforms:** Review of Laplace transform (LT), Existence of Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of Laplace transforms, relation between LTs, and FT of a signal, Inverse Laplace transform, applications of Z Transform.

**Text Books:**

1. Signals and Systems - A.V. Oppenheim, A.S. Willsky, and S.H. Nawab, PHI, 2<sup>nd</sup> Edition, 2016.
2. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
3. Signals and Systems – A. Anand Kumar, PHI, 4th Edition, 2017.

**Reference Books:**

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2<sup>nd</sup> Edition.
2. Fundamentals of Signals and Systems- Michel J. Robert, MGH Int. Edition, 2008
3. Signals and Systems, K Raja Rajeswari, B Visweswara Rao, PHI, 2009

**Web Links:**

1. <https://freevideolectures.com/course/3540/signals-and-systems-i>
2. <http://nptel.ac.in/courses/117104074/>
3. <http://nptel.ac.in/courses/117101055/>
4. [https://www.tutorialspoint.com//signals\\_and\\_systems/index.htm](https://www.tutorialspoint.com//signals_and_systems/index.htm)
5. <https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011>

## SEMICONDUCTOR DEVICES

(Open Elective - I)

**V Semester**

**Course Code: 191EC5003**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To make the students understand the physical phenomenon such as construction, transport mechanism and characteristics of diodes.
- COB 2: To familiarize the students with the operation and characteristics of Transistor.
- COB 3: To make the students understand the construction and operation of FET and MOSFET.
- COB 4: To impart knowledge on basics of special semiconductor devices.
- COB 5: To make the students understand physical and technical base of sensors.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 : Interpret the characteristics of semiconductor diodes.
- CO 2 : Apply the knowledge of semiconductors to illustrate the functioning of BJT.
- CO 3 : Demonstrate the switching and amplification Application of FET.
- CO 4 : Classify the semiconductor devices for special Applications.
- CO 5 : Identify the sensor types used in various applications and explain their principle of operation.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO 1(K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO 2(K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO 3(K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO 4(K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO 5(K3)	1	1	1	-	1	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO/ PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO 1(K2)	-	1	-
CO 2(K3)	-	-	-
CO 3(K2)	-	-	-
CO 4(K2)	-	1	-
CO 5(K3)	1	1	-

### UNIT-I

**PN junction Diode:** Theory and Operation of PN junction diode, V-I characteristics, Application of diode as Rectifier, Clipper and Clamper.

**Zener diode:** Principle, V-I characteristics, Zener breakdown and Avalanche breakdown, Zener diode as a voltage regulator.

### UNIT-II

**BJT:** Construction and operation of a transistor, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, transistor as a switch, transistor as an amplifier.

**UNIT-III**

**FET:** Construction and operation of FET, Characteristic of FET, low frequency model of FET, FET as a switch and an amplifier. MOSFET Characteristics (enhancement and depletion mode).

**UNIT-IV**

**Special Semiconductor Devices:** LED, LCD, Photo transistor, Tunnel diode, Varactor diode, Opto coupler, solar cell, Charged Coupled Device.

**UNIT-V**

**Sensors:** Temperature Sensor, Proximity Sensor, Sensistor, Thermistor, LDR, Flame Sensor, Humidity sensor, NEMS/MEMS.

**Text Books:**

1. D.Neamen and D.Biswa, “Semiconductor physics and devices”, McGraw Hill Education, 2017.
2. J. Millman, C. Halkias, Electronic Devices and Circuits, Tata Mc-Graw Hill 2<sup>nd</sup> Edition 2007
3. Clarence W. de Silva, “Sensors and Actuators: Engineering System Instrumentation”, CRC press second edition 2015.

**Reference Books:**

1. Umesh Mishra and Jasprit Singh, “Semiconductor Device Physics and Design”, Springer, 2008.
2. A. A. Balandin and K. L. Wang, Handbook of Semiconductor Nanostructures and Nanodevices, Grainger, 2006
3. W.R.Fahrner, “Nanotechnology and Nanoelectronics – Materials, Devices and Measurement Techniques” Springer, 2006

**Web Links:**

1. <https://freevideolectures.com/course/4277/nptel-fundamentals-semiconductor-devices/58>
2. <https://www.coursera.org/specializations/semiconductor-devices>
3. <https://nptel.ac.in/courses/108/108/108108112/> Prof Sanjiv Sambandan

## R PROGRAMMING

### (Open Elective – I)

V Semester

Course Code: 191CS5004

L	T	P	C
2	1	0	3

### Course Objectives:

- COB 1: To impart the knowledge on the R basic concepts.
- COB 2: To enable the student learn R program structure.
- COB 3: To inculcate the knowledge on mathematical functions.
- COB 4: To illustrate the concept of graph functions.
- COB 5: To make the students understand the concepts of distribution functions and regressions models.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 : Illustrate the basic concepts and advanced data structures of R programming.
- CO 2 : Understand control statements and operators in R.
- CO 3 : Implement simulation, Probability and linear algebra operations.
- CO 4 : Make use of graph functions.
- CO 5 : Develop programs for distribution functions and regression models.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	2	1	-	-	1	-	-	-	-	-	-	-
CO2 (K2)	2	1	-	-	1	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	1	3	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO /PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	2	2	1
CO2 (K2)	2	2	1
CO3 (K3)	3	3	2
CO4 (K3)	3	3	2
CO5 (K3)	3	3	2

### UNIT-I

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

### UNIT-II

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

### UNIT-III

**Simulation in R:** Math Function, Extended Example Calculating Probability-Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross



Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files.

#### **UNIT-IV**

**Graphics:** Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.

#### **UNIT-V**

**Probability Distributions:** Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA, Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression.

#### **Text Books:**

1. The Art of R Programming, Norman Matloff, 1<sup>st</sup> Edition, Cengage Learning, 2011.
2. R for Everyone, Lander, 2<sup>nd</sup> Edition, Pearson, 2018.

#### **Reference Books:**

1. R Cookbook, J.D.Long & Paul Teetor, 2<sup>nd</sup> Edition, Oreilly, 2019.
2. R in Action, Rob Kabacoff, 2<sup>nd</sup> Edition, Manning, 2015.

#### **Web Links:**

1. [https://onlinecourses.nptel.ac.in/noc19\\_ma33/preview](https://onlinecourses.nptel.ac.in/noc19_ma33/preview)
2. <https://www.coursera.org/projects/getting-started-with-r>
3. <https://www.geeksforgeeks.org/introduction-to-r-programming-language/>
4. <https://www.udacity.com/course/data-analysis-with-r--ud651>

## OVERVIEW OF MINING

### (Open Elective - I)

**V Semester****Course Code: 191MI5001**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

- COB 1: To impart knowledge on the mine lifecycle.
- COB 2: To make the students understand the factors responsible for location, shape and size of the shaft.
- COB 3: To demonstrate the students the system of ventilation, Lighting and Permanent lining, need for drift.
- COB 4: To explain the special methods and Modern techniques of Shaft sinking.
- COB 5: To make the students understand the classification of explosives, detonators and detonating fuses and nonel detonators.

**Course Outcomes:**

At the end of the Course, Student will be able to:

- CO 1 : Analyze different stages in the life of a mine.
- CO 2 : Choose a suitable location for opening to a deposit.
- CO 3 : Organize for building appropriate permanent lining, drift with proper ventilation and lighting arrangements.
- CO 4 : Analyze the special methods need to be adopted for a particular situation.
- CO 5 : Distinguish the uses of explosives.

**Mapping of course outcomes with program outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K4)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO3 (K3)	-	-	-	-	-	-	-	-	-	-	-	-
CO4(K4)	-	-	-	-	-	-	-	-	-	-	-	-
CO5 (K4)	1	-	-	-	-	-	-	-	-	-	-	-

**Mapping of course outcomes with program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K4)	-	-	-
CO2 (K3)	-	-	-
CO3 (K3)	-	-	-
CO4(K4)	-	-	-
CO5 (K4)	-	-	-

**UNIT-I**

Mineral distribution in India and World. Contribution of mining to civilization, Stages in the life of a mine.

**UNIT-II**

Overview of surface mining, surface mining methods. Unit operations, Mechanization of surface mines.

**UNIT-III**

Overview of Underground Mines. Methods of Underground mining. Mechanization of underground mines.

**UNIT-IV**

Safety practices in opencast and underground Mines.

**UNIT-V**

Impacts of Mining on environment.

**Text Books:**

1. D.J.Deshmukh, Elements of Mining Technology, Denett& Co., Nagpur Vol. I, 1998.
2. DrT.N.Singh, Surface Mining, Lovely Prakashan, Dhanbad ,2<sup>nd</sup> edition 2002.
3. B.V.Gokhale, Blasthole drilling Technology, multifields, Bombay, 1<sup>st</sup> edition 2001.

**Reference Books:**

1. Indian Bureau of Mines, Minerals Year Book & other publications, Latest Edition.
2. DrC.M.Kole, Khuli Khan KaAyojan (Hindi), CMPDIL, Ranchi , 1<sup>st</sup> edition 1996.
3. Dr. Calvin Konya; “Rock Blasting and Overbreak Control” Precision Blasting Services, Montville, Ohio 2<sup>nd</sup> edition, 2004.

**Web Links:**

1. <http://www.miningglobal.com/operations/gifs-5-stages-mining-life-cycle>
2. [https://www.slideshare.net/umer\\_1/stages-in-life-of-mine](https://www.slideshare.net/umer_1/stages-in-life-of-mine)
3. <https://www.minecationstandards.org/fileadmin/MAS/documents/nmas-national>
4. [stabdards/afghanistan/AMAS\\_07.04\\_Storage\\_Transportation\\_Handling\\_of\\_Explosives.pdf](#)

## PROCESS INTENSIFICATION IN PETROLEUM INDUSTRY

(Open Elective - I)

V Semester

Course Code: 191PT5001

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To help the students to understand the basic principles and mechanisms adopted in process intensification methodologies.
- COB 2: To impart theoretical knowledge on various principles associated to various unit operations and unit processes.
- COB 3: To teach the students various principles associated to various unit operations.
- COB 4: To help the student's various principles associated to various unit operations and unit processes.
- COB 5: To impart knowledge on available in petrochemical, fine chemical, pharmaceutical, carbon capture and bioprocess engineering to understand the role of process intensification to improve process performance.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 : Apply the basic principles and mechanisms that are responsible for process intensification.
- CO 2 : Analyze various modifications to process equipment and designs with which process intensification becomes a reality in unit operations and unit processes.
- CO 3 : Analyze various case studies available in petrochemical, fine chemical, bioprocesses and carbon capture.
- CO 4 : Correlate textbook reported methodologies with Computational Fluid Dynamics and experimental process intensification.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO3 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO4 (K3)	1	-	-	-	-	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	1	-	-
CO2 (K3)	-	-	-
CO3 (K3)	-	-	-
CO4 (K3)	-	-	-

### UNIT-I

**History of Process Intensification:** Rotating boilers – Rotating non-pipe – Separators – Rotating heat transfer devices.

**Overview of Process Intensification:** Definition of Process Intensification (PI) – Advantages of PI – Obstacles to PI.

### UNIT-II

**Mechanisms Involved in Process Intensification:** Mechanisms involved in heat transfer intensification –Electrically enhanced process intensification – Microfluidics – Pressure.

**Compact and Micro-heat exchangers & Process Intensification:** Plate, Printed-circuit, Chart-flow, Polymer film, Foam and mesh heat exchangers – Micro-heat exchangers – Small channels – Nano fluids.

### UNIT-III

**Down hole Separation Technology:** Overview- Potential Down hole Separation Technology- Present Status- Advantages-Challenges-Down hole oil- water separation (DOWS) – hydro cyclone separator: Different configurations -Working Principle-Performance factors- Selection Criteria-Scale up-Experiences with problems-Reinjection systems- Down hole completion designs for DOWS – Down hole gas-water Separations-Application of electrical submersible pumps-Working principle-Modified plunger pumps. Three-phase Separation Technology- Case studies on DOWS and DGWS.

### UNIT-IV

**Application of Solar Energy in Oil and Gas Operations:** Solar Energy-PV Cells-Concentration of Solar Power-Energy use in offshore rigs and FPSO- Energy and Cost Analysis-Solar panels required to replace fossil fuels-Comparison of Diesel Power with Solar Power Costs-Ability of Solar Energy Use on Offshore Rigs-Solar Energy Enhanced Oil Recovery.

### UNIT-V

**Application of Divided Wall Distillation technology in separation of NGL:** Working principle of Divided wall distillation column-Advantages-Various configurations-Separation of NGL.

#### Text Books:

1. Process Intensification: Engineering for Efficiency, Sustainability and Flexibility, D. Reay, C. Ramshaw and A. Harvey, Butterworth-Heinemann, 1<sup>st</sup> Edition, Burlington, 2008.

#### Reference Books:

1. Re-Engineering the Chemical Processing Plant: Process Intensification, A. Stankiewicz and J.A. Moulijn (Editors), Marcel Dekker, New York, 2004.

#### Web Links:

1. <https://www.sciencedirect.com/book/9780750689410/process-intensification>
2. <https://www.sciencedirect.com/science/article/pii/B9780750689410000043>
3. <http://www.yourarticlelibrary.com/energy/solar-energy-10-major-application-of-solar-energy-explained/28197>
4. [https://en.wikipedia.org/wiki/Digital\\_divide](https://en.wikipedia.org/wiki/Digital_divide)

## FUNDAMENTALS OF PETROLEUM INDUSTRY

(Open Elective - I)

**V Semester**

**Course Code: 191PT5O02**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To help the students to understand the basic principles and mechanisms adopted in petroleum industry
- COB 2: To impart theoretical knowledge on various principles associated to various unit operations and unit processes
- COB 3: To teach the students various principles associated to various unit operations
- COB 4: To help the student's various principles associated to various treating operations and unit processes
- COB 5: To impart knowledge on available in petroleum well servicing unit

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 : Apply the basic principles and mechanisms that are responsible for petroleum industry.
- CO 2 : Analyze various modifications to equipment and designs with which evaluate the lithological characteristics and behavior of reservoir.
- CO 3 : Analyze various case studies available in petrochemical, chemical, bioprocesses for treatment of wastage.
- CO 4 : Analyze various modification to well for better production rate.

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K4)	-	-	-	-	-	-	-	-	-	-	-	-
CO3 (K4)	-	-	-	-	-	-	-	-	-	-	-	-
CO4 (K4)	-	-	-	-	-	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	-	-	-
CO2 (K4)	-	-	-
CO3 (K4)	-	-	-
CO4 (K4)	-	-	-

### UNIT-I

**The history of production:** Oil beginning- A case for casing- More fireworks- Underground mysteries- Breathing of the earth- Crisis and reservoir engineering- Horizontal drilling- The great offshore-Indian scenario.

### UNIT-II

**The reservoir:** Origin- Transformation- Characterization- Discovery.

**What's in the container? The prize:** Determinants- The contents- The chemistry- Composition- Properties- Impurities- Fingerprints- The origin of hydro carbons.

**Drilling:** The spring pole- Cable tool drilling and operations- Rotary drilling- Rig components- Drilling mud- Blowout preventers- Drilling off shore- Top drives and automation- The course- Location

**UNIT-III**

**Logging testing and completing:** Logging- Correlation logs- Real time-Directional and horizontal wells- Original hydrocarbons in place- Open hole testing- Completions- Cased hole logging and measuring devices.

**Hydrocarbon activity in the reservoir:** Phases- Phases diagrams- Reservoir fluid categories- Using phase diagrams- Gas wells Vs oil wells- Shrinkage– Solution gas- oil ratio- Relative permeability.

**Production:** The motivating force- Drive mechanisms- Producing phases-Primary production- Secondary recovery- Pressure maintenance and water flooding- Tertiary recovery.

**UNIT-IV**

**Making it marketable:** Field processing: Gas treating- Oil treating- Water disposal- Testing- Measurement and metering- Storage.

**UNIT-V**

**Remedial operations and workovers:** Decision making- Workover rigs-Coiled tubing- Subsea completions- Well problems and stimulation-Changing production intervals.

**Text Books:**

1. Oil and Gas Production in Nontechnical Language, Martin S. Raymond& William L. Leffler, Penn Well Corporation, 2006.

**Reference Books:**

1. Introduction to Oil and Gas Production, American Petroleum Institute,5th Edition, 1996.
2. Oil and Gas Production Hand Book: An Introduction Oil and Gas Production, Havard Devold, ABB ATPA Oil and Gas, 2006.

## BASIC CROP PRODUCTION PRACTICES

(Open Elective – I)

**V Semester**

**Course Code: 191AG5001**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### Course Objectives:

- COB 1: To enable the students to study principles of agricultural and horticultural crop production and to introduce the production practices of crops.
- COB 2: To make the students to acquire knowledge for delineate the role of agricultural and irrigation engineers in relation to various crop production practices.
- COB 3: To make the students to acquire knowledge on crop selection, crop production and crop management.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1 : Explain factors affecting on crop growth and production.
- CO 2 : Explain crop selection and establishment of an adequate crop stand and ground cover.
- CO 3 : Explain crop water management.
- CO 4 : Apply agriculture crops production practices in field.
- CO 5 : Apply the horticulture crops production practices in field.

### Mapping of course outcomes with program outcomes:

CO's/PO's	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO2 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO3 (K2)	1	-	-	-	-	-	-	-	-	-	-	-
CO4 (K3)	1	-	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	1	-	-	-	-	-	-	-	-	-	-	-

### Mapping of course outcomes with program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K2)	-	-	1
CO2 (K2)	-	-	1
CO3 (K2)	-	1	-
CO4 (K3)	-	-	-
CO5 (K3)	-	-	-

### UNIT-I

**Agriculture and Crop Production:** Introduction to agriculture and its crop production sub-sectors – field crop production and horticulture; Factors affecting crop growth and production: genetic (internal) and environmental (external) factors; Crop management through environmental modification and adaptation of crops to the existing environment through crop cultural practices.

### UNIT-II

**Crop Selection and Establishment:** Regional and seasonal selection of crops; Systems of crop production; Competition among crop plants; Spacing and arrangement of crop plants; Field preparation for crops including systems of tillage; Establishment of an adequate crop stand and ground cover, including selection and treatment of seed, and nursery growing.



**UNIT-III**

**Crop Management:** Crop water Management; a Crop nutrition management – need for supplementation to soil supplied nutrients, sources, generalized recommendations, methods and timing of application of supplemental nutrients including fertigation scheduling; Crop protection including management of weeds, pests and pathogens; Integrated methods of managing water, nutrients and plant protection; Types and methods of harvest.

**UNIT-IV**

**Production Practices of Agricultural Crops:** Generalized management and cultivation practices for important groups of field crops in Andhra Pradesh: cereal crops, grain legumes, oil seed crops, sugarcane, and fiber crops, and special purpose crops such as those grown for green manure and fodder.

**UNIT-V**

**Production Practices of Horticultural Crops:** Important basic groups of horticultural crops in A.P such as vegetable crops, fruit crops, flower crops; Cultivation practices of major fruits, major vegetables and major flowers of each group; Special features of production of horticultural crops – greenhouse cultivation, Organic farming, Zero budget farming, Vertical gardening and Kitchen farming.

**Text Books:**

1. Rajendra Prasad, Text Book of Field Crop Production. Directorate of Information and Publication, Krishi Anusandhan Bhavan, Pusa, New Delhi, 2015.
2. Reddy T. Sankara G.H. Yellamanda Reddi, Principles of Agronomy, Kalyani Publishers, New Delhi, 2005.
3. Handbook of Agriculture. ICAR Publications, New Delhi, 2011.

**Reference Books:**

1. Bose T. K. and L.P.Yadav. Commercial Flowers, Naya Prakash, Calcutta.1989.
2. Crop Production Guide, Tamil Nadu Agricultural University Publication, Coimbatore.2005.
3. Kumar, N., Abdul Khader, M. Rangaswami, P. and Irulappan, I. Introduction to spices, plantation crops, medicinal and aromatic plants. Rajalakshmi Publications, Nagercoil.1993.
4. Kumar, N., "Introduction to Horticulture", Rajalakshmi Publications. Nagercoil,7<sup>th</sup> edition, 2015.
5. Shanmugavel, K.G. Production Technology of Vegetable Crops. Oxford India Publications, New Delhi. 1989.

**Web Links:**

1. [https://www.careerlauncher.com/cbse-ncert/class-8/Science/CBSE-CropProduction and Management-Notes.html#:~:text=%20E2%80%A2%20Basic%20Practices %20of% 20Crop,is%20called%20ploughing%20or%20tilling.](https://www.careerlauncher.com/cbse-ncert/class-8/Science/CBSE-CropProduction and Management-Notes.html#:~:text=%20E2%80%A2%20Basic%20Practices%20of%20Crop,is%20called%20ploughing%20or%20tilling.)
2. [https://www.edubeans.com/Class\\_VIII\\_Science\\_Crop-Production-and-Management.php](https://www.edubeans.com/Class_VIII_Science_Crop-Production-and-Management.php)
3. [https://www.edubeans.com/Class\\_VIII\\_Science\\_Crop-Production-and-Management.php](https://www.edubeans.com/Class_VIII_Science_Crop-Production-and-Management.php)
4. [https://www.edubeans.com/Class\\_VIII\\_Science\\_Crop-Production-and-Management.php](https://www.edubeans.com/Class_VIII_Science_Crop-Production-and-Management.php)
5. [http://cbseacademic.nic.in/web\\_material/Curriculum/Vocational/2018/Basic%20Agriculture%20X%20\(408\).pdf](http://cbseacademic.nic.in/web_material/Curriculum/Vocational/2018/Basic%20Agriculture%20X%20(408).pdf)

## OPERATING SYSTEMS AND COMPUTER NETWORKS LAB

(Common to CSE & IT)

V Semester

Course Code: 191CS5L04

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Objectives:**

- COB 1: To enable the students design and apply the process management concepts.
- COB 2: To impart the knowledge of System calls and Deadlock handling algorithm.
- COB 3: To demonstrate the memory management concepts.
- COB 4: To impart knowledge on the design concepts of computer networks
- COB 5: To enable the students design and apply data link layer framing techniques
- COB 6: To demonstrate the routing algorithms, error correction and detection
- COB 7: To make the students learn encryption techniques to secure data in transit

**Course Outcomes:**

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

- CO 1: Simulate various process scheduling algorithms.
- CO 2: Experiment with various system calls.
- CO 3: Develop algorithm to implement deadlocks avoidance and memory management algorithms.
- CO 4: Simulate various Framing method.
- CO 5: Implement various routing algorithms for effective data transmission.

**Mapping of Course Outcomes with Program Outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1(K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO2(K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO3(K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO4(K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO5(K3)	3	2	1	-	-	-	-	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO /PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	3	3	2
CO2 (K3)	3	3	2
CO3 (K3)	3	3	2
CO4 (K3)	3	3	2
CO5 (K3)	3	3	2

**List of Experiments:****OPERATING SYSTEMS LAB****1) CPU scheduling algorithms**

- 1.1) Simulate the FCFSCPU scheduling algorithm.
- 1.2) Simulate the SJFCPU scheduling algorithm.

- 1.3) Simulate the Priority CPU scheduling algorithm.
- 1.4) Simulate the Round Robin CPU scheduling algorithm.

## **2) System calls**

- 2.1) Implementation of fork (), wait(), exec(),and exit(), System calls.
- 2.2) Implementation of cp command with the use of open(),read(), write () system calls.

## **3) Deadlock Avoidance**

- 3) Simulate Bankers Algorithm for DeadLock Avoidance.

## **4) Page Replacement Algorithms**

- 4.1) Simulate the FIFO page replacement algorithm.
- 4.2) Simulate the LRU page replacement algorithm.
- 4.3) Simulate the LFU page replacement algorithm.

## **5) Multiprogramming**

- 5.1) Simulate the Multiprogramming with affixed number of tasks (MFT).
- 5.2) Simulate the Multiprogramming with a variable number of tasks (MVT).

## **6) File Allocation**

- 6.1) Simulate the Sequenced File allocation strategies.
- 6.2) Simulate the Indexed File allocation strategies.
- 6.3) Simulate the Linked File allocation strategies.

## **COMPUTER NETWORKS LAB**

### **7) Framing Method**

- 1.1) Implement data link layer framing method of Character stuffing.
- 1.2) Implement data link layer framing method of Bit stuffing

### **8) Cyclic Redundancy Check**

- 2.1 ) Implement CRC 12.
- 2.2 ) Implement CRC 16.
- 2.3 ) Implement CRC CCIT.

- 9) Implement Dijkstra's algorithm to compute the shortest path through a graph
- 10) Implement distance vector routing algorithm
- 11) Implement subnet of hosts to obtain Broadcasting
- 12) Implement Sliding Window Protocol for Go – Back N.

### **List of Augmented Experiments:**

(Any 2 of the following experiments can be performed)

- 13) Simulate Best-Fit contiguous memory allocation technique.
- 14) Simulate FCFS Disk Scheduling algorithm.
- 15) Implementation of link state routing algorithm
- 16) Implement Sliding Window Protocol for Selective Repeat

**Reference Books:**

1. Operating Systems: Design and Implementation, Andrew S.Tanenbaum, Albert S.Woodhu, 2<sup>nd</sup> Edition,.
2. Instructors Manual to Accompany Operating
3. A Practical Guide to Computer Network & Internet Technologies, Babu Ram Dawadi  
Institute of Engineering, Pulchowk Campus, Tribhuvan University.

**Web Links:**

1. <https://www.coursera.org/learn/fundamentals-network-communications>.
2. <http://www.indiastudychannel.com/resources/150255-Computer-Networks-Lab-Programs-for-BTech-Computer-Science-and-Engineering-CSE.aspx>
3. <http://www.askforprogram.in/p/computer-ne.htm>

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## DATABASE MANAGEMENT SYSTEMS LAB

(Common to CSE & IT)

V Semester

Course Code: 191CS5L05

L	T	P	C
0	0	2	1

**Course Objectives:**

- COB 1: To impart the fundamentals on the relational data model.
- COB 2: To make the students to implement SQL and procedural interfaces to SQL.
- COB 3: To enable the students to build three level architectures.
- COB 4: To illustrate the components of SQL and its applications.
- COB 5: To interpret the concepts and techniques relating to query processing by SQL.
- COB 6: To impart the knowledge on development of packages.

**Course Outcomes:**

At the end of the course student will be able to

- CO 1: Make use of the concepts of relational model techniques for database design.
- CO 2: Construct a database schema for a given problem-domain.
- CO 3: Apply Normalization techniques on a database to avoid anomalies.
- CO 4: Build queries on a database using SQL DDL/DML commands.
- CO 5: Apply integrity constraints on a database using RDBMS.
- CO 6: Develop PL/SQL stored procedures, stored functions, cursors and packages.

**Mapping of Course Outcomes with Program Outcomes:**

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO2 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO3 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO5 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO6 (K3)	3	2	1	1	3	-	3	-	-	-	-	-

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO1 (K3)	3	3	2
CO2 (K3)	3	-	2
CO3 (K3)	3	3	2
CO4 (K3)	3	3	3
CO5 (K3)	3	3	2
CO6 (K3)	3	-	2

**List of Experiments:****SQL:**

- 1) Queries for Creating, Altering and Dropping Tables, and Constraints.
- 2) Queries to Retrieve and Change Data: Select, Insert, Delete and Update.
- 3)
  - 1.1) Queries to facilitate acquaintance of Built-in Functions: String Functions, Numeric Functions, Date Functions and Conversion Functions.
  - 1.2) Queries using operators in SQL.

4)

4.1) Queries using Group By, Order By, and Having Clauses.

4.2) Queries on Joins and Correlated Sub-queries.

5) Queries on Controlling Data: Commit, Rollback, and Savepoint.

6) Queries on Working with Index, Sequence.

7) Queries to Build Views.

**PL/SQL**

8) Write a PL/SQL Code using Basic Variables and Usage of Assignment Operation.

9) Write a PL/SQL Code to Bind and Substitute variables in PL/SQL.

10) Write a PL/SQL block using SQL and Control Structures.

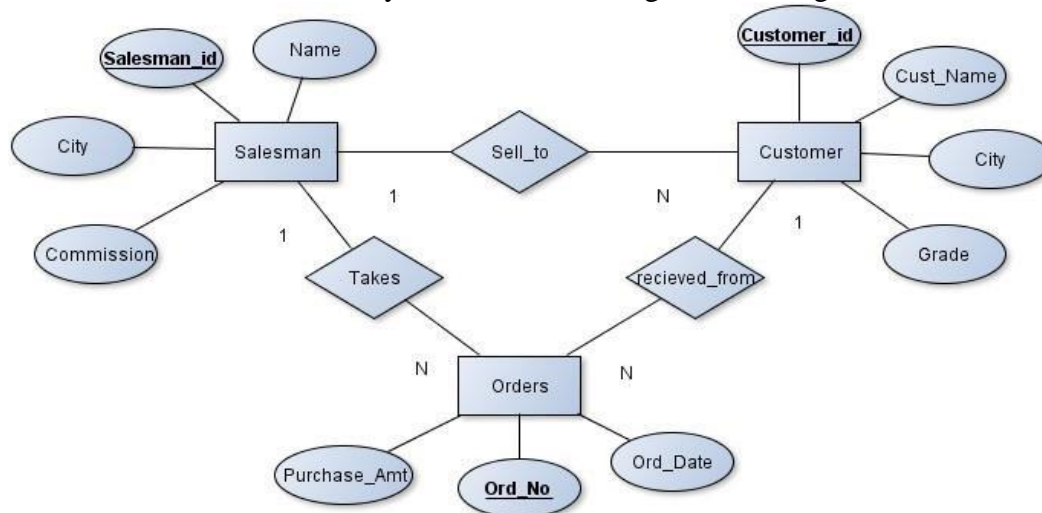
11) Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types.

12) Write a PL/SQL Code using Procedures, Functions, Packages.

**List of Augmented Experiments:**

(Any 2 of the following experiments can be performed)

13) For a Sales Order Database System, based on the given E-Rdiagram.



a. Design a schema by applying functional dependencies.

b. Apply constraints and verify them.

14) Based on the following schema for a Library Database:

BOOK (Book\_id, Title, Publisher\_Name, Pub\_Year)

BOOK\_AUTHORS (Book\_id, Author\_Name) PUBLISHER (Name, Address, Phone)

BOOK\_COPIES (Book\_id, Branch\_id, No-of\_Copies)

BOOK\_LENDING (Book\_id, Branch\_id, Card\_No, Date\_Out, Due\_Date)

LIBRARY\_BRANCH (Branch\_id, Branch\_Name, Address)

14.1) Draw the E-R diagram and show the necessary multiplicity and associations among them.

14.2) Draw the Schema diagram and show the necessary associations among them.

**15) For a Faculty Database:**

EMPLOYEE (EMPID, FName, LName, Address, Sex, Salary, DeptNo)

DEPARTMENT (DeptNo, DName, HOD\_EMPID)

PROJECT (ProjNo, PName, DeptNo)

WORKS\_ON (EMPID, ProjNo, Hours)

**EMPLOYEE DATA:**

EMPID	FName	LName	Address	Sex	Salary	DeptNo
1201	Adarsh	Kumar	Kakinada	F	150000	1
1240	Mahi	John	Rajahmundry	F	95000	1
1245	Ramu	Murty	Rajahmundry	M	90000	2
1234	Aditya	Surya	Banglore	M	80000	1
1247	Jack	Paul	Banglore	M	75000	2
1235	Pradeep	Chitra	Rajahmundry	M	78000	1
1211	Srinivas	Kumar	Hyderabad	M	59000	1
1492	Gopala	Rao	Kakinada	M	65000	2
1250	Eswari	Nirupama	Kakinada	F	65000	2

**DEPT DATA:**

Dept.No	D. Name	HOD_EMPID
1	CSE	1240
2	IT	1245

**PROJECT DATA:**

Proj. No	P. Name	Dept. No
100	IoT	1
101	CLOUD	1
102	BIGDATA	2
103	NETWORKS	2
104	IOT	2
105	NETWORKS	1

**WORKS\_ON DATA:**

EMPID	Proj. No	Hours
1245	104	16
1240	101	22
1201	100	31
1250	102	25
1492	103	25
1235	105	29

With the sample data Write SQL queries to

15.1) To Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.

15.2) Find the sum of the salaries of all employees of the 'IT' department, as well as the maximum salary, the minimum salary, and the average salary in this department.

**16) For a Movie Database:**

ACTOR (Act\_id, Act\_Name, Act\_Gender) DIRECTOR (Dir\_id,Dir\_Name)

MOVIES (Mov\_id, Mov\_Title, Mov\_Year, Dir\_id) MOVIE\_CAST (Act\_id, Mov\_id, Role)

RATING (Mov\_id, Rev\_Stars)

With the sample data Write SQL queries to

1. List the titles of all movies directed by 'STEVENSPIELBERG'.
2. Find the movie names where one or more actors acted in two or more movies.
3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).
6. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.

**ACTOR DATA:**

Act_id	Act_Name	Act_Gender
01	DICAPRIO	M
02	KATE WINSLET	F
103	SAM WORTHINGTON	M
104	SAM NEIL	M
105	CATE BLANCHETT	F
106	CHRIS PRATT	M
107	BRYCE DALLAS	F
108	LAURA DERN	F
109	DANIEL YORK	F

**DIRECTOR DATA:**

Dir_id	Dir_Name
10	STEVEN SPIELBERG
11	JAMES CAMERON
12	MARTIN SCORSESE
13	BAZ LUHRMANN
14	CHRISTOPHER NOLAN
15	COLIN TREVORROW
16	RIDLEY SCOTT

**MOVIES DATA:**

Mov_id	Mov_Title	Mov_Year	Dir_id
1001	JURASSIC PARK	1993	10
1002	TITANIC	1997	11
1003	THE AVIATOR	2004	12
1004	BODY OF LIES	2008	16
1005	AVATAR	2009	11
1006	INCEPTION	2010	14



1007	THE GREAT GATSBY	2013	13
1008	JURASSIC WORLD	2015	15
1009	THE BFG	2016	10
1010	THE POST	2017	10

**MOVIES\_CAST DATA:**

Act_id	Mov_id	Role
104	1001	HERO
108	1001	HEROINE
101	1002	HERO
102	1002	HEROINE
101	1003	HERO
109	1003	HEROINE
101	1004	HERO
103	1005	HERO
101	1006	HERO
101	1007	HERO
106	1008	HERO
107	1008	HEROINE

**RATING DATA:**

Mov_id	Rev_stars
1001	5
1002	6
1003	3
1004	4
1005	4
1006	2
1007	2
1008	6
1009	4
1010	2

**Reference Books:**

1. SQL, PL/SQL The programming language of ORACLE, Ivan Bayross, Fourth edition, BPB Publication, 2009.
2. SQL/PLSQL for ORACLE 9i, P.S.Desh pande, Dream tech Press, 2003.
3. Teach yourself PL/SQL in 21 days, Tom Luers, Timothy Atwood and Jonatham Gennick, First Edition, Techmedia, 1997.

**Web Links:**

1. <http://nptel.ac.in/courses/106106093/6>
2. <http://www.tutorialspoint.com/plsql/>
3. <https://www.plsql.co/>
4. <https://www.w3schools.com/sql/>
5. <http://www.cs.wisc.edu/~dbbook>

## EMPLOYABILITY SKILLS-III

(Common to all branches)

**V Semester**

**Course Code: 191HS5T06**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### Course Objectives:

- COB 1: To provide basic communication to ensure employability skills.
- COB 2: To meet the changing global needs and demands.
- COB 3: To orient students towards career and profession.
- COB 4: To equip students with fundamental and advanced inputs as various techniques of strengthening their professional abilities.

### Course Outcomes:

At the end of the Course, Student will be able to:

- CO 1: Calculate the clock and calendar problems by simple methods.
- CO 2: Discuss about different types of puzzles.
- CO 3: Breakdown the typical write-up skills.
- CO 4: Apply different types of models on percentages, profit and loss, simple interest and compound interest.
- CO 5: Demonstrate the tools of the soft skills.

### Mapping of Course Outcomes with Program Outcomes

CO/PO	PO 1 (K3)	PO 2 (K4)	PO 3 (K5)	PO 4 (K5)	PO 5 (K3)	PO 6 (K3)	PO 7 (K2)	PO 8 (K3)	PO 9 (K2)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO 1(K3)	-	-	-	-	-	-	-	-	-	-	-	2
CO 2(K3)	-	-	-	-	-	-	-	-	-	2	-	2
CO 3(K2)	-	-	-	-	-	-	-	-	-	-	-	2
CO 4(K4)	-	-	-	-	-	-	-	-	-	-	-	2
CO 5(K3)	-	-	-	-	-	-	-	-	-	2	-	2

### Mapping of Course Outcomes with Program Specific Outcomes

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)
CO 1(K3)	-	-	-
CO 2(K3)	-	-	-
CO 3(K2)	-	-	-
CO 4(K4)	-	-	-
CO 5(K3)	-	-	-

### UNIT-I

**Aptitude:** puzzle test, group reasoning.

**Soft Skills:** Group discussion.

### UNIT-II

**Aptitude:** clock, calendar.

**Soft Skills:** Resume writing, Personalized Resume preparation, Compose and Prepare a cover letter.

### UNIT-III

**Aptitude:** cubes & dice, partnership.

**Soft Skills:** E-mail -Writing & Etiquette, Business Etiquette.

### UNIT-IV

**Aptitude:** percentage, profit and loss.

**Soft Skills:** Interviewing skills-1, Do's & don'ts in an interview, Interview Demonstration Videos, Interview Preparation.

**UNIT-V**

**Aptitude:** simple interest, compound interest

**Soft Skills:** Stress Management, Personal priorities effect on career decisions, Personal priorities to professional priorities.

**Text Books:**

1. Quantitative Aptitude - Dr. R.S. Aggarwal , S CHAND.
2. Quick Learning Objective General English – Dr. R.S. Aggarwal, S CHAND.

**Reference Books:**

1. Quantitative Aptitude - Abhijit Guha Mc Graw Hill Publications.
2. Quantitative Aptitude–Arun Sharma, Mc Graw Hill Publications.
3. A New Approach to Objective English -R.S. Dhillon DGP Publications.

**Web Links:**

1. [www.indiabix.com](http://www.indiabix.com)
2. [www.bankersadda.com](http://www.bankersadda.com)