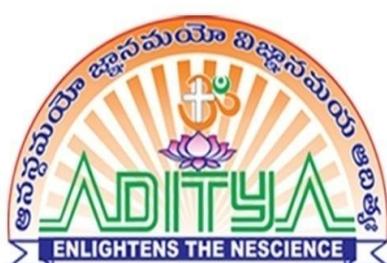


ACADEMIC REGULATIONS, PROGRAM STRUCTURE AND SYLLABUS

**COMPUTER SCIENCE &
ENGINEERING**

For

B.Tech FOUR YEAR DEGREE PROGRAM
(Applicable for the batches admitted from 2017-18)
(I to VIII 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 125 Acres of pollution free and lush green landscaped surroundings by the visionaries of Aditya Academy who are in the glorious service field of education since last 33 years.

AEC believe in the holistic development of society at large and are researching its efforts in multi-disciplinary activities. We shoulder the responsibility of shaping the Intellect, Character and Physique of every student, because we believe that these students would be the architects to develop a humanized and harmonious society, and the nation as a whole.

Our vision is to impart education, in a conductive ambience, 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 betterment of our society. It is our endeavor to develop a system of Education which can harness students' capabilities and the muscles of the mind thoroughly trained to enable it to manifest the great feats of intellectualism which it is capable of.

SALIENT FEATURES:

- An Autonomous Institution.
- Accredited by NAAC with "A" Grade in 2015 and NBA in 2008.
- Recognized by UGC under sections 2(f) & 12(B).
- Affiliated to JNTUK, Kakinada.
- Recognized by Scientific and Industrial Research Organizations (SIROs) of Department of Scientific and Industrial Research, Ministry of Science and Technology, Govt. of India.
- Rated as "GOLD" Category institute by AICTE-CII Survey of Industry – Linked Technical Institutes 2016.
- Bagged Grade "A" (top grade) by the Govt. of A.P.
- Dept. of Science and Technology under Technology Development Board has sanctioned Incubation Centre and only one College in the state received this financial Assistance.

- Best Rankings & Ratings given to Aditya by reputed Magazines & journals in their surveys:
 - Grade AAA by careers 360.
 - One of the best 20 Engineering colleges in India by The Sunday Indian.
 - South India IV rank by Digital Mailers.
 - South India VI rank by Silicon India.
 - India 13th Rank out of top 25th Engineering Colleges by 4Ps.
 - Asia's Top 100 colleges by WCRC Leaders.
 - Higher Education Review 35th Rank in India.
 - South India's 68th Rank, India's 99th Rank by the Week magazine.
 - 8th Rank in providing high quality infrastructure out of 10 engineering Colleges in India by The Week magazine and more
- The college has students from 17 states across India & 13 foreign countries.
- 150+ foreign students.
- Honored with Best Placement Award by Chief Minister of Andhra Pradesh.
- Only one college in AP received Best Performance Award from Tech Mahindra for its outstanding achievement in campus placements.
- Remarkable achievement of campus placements in CMM Level 5 Companies
- Students received Gold Medals at University level.
- Offering most job potential engineering courses of Petroleum Engineering, Mining Engineering, and Agricultural Engineering in addition to the regular courses of Mechanical, Civil, and EEE, ECE, CSE and IT at UG, PG and Diploma Levels.
- Skill Development Centre with the collaboration of Govt. of A.P. (APSSDC)
- 0. Siemens Centre of Excellence Campus.
- 1. PMKVY Skill Development Centre Campus.
- 2. South India's first Microsoft Ed-vantage Platinum Campus.
- Campus of Microsoft innovation centre.
- Adobe's Centre of Excellence Campus.
- Campus of CISCO Networking Academy.
- MOU with 4 Foreign Universities.
- MOU with Educational Consultants India Ltd., (EdCil).
- On campus Nationalized Bank with 8 ATMs facility.
- On campus hostels with world class infrastructure facilities & 50+ resident staff.
- Own transportation facility to pickup and drop the students and staff covering all the villages in the District with more than 60 buses.

ACADEMIC REGULATIONS (AR17)

Applicable for the students admitted from the academic year 2017-18 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.

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

2. PROGRAMS OF STUDY

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

S. No	Branch	Program code
01	Civil Engineering	01
02	Electrical and Electronics Engineering	02
03	Mechanical Engineering	03
04	Electronics and Communication Engineering	04
05	Computer Science and Engineering	05
06	Information Technology	12
07	Mining Engineering	26
08	Petroleum Technology	27
09	Agricultural Engineering	35

3. 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 Industry-Oriented (Internship) Minor Project shall be evaluated for 50 marks, Major Project work for 200 marks, Audit courses for 50 marks and Employability Skills course for 50 marks.

3.2 For theory courses, the distribution shall be 40 marks for Sessional evaluation and 60 marks for the End - Examinations. 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 (Conducted at College level with 20 Multiple choice questions with a weightage of ½ mark each) and Assignment - 06 (Theory, 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 is conducted for 10 marks and descriptive examination is conducted for 24 marks are to be added to the assignment of 06 marks for finalizing Sessional marks of 40. The End examination is conducted for 60 marks in 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.

- 3.3 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, day-to-day work-15 marks, observation and Record-10 marks and laboratory Exam -15 marks. The End examination shall be conducted by the concerned teacher and external examiner appointed by the Principal.
- 3.4 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 day - to - day work, 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.
- 3.5 For audit courses, during a semester there shall be one examination for 50 marks for a duration of 180 minutes in which a student should get minimum 40% of the marks for satisfactory, otherwise the student is considered as not satisfactory. The

examination is conducted by covering the topics of all units, which contains five 10 marks questions with internal choice from each unit and each question may have sub questions. If a student failed to get satisfactory marks or is absent for examination, he has to write the exam in that course when conducted next.

- 3.6 For Employability Skills (which includes Aptitude and Soft Skills) as an audit course, during a semester there shall be an evaluation for 50 marks. For Aptitude, an examination is conducted for 50 minutes with 50 questions carrying 25 marks (multiple choice questions weightage of $\frac{1}{2}$ mark each). For Soft Skills, an activity based examination is conducted for 25 marks. The marks obtained for Employability Skills is the sum of marks obtained in Aptitude and Soft Skills together for 50. The student should get minimum 40% of the marks for satisfactory; otherwise the student is considered as not satisfactory. If a student failed to get satisfactory marks or is absent for examination, he has to write the exam in that course when conducted next.
- 3.7 For Employability Skills (which includes Aptitude and Soft Skills) as a credit course, the exam is conducted for 50 marks in which 20 marks are conducted for Sessional examination and 30 marks for Semester End Examination. There shall be two sessional examinations during the semester. For Aptitude, Sessional examination is conducted for 20 minutes with 20 questions (multiple choice questions weightage of $\frac{1}{2}$ mark each) carrying 10 marks and for Soft Skills, Sessional examination is conducted as activity based for 10 marks. The Sessional Marks for Employability Skills is the sum of marks obtained in Aptitude and Soft Skills together for 20. 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 30 minutes with 30 questions (multiple choice questions weightage of $\frac{1}{2}$ mark each) carrying 15 marks and for Soft Skills, it is conducted as activity based for 15 marks.
- 3.8 For Industry-Oriented (Internship) Minor Project, the students have to do a project in collaboration with an industry of their specialization, during the vacation after VI Semester End examination. However, the minor project and its report shall be evaluated in VII Semester. The Minor Project shall be submitted in report form and should be presented before the committee, which shall be evaluated for Sessional marks of 50. The committee consists of Head of the

Department, Supervisor of the minor project and a senior faculty member of the department. There shall be no external evaluation.

- 3.9 For Major Project, 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 on the basis of two seminars given by each student on the topic of his major project and evaluated by an internal committee that consists of Head of the Department, Supervisor of the major project and one senior faculty of the department. 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 major project.

4. ATTENDANCE REQUIREMENTS

- 4.1 A student shall be eligible to write the End examinations if he acquires a minimum of 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 a 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 fee of Rs. 500/- shall be payable towards condonation for 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 is shortage of attendance in a semester may seek re-admission into that semester when offered within 2 weeks from the date of the commencement of class work.

5. MINIMUM ACADEMIC REQUIREMENTS

The following academic requirements have to be satisfied 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 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 takes 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 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 exam 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. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

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:

Class Awarded	CGPA to be secured	From the CGPA Secured from 180 Credits
First Class with Distinction	≥ 7.75 with no course failures	
First Class	≥ 6.75 with course failures	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 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):

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

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

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

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

COMPUTATION OF CGPA

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

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

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

- ii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- iii. Equivalent Percentage = $(CGPA - 0.75) \times 10$

8. MINIMUM INSTRUCTION DAYS

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

9. TRANSFER

9.1 Aditya Engineering College (AEC) proposes to practice JNTUK / State government guidelines for transfer.

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

10. WITHHOLDING OF RESULTS

If the student not paid any dues to the college or involved in indiscipline activities, 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 readmitted students will be governed by the regulations under which the student has been admitted.
- 11.3
 - a) In case of transferred students from other Universities / colleges, the credits shall be transferred to AEC as per the academic regulations and course structure of the AEC.
 - b) The students seeking transfer to AEC from various other universities/institutions have to obtain the credits of any equivalent courses as prescribed by college. In addition the transferred students have to pass the failed courses at the earlier institute.

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 at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

ACADEMIC REGULATIONS (AR17) LATERAL ENTRY

Applicable for the students admitted into III semester from the Academic Year 2018-19 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.
- 1.2 The student shall register for 133 credits and secure all the 133 credits. All the credit courses shall be considered for calculation of SGPA and CGPA.

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:

Class Awarded	CGPA to be secured	From the CGPA Secured from 133 Credits
First Class with Distinction	≥ 7.75 with no course failures	
First Class	≥ 6.75 with course failures	
Second Class	≥ 5.75 to <6.75	
Pass Class	≥ 4.75 to <5.75	

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

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.

	Nature of Malpractices / Improper conduct	Punishment
	If the candidate	
1(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the 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 subject 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 offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
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 or Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

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

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

LET US MAKE ADITYA A RAGGING FREE CAMPUS

Ragging



ABSOLUTELY NO TO RAGGING

- 1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
- 2. Ragging entails heavy fines and/or imprisonment.**
- 3. Ragging invokes suspension and dismissal from the College.**
- 4. Outsiders are prohibited from entering the College and Hostel without permission.**
- 5. Girl students must be in their hostel rooms by 7.00 p.m.**
- 6. All the students must carry their Identity Cards and show them when demanded**
- 7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

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 produce competent professionals to become part of the industry and research organizations at the national and international levels through excellence in Computer Science & Engineering education and research.

MISSION

- M1: Designing curriculum to meet the future challenges in Computer Science & Engineering and society by anticipating relevant trends.
- M2: Inculcating the problem solving skills, leadership qualities in students and enable them to work in teams to become successful in their careers.
- M3: Nurturing with Scientific Research in the field of Information Technology, enable students to involve in technological innovations.
- M4: Transforming the Computer Science and Engineering department as a leader in imparting Computer Science and Engineering education and research by a committed faculty.

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

PEO 1	Successfully be employed in industry, government, or entrepreneurial endeavors and solve complex problems by the applications of Technologies to meet the needs of employers.
PEO 2	Adapt to new technologies, tools and methodologies, to assess and respond to the challenges of the changing environment and needs of the society by providing sustainable innovative solutions to upgrade the society forever.
PEO 3	Apply fundamental knowledge, making them fit to pursue higher education in leading University in India/abroad or computing as a career.
PEO 4	Demonstrate interpersonal skills, leadership ability and team building to achieve organization goals and serve society with professional ethics and integrity.

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

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

PSO 1	Identify, formulate, and solve Computer Science and engineering problems
PSO 2	Apply modern computer languages, environments, and platforms leading to innovative career paths.
PSO 3	Design and develop software in Networking, Mobile, Cloud Computing, Security etc.,
PSO 4	Analyze the enormous data using data analytics tool and various programming languages.

Mission of the department – PEOs mapping

PEO's Statements	M1	M2	M3	M4
PEO 1: Successfully be employed in industry, government, or entrepreneurial endeavors and solve complex problems by the applications of Technologies to meet the needs of employers.	3	3	3	3
PEO 2: Adapt to new technologies, tools and methodologies, to assess and respond to the challenges of the changing environment and needs of the society by providing sustainable innovative solutions to upgrade the society forever.	3	3	3	3
PEO 3: Apply fundamental knowledge, making them fit to pursue higher education in leading University in India/abroad or computing as a career.	3	3	3	3
PEO 4: Demonstrate interpersonal skills, leadership ability and team building to achieve organization goals and serve society with professional ethics and integrity.	2	2	2	3

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	
171HS1T01	English – I	HSS	3	1	---	4	3
171BS1T01	Mathematics – I	BS	3	1	2	6	3
171BS1T02	Mathematics – II	BS	3	1	---	4	3
171BS1T04	Applied Physics	BS	3	1	---	4	3
171ES1T03	Engineering Drawing	ES	3	1	---	4	3
171ES1T01	Computer Programming	ES	3	1	---	4	3
171HS1L01	English Communication Skills Lab – I	HSS	---	---	3	3	2
171BS1L04	Applied Physics Lab	BS	---	---	3	3	2
171ES1L01	Computer Programming Lab	ES	---	---	3	3	2
TOTAL			18	6	11	35	24

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	
171HS2T03	English – II	HSS	3	1	---	4	3
171BS2T06	Mathematics – III	BS	3	1	2	6	3
171HS2T02	Environmental Studies	HSS	2	1	---	3	2
171BS2T05	Applied Chemistry	BS	3	1	---	4	3
171ES2T02	Engineering Mechanics	ES	3	1	---	4	3
171CS2T01	Data Structures through C	PC	3	1	2	6	3
171HS2L02	English Communication Skills Lab – II	HSS	---	---	3	3	2
171BS2L03	Applied Chemistry Lab	BS	---	---	3	3	2
171ES2L02	Engineering Workshop & IT Workshop	ES	---	---	3	3	2
TOTAL			17	6	13	36	23

BS: Basic Sciences; HSS: Humanities and Social Sciences; ES: Engineering Sciences; PC: Professional Core;
PE: Professional Elective; OE: Open Elective; SS: Self Study Course; PR: Project.

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	
171BS3T08	Mathematical Foundations of Computer Science	BS	3	1	---	4	3
171ES3T23	Digital Logic Design	ES	3	1	---	4	3
171CS3T02	Statistics with R Programming	PC	3	---	2	5	3
171CS3T03	Object Oriented Programming Through C++	PC	3	1	---	4	3
171HS3T04	Managerial Economics & Financial Analysis	HSS	3	1	---	4	3
171CS3T04	Advanced Data Structures	PC	3	1	---	4	3
171CS3L01	Object Oriented Programming Lab	PC	---	---	3	3	2
171CS3L02	Advanced Data Structures Lab	PC	---	---	3	3	2
171HS3A10	Employability Skills – I	HSS	---	---	2	2	---
171HS3A09	Professional Ethics & Human Values	HSS	2	---	---	2	---
TOTAL			20	5	10	35	22

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	
171CS4T05	Software Engineering	PC	3	1	---	4	3
171CS4T06	Formal Languages & Automata Theory	PC	3	1	---	4	3
171CS4T07	Java Programming	PC	3	1	---	4	3
171CS4T08	Database Management Systems	PC	3	1	---	4	3
171CS4T09	Principles of Programming Languages	PC	3	1	---	4	3
171CS4T10	Computer Organization	PC	3	1	---	4	3
171CS4L03	Java Programming Lab	PC	---	---	3	3	2
171CS4L04	Database Management Systems Lab	PC	---	---	3	3	2
171HS4A11	Employability Skills – II	HSS	---	---	2	2	---
171HS4A08	IPR & Patents	HSS	2	---	---	2	---
TOTAL			20	6	8	34	22

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	
171CS5T11	Compiler Design	PC	3	1	---	4	3
171CS5T12	Python Programming	PC	3	1	---	4	3
171CS5T13	Design & Analysis of Algorithms	PC	3	1	---	4	3
171CS5T14	Operating Systems	PC	3	1	---	4	3
---	Professional Elective - I	PE	3	1	---	4	3
171HS5T06	Employability Skills – III	HSS	2	---	---	2	1
171CS5L05	Operating System and Linux Lab	PC	---	---	3	3	2
171CS5L06	Python Programming Lab	PC	---	---	3	3	2
171CS5L07	Software Testing Lab	PC	---	---	3	3	2
171CS5L08	Compiler Design Lab	PC	---	---	3	3	2
171CS5S01	MOOCs – I	SS	---	---	---	--	---
TOTAL			17	5	12	34	24

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	
171CS6T15	Computer Networks	PC	3	1	---	4	3
171CS6T16	Web Technologies	PC	3	1	---	4	3
171CS6T17	Data Ware Housing and Data Mining	PC	3	1	---	4	3
---	Professional Elective - II	PE	3	1	---	4	3
---	Professional Elective - III	PE	3	1	---	4	3
171HS6T07	Employability Skills – IV	HSS	2	---	---	2	1
171CS6L09	Computer Networks Lab	PC	---	---	3	3	2
171CS6L10	Data Ware Housing and Data Mining Lab	PC	---	---	3	3	2
171CS6L11	Web Technologies Lab	PC	---	---	3	3	2
171CS6S02	MOOCs – II	SS	---	---	---	--	---
TOTAL			17	5	9	31	22

MOOCs – Massive Open Online Courses

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	
171CS7T18	Cryptography and Network Security	PC	3	1	---	4	3
171CS7T19	UML and Design Patterns	PC	3	1	---	4	3
171CS7T20	Cloud Computing	PC	3	1	---	4	3
171HS7T05	Management Science	HSS	3	1	---	4	3
---	Professional Elective - IV	PE	3	1	---	4	3
---	Professional Elective - V	PE	3	1	---	4	3
171CS7L12	UML and Design Patterns Lab	PC	---	---	3	3	2
171CS7L13	Big Data Analytics Lab	PC	---	---	3	3	2
171CS7P01	Industry Oriented (Internship) Minor Project	PR	---	---	---	-	1
			TOTAL	18	6	6	30
							23

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	PE	3	1	---	4	3
---	Open Elective	OE	3	1	---	4	3
171CS8P02	Project Work	PR	----	----	---	--	14
			TOTAL	6	2	0	8
							20

Professional Elective – I (V Semester)

S.No	Course Code	Name of the Course
1	171CS5E01	Unix and Shell Programming
2	171CS5E02	Advanced Computer Architecture
3	171CS5E03	Computer Graphics
4	171CS5E04	Software Testing Methodologies

Professional Elective – II (VI Semester)

S.No	Course Code	Name of the Course
1	171CS6E05	Software Quality Assurance
2	171CS6E06	Bio Informatics
3	171CS6E07	Human Computer Interaction
4	171CS6E08	Social Networks and Semantic Web

Professional Elective – III (VI Semester)

S.No	Course Code	Name of the Course
1	171CS6E09	Pattern Recognition
2	171CS6E10	Parallel Computing
3	171CS6E11	Storage Area Networks
4	171CS6E12	E - Commerce

Professional Elective – IV (VII Semester)

S.No	Course Code	Name of the Course
1	171CS7E13	Software Project Management
2	171CS5E14	Big Data Analytics
3	171CS7E15	Image Processing
4	171CS7E16	Cyber Laws

Professional Elective – V (VII Semester)

S.No	Course Code	Name of the Course
1	171CS7E17	Middleware Technologies
2	171CS7E18	Artificial Intelligence and Machine Learning
3	171CS7E19	Information Retrieval Systems
4	171CS7E20	Mobile Computing

Professional Elective – VI (VIII Semester)

S.No	Course Code	Name of the Course
1	171CS8E21	Agile Methodologies
2	171CS8E22	Cyber Security
3	171CS8E23	Distributed Databases
4	171CS8E24	Distributed Systems

Open Elective (VIII Semester)

S.No	Course Code	Name of the Course
1	171CS8O01	Microprocessor and Multi Core Systems
2	171CS8O02	Embedded Systems
3	171CS8O03	Soft Computing
4	171EE8O05	Robotics
5	171CS8O04	Operations Research
6	171CS8O05	Optical Communications
7	171EE8O07	Internet of Things
8	171EC8O02	Disaster Management
9	171CS8O06	Renewable Energy sources
10	171CS8O07	Nano Technology and its Applications

State the components of the Curriculum*Program curriculum grouping based on course components*

Course Component	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total number of credits
Basic Sciences	12.22	34	22
Engineering Sciences	8.89	22	16
Humanities and Social Sciences	11.11	37	20
Program Core	47.78	122	86
Program Electives	10.00	24	18
Open Electives	1.67	4	3
Project(s)	8.33	-	15
Internship/Seminars	-	-	-
Any other(Please specify)	-	-	-
Total	100	243	180

Rules for opting MOOCs

- Students should register for a course with prior permission from MOOCS-Coordinator of the department. User ID should be submitted to the MOOCS – Coordinator after the registration. It is through this User ID only; the student has to write the proctored examination.
- Students should register only for Technical Subjects. However, they can register for Interdisciplinary subjects also.
- Students have to register for a technical course which is not yet studied or will not be studied in the upcoming semesters.
- Students should register for a course with duration of ≥ 4 weeks or ≥ 20 hrs.
- Students MOOCS Certificate is considered only if the students write the examination under a proctored system. If the student registers a course where he/she has to write an unproctored online examination, he/she should bring it to the notice of the HOD for conducting the exam in the college. These exams will be usually planned on Saturdays.
- For MOOCS -1, the course completion certificate should be submitted to the MOOCS- Coordinator before the completion of V Semester end examinations.
- For MOOCS -2, the course completion certificate should be submitted to the MOOCS- Coordinator before the completion of VI Semester end examinations.

ENGLISH – I
(Common to all branches)

I Semester
Course Code: 171HS1T01

L	T	P	C
3	1	0	3

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 appraise the learner how Gandhi spent a period of three years in London as a student.
- COB 5: To make the learners rediscover India as a land of knowledge.
- COB 6: To discuss how scientific point of view seeks to arrive at the truth without being biased by emotion.
- COB 7: To inform the learner that all men are in peril.
- COB 8: To inspire the learners by inventions and contributions of great achievers.

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: Summarize how Gandhi grew in introspection.
- CO 2: Explain the conditions to achieve a higher quality of life, strength and sovereignty of a developed nation.
- CO 3: Identify the scientific attitude to solve many problems which we find difficult to tackle.
- CO 4: Identify that all men can come together and avert the peril.
- CO 5: Interpret humorous texts and use of words for irony.
- CO 6: Explain the characteristic traits of renowned scientists who contributed enormously to the scientific advancement of India.
- CO 7: Demonstrate writing and basic 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 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO2 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO3 (K3)	-	-	-	-	-	-	-	-	-	2	-	-
CO4 (K3)	-	-	-	-	-	-	-	-	-	2	-	-
CO5 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO6 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO7 (K2)	-	-	-	-	-	-	-	-	-	3	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	-	-	-	-
CO2 (K2)	2	-	-	-
CO3 (K3)	-	2	3	-
CO4 (K3)	-	-	-	-
CO5 (K2)	-	-	-	-
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. IN LONDON: M.K.GANDHI (Detailed)
2. G.D. NAIDU (Non-Detail)

UNIT-II

1. THE KNOWLEDGE SOCIETY- APJ ABDUL KALAM (Detailed)
2. G.R. GOPINATH (Non-Detail)

UNIT-III:

1. THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE (Detailed)
2. J.C. BOSE (Non-Detail)

UNIT-IV

1. MAN'S PERIL-BERTRAND RUSSELL (Detailed)
2. HOMI JEHANGIR BHABHA (Non-Detail)

UNIT-V

1. LUCK—MARK TWAIN (Detailed)
2. A SHADOW (Non-Detail)

Textbooks:

Detailed Text Book: 'English Essentials' Ravindra Publications.

Non Detailed Text Book: 'Modern Trail Blazers' Orient Black Swan Pvt. Ltd. Publishers.

Web Links:

1. <https://englishforundergraduates.wordpress.com/2016/09/25/the-knowledge-society-from-ignited-minds-a-p-j-abdul-kalam/>
2. <http://btechenglish.blogspot.in/2014/01/the-scientific-point-of-view-j-b-s.html>
3. <https://www.famousscientists.org/jagadish-chandra-bose/>
4. <https://www.thebetterindia.com/37339/homi-jehangir-bhabha/>

MATHEMATICS-I
(Common to all branches)

I Semester

Course Code: 171BS1T01

L T P C
3 1 2 3

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: Associate linear differential equations of first order to various physical problems involving differential equations of first order
- CO 2: Solve linear differential equations of higher order.
- CO 3: Solve linear systems of equations using the concept of rank, Gauss elimination, Gauss seidal method.
- CO 4: Find the eigen values and eigen vectors.
- CO 5: Associate the concepts of Partial Differentiation to maxima and minima of functions of several variables and to Partial differential equations.

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	2	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO5 (K2)	2	1	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	-	-	-	-
CO2 (K3)	-	-	-	-
CO3 (K3)	3	3	-	-
CO4 (K2)	2	-	-	-
CO5 (K2)	-	-	-	-

UNIT I

Differential equations of first order and first degree: Linear differential equations - Bernoulli differential equation - Exact differential equations-Equations reducible to exact (Type-1, Type-2, Type-3, Type-4)

Applications: Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories.

UNIT II

Linear differential equations of higher order: Linear differential equations of higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax} V(x)$, $xV(x)$ - Method of Variation of parameters, Method of undetermined coefficients.

*(MATLAB Exercise: Introduction to MATLAB commands and Solution of Initial Value Problems using the command ‘dsolve’)

Applications: Electric circuits, simple harmonic motion.

UNIT III

Linear systems of equations: Rank of a matrix - Echelon form-Normal form – Solution of linear systems – Gauss elimination method - Gauss Seidal method.

Applications: Finding the current in electrical circuits.

UNIT IV

Eigen values - Eigen vectors and Quadratic forms: Eigen values - Eigen vectors– Properties of eigen values (without proof) – Cayley -Hamilton theorem (without proof) - Inverse and powers of a matrix by using Cayley -Hamilton theorem- Diagonalization- Quadratic forms- Reduction of quadratic form to canonical form using orthogonal transformation– Nature of the quadratic form.

*(MATLAB Exercise: All Basic Operations on matrices are to be implemented using MATLAB including computation of rank, computation of eigen values and eigen vectors)

UNIT V

Partial differentiation and Partial differential equations: Homogeneous function-Euler’s theorem-Total derivative-Chain rule-Taylor’s and Maclaurin’s series expansion of functions of two variables– Functional dependence- Jacobian.

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

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange’s method (with constraints).

*(MATLAB Exercise: To Plot graphs of various single and multivariable functions using MATLAB and analyze their maxima and minima graphically).

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics, Forty Third Edition, Khanna Publishers.
2. Engineering Mathematics, Dr.T.K.V. Iyengar, S. Chand publications

Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, Tenth Edition, Wiley-India
2. Advanced Engineering Mathematics, D.G.Zill, MICHAIL R CULTER, Third Edition Norosa Publications 2009.
3. Advanced Engineering Mathematics With MATLAB, Dean G. Duffy, CRC Press.

4. Advanced Engineering Mathematics, Peter O'neil, Cengage Learning.
5. Advanced Modern Engineering Mathematics, Glyn James, Pearson education.
6. Getting started with MATLAB, MATLAB Rudra Pratap, Oxford Publication.

Web Links:

1. <http://mathworld.wolfram.com>
2. <https://www.khanacademy.org>
3. <http://nptel.ac.in/courses/122104017>

MATHEMATICS-II
(Common to ECE, CSE & IT)

I Semester
Course Code: 171BS1T02

L T P C
3 1 0 3

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 various numerical methods to find roots of equations and interpolating polynomials.
- CO 2: Apply numerical methods to initial value problems and problems involving integration.
- CO 3: Find the Fourier series of a given function and study the convergence of the series.
- CO 4: Find the Fourier transforms for given functions.
- CO 5: Apply method of separation of variables to solve one dimensional heat equation and wave equation and two dimensional laplace equations.

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 (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 (K3)	PSO 4 (K4)
CO1 (K3)	3	3	3	2
CO2 (K3)	3	3	3	2
CO3 (K2)	-	-	-	-
CO4 (K2)	-	-	-	-
CO5 (K3)	-	-	-	-

UNIT I

Solution of Algebraic and Transcendental Equations and Interpolation: Introduction-Bisection method – Method of false position – Iteration method – Newton - Raphson method. Errors in polynomial interpolation – Finite differences- Forward differences-Backward differences –Central differences – Relation between operators - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.

UNIT II

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

UNIT III

Fourier Series: Fourier series of periodic function - Dirichlet's conditions for Fourier expansion - Functions having points of discontinuities–Change of interval – Even and odd functions – Half-range series.

UNIT IV

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

UNIT V

Applications of Partial Differential Equations: Classification of Higher order P.D.E - Method of separation of Variables- Solution of One dimensional Wave equation, Heat equation and two-dimensional Laplace equation.

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Forty Third Edition, Khanna Publishers.
2. Mathematical Methods, V. Ravindranath And P. Vijayalakshmi, Himalaya Publishing House.

Reference Books:

1. Advanced Engineering Mathematics With MATLAB, Dean G. Duffy, CRC Press.
2. Advanced Engineering Mathematics, Erwin Kreyszig, Tenth Edition, Wiley-India.
3. Higher Engineering Mathematics, Dass H.K., Rajnish Verma. Er., S. Chand Co. Pvt. Ltd, Delhi.
4. Higher Engineering Mathematics John Bird, Fifth Edition Elsevier Limited, 2006.
5. Advance Engineering Mathematics SRK Iyengar, Alpha Sciences International Publication.

Web Links:

1. <http://mathworld.wolfram.com>
2. <https://www.khanacademy.org>
3. <http://nptel.ac.in/courses/122104017>

APPLIED PHYSICS
(Common to ECE, CSE & IT)

I Semester
Course Code: 171BS1T04

L T P C
3 1 0 3

Course Objectives:

- COB 1: To equip the students with basic knowledge of physics in the areas of optics and lasers.
- COB 2: To impart the basic knowledge of quantum mechanics and Semiconductors to engineering students.

Course Outcomes:

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

- CO 1: Make use of the basic concepts of interference and relate to the principle of interferometer.
- CO 2: Relate the basic concepts of diffraction to illustrate the principle of optical instruments like Telescope & microscope.
- CO 3: Explain the basic concepts of polarization, principle of polarimeter and the method of producing high intensity light beams.
- CO 4: Interpret the wave nature of microscopic particles by using quantum mechanics and explain the electrical conductivity of materials.
- CO 5: Explain the behaviour of materials and be able to classify them using the band theory of solids and the basic concepts of semiconductors.

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	-	-	-	-	-	-	-	-	-	-	-
CO3 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO5 (K2)	2	-	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	-	-	-	-
CO2 (K2)	-	-	-	-
CO3 (K2)	-	-	2	-
CO4 (K2)	-	-	-	-
CO5 (K2)	-	-	2	-

UNIT-I

Interference: Principle of Superposition – Coherence– Interference in thin films (reflection geometry) – Newton’s rings – construction and working principle of Interferometer.

UNIT-II

Diffraktion: Fraunhofer diffraction at single slit – Cases of double slit, N-slits, & circular aperture, Grating equation – Rayleigh criterion of resolving power-Resolving power of a grating, Telescope and Microscopes

UNIT-III

Polarization: Types of Polarization – Methods of production – Nicol Prism –Quarter wave plate and Half Wave plate- working principle of polarimeter (Sacharimeter).

LASERS: Characteristics– Stimulated emission – Einstein's Transition Probabilities- Pumping schemes- Ruby laser – Helium Neon laser-CO₂ Laser-Applications

UNIT-IV

Quantum Mechanics: Introduction –Matter waves – Schrödinger Time Independent and Time Dependent wave equations – Particle in a box.

FREE ELECTRON THEORY: Defects of classical free electron theory –Quantum Free electron theory –concept of Fermi Energy.

UNIT-V

Band Theory of Solids: Bloch's theorem (qualitative) – Kronig – Penney model (Qualitative) – energy bandsin crystalline solids – classification of crystalline solids– effective mass of electron & concept of hole.

Semiconductor Physics: Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein's equation- Hall effect in semiconductors.

Text Books:

1. Applied Physics – by M.N.Avadhanulu and T.V.S. Arun Murthy, S. Chand & Company Ltd.,
2. Engineering Physics by D. K. Bhattacharya and Poonam Tandon, Oxford press (2015).

Reference Books:

1. Applied Physics by P. K. Palanisamy, Scitech publications (2014)
2. Concepts of Modern Physics, Arthur Beiser, Tata McGraw-Hill Education, (2003)
- Engineering Physics by M. Arumugam, Anuradha Publication (2014).

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>

ENGINEERING DRAWING (Common to ECE, CSE & IT)

I Semester

Course Code: 171ES1T03

L	T	P	C
3	0	3	3

Course Objectives:

- COB 1: To impart the knowledge for drawing various types of polygons, conic sections and scales.
- COB 2: To improve the visualization skills of the students for representing the 3D objects in 2D planes.

Course Outcomes:

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

- CO 1: Sketch the polygons, conics and scales by using the principles of drawing.
- CO 2: Draw Orthographic projections of points and lines.
- CO 3: Draw Orthographic projections of planes in various positions.
- CO 4: Draw Orthographic projections of solids in various positions.
- CO 5: Construct isometric scale and isometric projections.
- CO 6: Convert isometric view in to orthographic views.

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	-	-	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	-	-	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	-	-	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	-	-	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	-	3	-	-	-	-	3	-	-
CO6 (K3)	3	2	1	-	3	-	-	-	-	3	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	-	-	-	-
CO2 (K3)	-	-	-	-
CO3 (K3)	-	-	-	-
CO4 (K3)	-	-	3	-
CO5 (K3)	-	-	3	-
CO6 (K3)	-	-	3	-

UNIT-I

Introduction to engineering drawing: Lettering, Dimensioning, Types of lines.

Geometrical constructions: Construction of regular polygons by general method and Inscribing circle method. Special Methods for pentagon and hexagon.

Conic sections: Ellipse, Parabola and Hyperbola by general method (eccentricity method) and special methods.

SCALES: Plain scale, Diagonal scale and Vernier scales.

UNIT-II

Orthographic projections: Introduction to Orthographic projections, Projections of points, projections of lines.

UNIT-III

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

UNIT-IV

Projections of solids: Prisms, pyramids, cones and cylinders with the axis parallel to both the reference planes and axis inclined to one of the reference planes.

UNIT-V

Isometric projections: Isometric scale, Isometric projections
Conversion of Isometric views into Orthographic views.

Text Books:

1. Engineering Drawing N.D.Bhatt, Charotar Publishers.
2. Engineering Drawing K.L.Narayana and P. Kannaiah. Scitech Publishers.

Reference Books:

1. Engineering Drawing K. Venugopal, New Age Publications.
2. Engineering Drawing M. B. shah & B.C. Rana., Pearson's Publishers.
3. Engineering Drawing B. Agrawal & C.M. Agrawal, Tata Mcgraw Hill Publishers.

Web Links:

1. <http://nptel.ac.in/courses/112103019>
2. <http://freevideolectures.com/Course/3420/Engineering-Drawing>
3. <http://engineeringdrawing.org>
4. <http://inoxwap.com/video/category/engineering-drawing-for-first-year-engineering.html>

COMPUTER PROGRAMMING

(Common to all branches)

I Semester
Course Code: 171ES1T01

L T P C
3 1 0 3

Course Objectives:

- COB 1: To impart adequate knowledge on the need of programming languages and problem solving techniques.
- COB 2: To develop programming skills using the fundamentals and basics of C language.
- COB 3: To enable effective usage of Control Structures, arrays, Strings, functions, structures and union.
- COB 4: To impart the knowledge of pointers and to understand the principles of dynamic memory allocation.
- COB 5: To illustrate the file concepts and its operations.

Course Outcomes:

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

- CO 1: Illustrate the basic concepts of Computers.
- CO 2: Solve mathematical and scientific problems using fundamentals of C.
- CO 3: Use Control Structures and Arrays in solving complex problems.
- CO 4: Develop modular programs to solve problems using control structures, Arrays and strings.
- CO 5: Demonstrate the pointers concept for allocating and deallocating memory dynamically.
- CO 6: Solve real world problems using the concept of structures and unions.
- CO 7: Develop real time applications using 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 (K3)	3	2	1	1	3	-	-	-	-	-	-	3
CO5 (K2)	2	1	-	-	2	-	-	-	-	-	-	3
CO6 (K4)	3	3	2	2	3	-	-	-	-	-	-	3
CO7 (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 (K3)	PSO 4 (K4)
CO1 (K2)	2	2	2	1
CO2 (K3)	3	3	3	2
CO3 (K3)	3	3	3	2
CO4 (K3)	3	3	3	2
CO5 (K2)	2	2	2	1
CO6 (K4)	3	3	3	3
CO7 (K3)	3	3	3	3

UNIT-I**Computer History, Hardware, Software, Programming Languages and Algorithms:**

Fundamental concepts of Computer, Programming Languages - Machine Language, Assembly Language, Low-level and High-level Languages, Basics of Hardware and Software, Algorithms, Flowchart, pseudo code, The Software Development Process.

Introduction to C Programming: Introduction, Structure of a C Program, Identifiers, main() function, printf() function, Indentation, Comments, Keywords, Data Types, Variables, Constants and Declarations, Input/Output Statements, Operators, Type Conversion.

UNIT -II

Control Flow, Relational Expressions & Arrays: Selection: if, if-else, nested if with examples, Multi-way selection: switch, else-if with examples. Repetition: Basic Loop Structures: for, while and do-while loops, counter controlled and condition controlled loops, nested loops, goto, continue and break.

Arrays: Introduction, Operations on Arrays, 2D Arrays, Arrays as Function Arguments, Multi Dimensional Arrays.

UNIT-III

Functions: Basics of Functions: Declaration, Definition and call, Categories of Functions, passing parameters to Functions, Variable Scope, Storage Classes, Recursive Functions, Recursion and its Types.

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

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, Pointer to Pointer, Pointers and Arrays, Pointers and Strings, Dynamic Memory Allocation Functions, Dangling Pointer, Command line Arguments.

UNIT-V

Structures: Introduction to Structures, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, derived data type, bit-fields.

Data Files: Introduction to Files, Using Files in C, Reading and Writing with Text Files, Error Handling during File Operations, Random File Access.

Text Books:

1. Computer Programming, Reema Thareja, Oxford University Press.
2. Ansi C Programming, Gary J. Bronson, Cengage Learning.
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 Publication.

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/>

ENGLISH COMMUNICATION SKILLS LAB- 1
(Common to all branches)

I Semester

Course Code: 171HS1L01

L	T	P	C
0	0	3	2

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)	-	-	-	-	2	-	-	-	-	3	-	-
CO2 (K3)	-	-	-	-	3	-	-	-	-	2	-	-
CO3 (K2)	-	-	-	-	2	-	-	-	-	3	-	-
CO4 (K3)	-	-	-	-	3	-	-	-	-	2	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	-	-	-	-
CO2 (K3)	-	-	-	-
CO3 (K2)	2	2	-	-
CO4 (K3)	-	3	-	-

PRACTICE 1:

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

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 Dr.M.Hari Prasad, Dr.Salivendra J.Raju And Dr.G.Suvarna Lakshmi, Maruthi Publications.
2. English For Professionals Prof Eliah, B.S Publications, Hyderabad.
3. A Handbook Of English For Professionals Prof Eliah, B.S Publications.
4. Effective Technical Communication M. Ashraf Rizvi, Tata Mcraw – Hill Publishing Company.
5. Word Power Made Handy, Dr. Shalini Verma, S. Chand Company.
6. Let Us Hear Them Speak, Jayashree Mohanraj, Sage Texts.

APPLIED PHYSICS LAB
(Common to ECE, CSE & IT)

I Semester
Course Code: 171BS1L04

L T P C
0 0 3 2

Course Objectives:

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

Course Outcomes:

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

- CO 1: Use spectrometer, polarimeter, 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 rigidity and determine frequency of an unknown electric vibrator.
- CO 4: Determine wavelength of unknown source, the width of narrow slits, spacing between close rulings using lasers and appreciate the accuracy in measurements.
- CO 5: Verify magnetic field along the axis of a circular coil.

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 (K2)	2	-	-	-	2	-	-	-	-	-	-	-
CO3 (K3)	3	-	-	-	3	-	-	-	-	-	-	-
CO4 (K3)	3	-	-	-	3	-	-	-	-	-	-	-
CO5 (K3)	3	-	-	-	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	-	-	-	-
CO2 (K2)	-	-	-	-
CO3 (K3)	-	-	-	-
CO4 (K3)	-	3	-	-
CO5 (K3)	-	-	-	-

LIST OF EXPERIMENTS:**(Any 10 of the following listed experiments)**

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of vibrations in stretched strings – Sonometer.
8. Determination of velocity of sound – Volume Resonator.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
12. Characteristics of Thermistor – Temperature Coefficients.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p - n junction.
15. Hall Effect in semiconductors.
16. Time constant of CR circuit.
17. Determination of wavelength of laser source using diffraction grating.
18. Determination of Young's modulus by method of single cantilever oscillations.
19. Determination of lattice constant – lattice dimensions kit.
20. Determination of Planck's constant using photocell.
21. Determination of surface tension of liquid by capillary rise method.
22. Polarimeter – Determination of specific rotation of sugar solution.
23. Single Slit – Determination of Slit width using laser or Determination of Wavelength of laser.

Reference Books:

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

COMPUTER PROGRAMMING LAB
(Common to all branches)

I Semester

Course Code: 171ES1L01

L T P C
0 0 3 2

Course Objectives:

- COB 1: To impart knowledge on various Editors.
- COB 2: To nurture the students on various operators and control structures in C.
- COB 3: To demonstrate the modular programming approach for solving problems.
- COB 4: To make the students understand, the concepts of array and structures.
- COB 5: To explain the file concepts for solving various problems.

Course Outcomes:

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

- CO 1: Implement basic programs in C.
- CO 2: Use Conditional and Iterative statements to solve real time scenarios in C.
- CO 3: Implement the concept of Arrays and Modularity.
- 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 (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	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	3	-	3	-
CO2 (K3)	3	-	3	-
CO3 (K3)	3	-	3	2
CO4 (K3)	3	-	3	-
CO5 (K3)	3	-	3	-

Exercise – 1:

Introduction to C Programming

- 1.1) Introduction about Editors –Turbo, vi, Emacs
- 1.2) C Program to Perform Addition, Subtraction, Multiplication and Division of two numbers from Command line
- 1.3) Write a C Program to Calculate area of a Triangle using Heron's formula.

Exercise – 2:**Basic Math**

- 2.1) Write a C Program to Find Whether the Given Year is a Leap Year or not.
- 2.2) Write a C Program to convert Celsius to Fahrenheit and vice versa.
- 2.3) Write a C Program to find largest of three numbers using ternary operator.

Exercise – 3:**Control Flow - I**

- 3.1) Write a C program to find the roots of a Quadratic Equation.
- 3.2) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch...case.
- 3.3) Scenario - 1 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.

3.4) Scenario - 2 RESET PASSWORD:

Sindhuja was using Syndicate Bank's Online Account. She wanted to pay her bills through Online. But she forgot 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:

1. Fast withdrawal
2. Mini Statement.
3. Balance Enquiry
4. Reset Password

Enter your choice: 4

Sample Output: Reset password: New password: ***** Confirm password: *****

Exercise –4:**Control Flow - II**

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

Exercise – 5:**Control Flow – III**

- 5.1) Write a C program to find the sum of individual digits of a positive integer.
- 5.2) Write a C program to check whether given number is palindrome or not.

5.3) Write a C program to read two numbers, x and n , and then compute the sum of the geometric progression $1+x+x^2+x^3+\dots+x^n$.

5.4) Scenario - 3 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	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

Exercise 6:

Arrays

Demonstration of arrays

6.1) Linear Search.

6.2) Bubble Sort.

6.3) Operations on Matrix.

6.4) Scenario – 4 Celebrity of the Week:

Red FM has launched a program called Celebrity of the week in their channel. Listeners are given a toll free number where they can listen to list of celebrities. Listeners can choose their favourite celebrity from the list and vote for him/her. The votes are validated from Monday to Saturday. The one with highest votes is called as "Celebrity of the Week" and his/her songs are played in the program, which is aired on Sundays. Now write a program to find the celebrity of the week.

Sample Input:

1. Nagachaitanya
2. Nithin
3. Prabhas
4. Ram
5. Thamanna
6. Samantha
7. Regina
8. Sruthihasan

Enter no of listeners: 10

Enter your favourite: 3

Enter your favourite: 8

Enter your favourite: 4

Enter your favourite: 3

Enter your favourite: 4

Enter your favourite: 2

Enter your favourite: 7

Enter your favourite: 3

Enter your favourite: 1

Enter your favourite: 5

Sample Output:

"Celebrity of the Week" is PRABHAS

Exercise – 7:

Functions

7.1) Write a C Program to demonstrate parameter passing in Functions and returning values.

7.2) Write a C Program to find Fibonacci, Factorial of a number with Recursion and without Recursion.

7.3) Scenario – 5 SELF DRIVE RENTAL

Sadiq and his friends are going to Bangalore. But they don't have a vehicle in Bangalore. For that they go to rental cars to take car for rent. You have find out what is total amount of car's rent. The car's rentals and rules are as follows.

i) Minimum booking is 4.

ii) There are 3 types of cars

- a) SWIFT
- b) SCORPIO
- c) INNOVA

iii) There are 3 categories in cars rental

- a) LTTE
- b) CLASS
- c) XL

FOR SWIFT,

- In LTTE 5 kms are free for one hour and Rs.70 per one hour, if they exceed 5kmph, then Rs.12 per km.
- In CLASS, 10 kms are free for one hour and Rs.90 per one hour, if they exceed 10kmph, then Rs.12 per km.
- In XL, 15 kms are free for one hour and Rs.110 per one hour, if they exceed 15kmph, then Rs.12 per km.

FOR SCORPIO,

- In LTTE, 5 kms are free for one hour and Rs.90 per one hour, if they exceed 5kmph, then Rs.15 per km.
- In CLASS, 10 kms are free for one hour and Rs.110 per one hour, if they exceed 10kmph, then Rs.15 per km.
- In XL, 15 kms are free for one hour and Rs.130 per one hour, if they exceed 15kmph, then Rs.15 per km.

FOR INNOVA

- In LTTE, 5 kms are free for one hour and Rs.110 per one hour, if they exceed 5kmph, then Rs.18 per km.
- In CLASS, 10 kms are free for one hour and Rs.130 per one hour, if they exceed 10kmph, then Rs.18 per km.
- In XL, 15 kms are free for one hour and Rs.150 per one hour, if they exceed 15kmph, then Rs.18 per km.

SAMPLE INPUT:

ENTER NO.OF DAYS AND HOURS FOR CAR: 01 02 (I.E 1 DAY 2 HOURS = 26 HOURS)

1. SWIFT
2. SCORPIO
3. INNOVA

SELECT A CAR: 2

1. LTTE
2. CLASS
3. XL

SELECT RENTAL TYPE: 2

TOTAL KMS COVERED: 300

SAMPLE OUTPUT:

TOTAL HOURS:	26
CAR NAME:	SCORPIO
RENTAL TYPE:	CLASS
AMOUNT:	2860
EXCEED AMOUNT (40KM *15):	600
GRAND TOTAL:	3460

Exercise – 8:**Strings**

8.1) Implementation of string manipulation operations with library function.

- i. copy
- ii. concatenate
- iii. length
- iv. compare

8.2) Implementation of string manipulation operations without library function.

- i. copy
- ii. concatenate
- iii. length
- iv. compare

8.3) Verify whether the given string is a palindrome or not

8.4) Scenario – 6 Word with Obesity:

Jeeth is a fun loving and active boy. He likes to play with words and numbers. One day Jeeth and his friends attended a seminar, which was conducted in his school. The Seminar was about "Causes of obesity in children and its effects". Jeeth and his friend Ram are not interested in listening to the seminar, so he thought of giving a puzzle to Ram. Jeeth gave some words to Ram and wanted him to find the word with Obesity. Ram was confused and asking your help. Write a program to find the weights of the words and display the word with highest weight (word with obesity).

Sample Input:

Enter no of words: 3

Enter 3 words: apple banana carrot

Sample Output:

Word with Obesity is carrot

Exercise – 9:

Arrays and Pointers

9.1) Write a C Program to Access Elements of an Array Using Pointer

9.2) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 10:

Dynamic Memory Allocations

10.1) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

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

Exercises – 11:

Structures

11.1) Write a C Program to Store Information of a book Using Structure

11.2) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation

11.3) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

11.4) Scenario – 7 Library Management

Shilpa 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 Input.

Enter the name of student, Roll No. Branch, Section, Year, DOL, DOR,

Sample output

No. of days returned after the due date = 5

Late fee per day = Rs. 50

Fine paid by the student is $5 * 50 = 250$.

Exercise -12:**Files**

12.1) Write a C program to open a file and to print the contents of the file on screen.

12.2) Write a C program to copy content of one file to another file.

12.3) Write a C program to merge two files and store content in another file.

12.4) Scenario – 8 Student Information System Using Files:

Lakshya International school was recently established and having large no of admissions. The school management wanted the Student information to be computerized and wanted to maintain in a simple and effective manner. You are asked to develop Student Information System using Files to perform the following tasks

1. Add New Student
2. Update Existing Student
3. Delete Existing Student
4. Retrieve A Particular/All Students

Sample Input:

Choose the task you want to perform:

1. Add
2. Update
3. Delete
4. Retrieve

Your choice: 1

Enter student details:

Name: Akhil

Age: 5

Class: 1

Sample Output:

Student details added

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/>

ENGLISH – II
(Common to all branches)

II Semester

Course Code: 171HS2T03

L	T	P	C
3	1	0	3

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 make the learner understand how modern life has been shaped by Technology.
- COB 5: To make the students understand the importance of work.

LISTENING SKILLS:

Objectives:

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

SPEAKING SKILLS:**Objectives:**

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

READING SKILLS:**Objectives:**

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

WRITING SKILLS:**Objectives:**

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students capable of note-making.
5. To make the students to write formal and informal letters.
6. To enable the students to write CV
7. To enable the students to write technical reports.

Course Outcomes:

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

- CO 1: Compare the difference between modern technology and people's technology.
- CO 2: Identify the causes for climate change.
- CO 3: Explain the applications of modern technologies.
- CO 4: Infer that spiritual help is the true bias of all activities in life.
- CO 5: Identify professional work habits, necessary for effective collaboration and cooperation.
- CO 6: Rephrase coherent writing in political, social and religious background.
- CO 7: Demonstrate writing and basic 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 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO2 (K3)	-	-	-	-	-	-	-	-	-	2	-	-
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 (K3)	PSO 4 (K4)
CO1 (K2)	-	-	2	-
CO2 (K3)	-	-	-	-
CO3 (K2)	-	-	2	-
CO4 (K2)	-	-	-	-
CO5 (K3)	3	-	-	-
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. TECHNOLOGY WITH A HUMAN FACE (Detailed)
2. AN IDEAL FAMILY (Non-Detailed)

UNIT-II

1. CLIMATE CHANGE AND HUMAN STRATEGY (Detailed)
2. WAR (Non-Detailed)

UNIT-III

1. EMERGING TECHNOLOGIES (Detailed)
2. THE VERGER (Non-Detailed)

UNIT-IV

1. THE SECRET OF WORK (Detailed)
2. THE SCARECROW (Non-Detailed)

UNIT-V

1. WORK BRINGS SOLACE (Detailed)
2. A VILLAGE LOST TO THE NATION (Non-Detailed)

Text Books:

Detailed Text Book: ‘Sure Outcomes’ by Orient Black Swan Pvt. Ltd. Publishers.

Non Detailed Text Book: Panorama- A course on Reading by Oxford University Press Pvt. Ltd. Publishers.

Web Links:

1. http://www.cooperative-individualism.org/schumacher-e-f_technology-with-a-human-face-1973.htm
2. <http://www.sinden.org/verger.html>
3. <http://btechenglish.blogspot.in/2015/05/work-brings-solace-sure-out-comes-b.html>
4. http://www.ramakrishnavivekananda.info/vivekananda/volume_1/karma-yoga/secret_of_work.htm

MATHEMATICS-III
(Common to all branches)

II Semester
Course Code: 171BS2T06

L T P C
3 1 2 3

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: Compute Laplace transform of various functions.
- CO 2: Apply Laplace transform to solve initial value problems.
- CO 3: Discuss about beta and gamma function, double integral over a region and triple integral over a volume.
- CO 4: Find the gradient of a scalar function, divergence and curl of a vector function.
- CO 5: Apply line, surface and volume integrals to find work done by a force, flux.

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 (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 (K3)	PSO 4 (K4)
CO1 (K3)	3	-	-	-
CO2 (K3)	3	-	-	-
CO3 (K2)	-	-	-	-
CO4 (K2)	-	-	-	-
CO5 (K3)	-	-	-	-

UNIT -I

Laplace transforms: Laplace transforms of standard functions-First Shifting theorem, Change of scale, Multiplication with t, Division by t - Transforms of derivatives and integrals – Unit step function –Dirac's delta function, Periodic functions.

UNIT- II

Inverse Laplace Transforms : Inverse Laplace transforms – Convolution theorem (with out proof), Second shifting theorem.

*(MATLAB Exercise: Computing Laplace transform of $f(t)$ using symbolic toolbox, Solving initial value problems using ‘dsolve’)

Applications: Evaluating improper integrals, solving initial value problems using Laplace transforms.

UNIT - III

Multiple integrals and Beta, Gamma functions: Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration, Beta and Gamma functions- Properties - Relation between Beta and Gamma functions-

Applications: Finding Areas and Volumes.

UNIT - IV

Vector Differentiation: Gradient - Directional Derivatives - Divergence- Curl - Laplacian operator -Vector identities.

Applications: Equation of continuity, potential surfaces

UNIT - V

Vector Integration: Line integral – Work done - Surface and volume integrals, Green’s Theorem, Stokes Theorem and Gauss Divergence theorem (without proof) and related problems.

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Forty Third Edition, Khanna Publishers.
2. Engineering Mathematics, Dr. T K V Iyengar, S. Chand Publications.

Reference Books:

1. Thomas Calculus, George B. Thomas, D, Weir And J. Hass. Tweleth Edition, Pearson Education, 2010.
2. Advanced Engineering Mathematics, Greenberg, Second Edition, Pearson Education.
3. Advanced Engineering Mathematics, Erwin Kreyszig, Tenth Edition, Wiley-India.
4. Mathematical Techniques, W. Jordan And T. Smith, Oxford University Press.

Web Links:

1. <http://mathworld.wolfram.com>
2. <https://www.khanacademy.org>
3. <http://nptel.ac.in/courses/122104017>

ENVIRONMENTAL STUDIES
(Common to ECE, CSE & IT)

II Semester
Course Code: 171HS2T02

L T P C
2 1 0 2

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 environmental management systems.

Course Outcomes:

At the end of the Course, 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: Classify environmental assessment and the stages involved in EIA.
- 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)	2	-	-	-	-	2	3	2	-	-	-	-
CO3 (K1)	1	-	-	-	-	1	2	1	-	-	-	-
CO4 (K2)	2	-	-	-	-	2	3	2	-	-	-	-
CO5 (K2)	1	-	-	-	-	2	3	2	-	3	-	-
CO6 (K2)	1	-	-	-	-	2	3	2	-	-	-	-
CO7 (K4)	-	-	-	-	-	3	3	3	-	-	3	-
CO8 (K2)	2	1	-	-	-	2	3	2	3	3	2	3

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K1)	-	-	-	-
CO2 (K2)	-	-	2	-
CO3 (K1)	-	-	-	-
CO4 (K2)	2	-	-	-
CO5 (K2)	-	-	-	-
CO6 (K2)	-	-	-	-
CO7 (K4)	-	-	-	-
CO8 (K2)	2	2	2	-

UNIT –I

Ecosystems: Scope of environmental studies, Structure- Producers, consumers and decomposers

Function – Food chain, Food web, Tropic structure and Energy flow in the ecosystem

Ecological pyramids, nutrient recycling, primary and secondary production, ecosystem regulation. Ecological succession Terrestrial ecosystem and aquatic ecosystem - Introduction, types, characteristic features.

UNIT – II

Natural Resources: Natural resources and associated problems Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

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

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

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

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources vs oil and natural gas extraction.

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

UNIT – III

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

UNIT – IV

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Style.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V

Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Global challenges

Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act-Issues involved in enforcement of environmental legislation. - Public awareness and Environmental management.

Text Books:

1. Environmental Studies, K.V. S. G. Murali Krishna, Vgs Publishers, Vijayawada
2. Environmental Studies, R. Rajagopalan, Second Edition, Oxford University Press, 2011.
3. Environmental Studies, P.N. Palanisamy, P. Manikandan, A. Geetha, And K. Manjula Rani; Pearson Education,

Reference Books:

1. Text Book Of Environmental Studies, Deesrita Dave & P. Udaya Bhaskar, Cengage Learning.
2. A Textbook Of Environmental Studies, Shaashi Chawla, TMH, New Delhi.
3. Environmental Studies, Benny Joseph, Tata Mcgraw Hill Co, New Delhi.
4. "Perspectives In Environment Studies" Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014.

Web Links:

1. www.nptel.ac.in/courses/122102006/
2. www.nptel.ac.in/courses/120108002/
3. www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html
4. www.nptel.ac.in/courses/120108004/

APPLIED CHEMISTRY
(Common to ECE, CSE & IT)

II Semester

Course Code: 171BS2T05

L	T	P	C
3	1	0	3

Course Objectives

- COB 1: To impart knowledge about polymers and plastic materials that are used in household appliances, aerospace and automotive industries.
- COB 2: To nurture students about fuels as energy source used in industries like thermal power plant, steel industry, fertilizer industry etc., and automobiles.
- COB 3: To impart knowledge about working of primary, secondary cells. Theories of corrosion and its control methods.
- COB 4: To impart knowledge on advance materials like Nano, Super Conductors also Semi Conductors and Liquid Crystals.
- COB 5: To educate students about renewable energy resources as alternatives for producing electrical energy.

Course Outcomes

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

- CO 1: Explain polymeric materials their uses and moulding techniques of plastics.
- CO 2: Classify solid, liquid and gaseous fuels.
- CO 3: Explain about batteries, corrosion and their control methods.
- CO 4: Explain Nano materials, Super Conductors, Semi Conductors and Liquid Crystals.
- CO 5: Summarize non-conventional energy sources and their 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 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO2 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO3 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO5 (K2)	2	-	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	-	-	-
CO2 (K2)	-	-	-	-
CO3 (K2)	-	-	2	-
CO4 (K2)	2	2	-	-
CO5 (K2)	-	-	-	-

UNIT - I**High Polymers and Plastics:**

Polymerisation: Introduction- Mechanism of polymerization - Stereo regular polymers - Physical and mechanical properties – Plastics as engineering materials: advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (compression moulding, injection moulding, extrusion moulding and transfer moulding techniques)- Preparation, properties and applications of polyethene, PVC, Bakelite and polycarbonates. Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers: Buna S, Buna N, Thiokol – Applications of elastomers. Biodegradable polymers.

UNIT - II**Fuel Technology:**

Fuels:- Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula – Coal — Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents – Power alcohol – Bio-diesel – Gaseous fuels – Natural gas. LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus.

UNIT - III

Electrochemical Cells And Corrosion: Galvanic cells - Reversible and irreversible cells – Single electrode potential- Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Li cells - Zinc – air cells.

Corrosion:- Definition – Theories of Corrosion (electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Cathodic protection - Protective coatings: – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating).

UNIT - IV**Chemistry of Advanced Materials:**

Nano materials:-Introduction – Sol-gel method - Carbon nano tubes and fullerenes: Types, preparation, properties and applications.

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

Semi conductors:- Preparation of semiconductors, working of diodes and transistors.

Green synthesis:-Principles

Liquid crystals:-Introduction – Types – Applications

Fuel cells:- Introduction - cell representation, H_2-O_2 fuel cell: Design and working, advantages and Limitations. Types of fuel cells: methanol-oxygen fuel cells.

UNIT - V**Non Conventional Energy Sources :**

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

- (i) Hydropower includes setup a hydropower plant (schematic diagram).
- (ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant.
- (iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.
- (iv) Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.
- (v) Biomass and bio fuels.

Text Books:

- 1. Engineering Chemistry Jain and Jain; Dhanpat Rai Publishing Co.
- 2. A Text books of Applied Chemistry Dr. Bharathi kumari Yalamananchili, VGS publications.
- 3. Engineering Chemistry Shikha Agarwal; Cambridge University Press, 2015 edition.

Reference Books:

- 1. Engineering Chemistry PrasanthRath, Cengage Learning, 2015 edition.
- 2. A text book of engineering Chemistry S. S. Dara; S. Chand & Co Ltd., Latest Edition
- 3. Applied Chemistry H.D. Gesser, Springer Publishers
- 4. Text book of Nano-science and nanotechnology B.S. Murthy, P. Shankar and others, University Press, IIM

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>

ENGINEERING MECHANICS
(Common to CSE & IT)

II Semester
Course Code: 171ES2T02

L T P C
3 1 0 3

Course Objectives:

- COB 1: To impart knowledge on the concept of forces and its resolution in different planes, resultant of force system, forces acting on a body, their free body diagrams using graphical methods and to know the concept of friction.
- COB 2: To make the students calculate the centre of gravity and moment of inertia.
- COB 3: To educate the students about kinematics, kinetics, work - energy and impulse - momentum principles.

Course Outcomes:

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

- CO 1: Determine the resultant force and moment for a given force system.
- CO 2: Explain the concept of friction.
- CO 3: Calculate the forces in planar and spatial systems.
- CO 4: Locate centroid of composite areas and centre of gravity of composite bodies.
- CO 5: Calculate the moment of inertia of composite areas and rigid bodies.
- CO 6: Apply the concepts of kinematics, kinetics, work - energy and impulse - momentum methods to particle motion.

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	-	-	-	-	-	-	-	-	-
CO2 (K2)	2	1	1	-	-	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	-	-	-	-	-	-	-	-	-
CO4 (K1)	1	1	1	-	-	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	-	-	-	-	-	-	-	-	-
CO6 (K3)	3	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	-	-	-	-
CO2 (K2)	-	-	-	-
CO3 (K3)	-	-	3	-
CO4 (K1)	-	-	1	-
CO5 (K3)	-	-	-	-
CO6 (K3)	-	-	-	-

UNIT- I

Introduction to Engineering Mechanics – Basic Concepts. Systems of Forces: Coplanar Concurrent Forces & Non Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

Friction: Introduction, limiting friction and impending motion, Coulomb's laws of dry friction, coefficient of friction, cone of friction.

UNIT- II

Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, and Spatial Systems for concurrent forces. Lami's Theorem, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

UNIT- III

Centroid: Centroid of simple figures (from basic principles) – Centroid of composite figures.

Centre of Gravity: Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems.

UNIT- IV

Area Moment of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moment of Inertia of composite figures.

Mass Moment of Inertia: Moment of Inertia of masses, Transfer formula for Mass Moment of Inertia, Mass Moment of inertia of composite bodies.

UNIT – V

Kinematics: Basics of linear motion.

Kinetics: Particle and Rigid body in translation – Central force motion – Equations of plane motion – Fixed axis rotation.

Work – Energy Method: Equations for translation, Work-Energy Applications to particle motion, Connected system-Fixed axis rotation and plane motion. Impulse momentum method.

Text Books:

1. Engineering Mechanics Statics And Dynamics - A.K.Tayal, Umesh Publications.
2. Engineering Mechanics Statics And Dynamics - A Nelson, Mc Graw Hill Publications.

Reference Books:

1. Engineering Mechanics Statics And Dynamics – R.C.Hibbeler, Eleventh Edition – Pearson Publication.
2. Engineering Mechanics, Statics And Dynamics – I.H.Shames, – Pearson Publication.
3. Mechanics For Engineers, Statics - F.P.Beer & E.R.Johnston – Fifth Edition. Mc Graw Hill Publication.
4. Mechanics For Engineers, Dynamics - F.P.Beer & E.R.Johnston –Fifth Edition. Mc Graw Hill Publication.

Web Links:

1. <http://www.nptelvideos.in/2012/12/engineering-mechanics-drgsaravana-kumar.html>
2. <http://freevideolectures.com/Course/2264/Engineering-Mechanics>
3. <http://freevideolectures.com/Course/2690/Applied-Mechanics>
4. <https://cosmolearning.org/courses/engineering-mechanics/video-lectures/>

DATA STRUCTURES THROUGH C
(Common to ECE, CSE & IT)

II Semester
Course Code: 171CS2T01

L T P C
3 1 2 3

Course Objectives:

- COB 1: To Understand the Concepts of Data Structures, complexities and recursive Algorithms.
- COB 2: Exposure to searching and sorting techniques.
- COB 3: Applying stack and queue techniques for logical operations.
- COB 4: Exposure to list representation models in various types of applications.
- COB 5: Implementation of tree in various forms
- COB 6: Orientation on graphs, representation of graphs, graph traversals, spanning trees.

Course Outcomes:

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

- CO 1: Illustrate time and space complexities of an algorithm.
- CO 2: Develop recursive and non-recursive approaches to design an algorithm.
- CO 3: Apply various searching and sorting techniques to solve computing problems.
- CO 4: Implement stacks and queues using different approaches.
- CO 5: Describe applications of linear data structures.
- CO 6: Explain various operations using linked list.
- CO 7: Understand the concept of trees.
- CO 8: Implement a tree and its various traversals using various approaches.
- CO 9: Apply various applications of trees in real time scenarios.
- CO 10 Demonstrate various graph traversing techniques and spanning 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)
CO1 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO5 (K2)	2	-	-	-	2	-	-	-	-	-	-	-
CO6 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO7 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO8 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO9 (K3)	3	-	-	1	3	-	-	-	-	-	-	-
CO10 (K2)	2	1	-	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	2	2	-
CO2 (K3)	3	3	3	2
CO3 (K3)	3	3	3	2
CO4 (K3)	3	3	3	-
CO5 (K2)	2	2	2	-
CO6 (K2)	2	-	2	1
CO7 (K2)	2	-	2	-
CO8 (K3)	3	-	3	-
CO9 (K3)	3	-	3	-
CO10 (K2)	2	-	2	-

UNIT -I

INTRODUCTION: Basic Concepts : Pseudocode, Algorithm Header, Purpose, Conditions and return, Statement numbers, Variables, Statement constructs, Sequence, Selection, Loop.

Introduction to Data structures and Algorithms- Basic Terminology, Classification of data structures, Operations on Data Structures, Time and Space Complexity, Big O, Omega and Theta Notation, Recursion .

Searching and Sorting : Linear search, Binary search , Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort, radix Sort, Heap Sort , Comparison of Sorting Algorithms.

UNIT -II

STACKS AND QUEUES:

Stacks: Introduction, Array representation of stacks, Operations and implementation, Applications of stacks

Queues: Introduction, Array representation of Queue, Types of Queues: Circular and Deques, Operations and implementation, Applications of Queues.

UNIT-III

LINKED LISTS: Introduction, Singly linked list, Circular linked list, Doubly linked list, Circular Doubly Linked Lists, Linked Representation of Stacks and Queues, Applications of linked lists.

UNIT-IV

TREES: Introduction, Types of Trees, Traversing a Binary Tree,(In-Order, Pre-Order, Post-Order) , Applications of Trees.

Binary Search Trees: Definition, Operations: Searching, insertion, deletion.

UNIT-V

GRAPHS: Introduction, Graph Terminology, Directed Graph, Bi Connected Components, Representation of Graphs , Graph traversal Algorithms , Shortest Path Algorithms , Application of Graphs. (Algorithmic Concepts Only, No Programs required).

Practice Session:

*Note: practice session is not considered for external evaluation.

1. Write a C program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
2. Write a C program that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.
3. Write a C program that implement Bubble sort, Quick sort, Insertion sort, Selection sort, Merge sort, Radix sort to sort a given list of integers in ascending order.
4. Write a C program that implement stack operations, Queue operations using arrays.
5. Write a C program that uses Stack operations to Conversion of infix expression into postfix expression.
6. Write a C program that Creates singly linked list and its operations.
7. Write a C program that implement stack operations, Queue operations using Linked List.
8. Write a recursive and non-recursive C program to traverse a binary tree in preorder, inorder and postorder.
9. Write a C program to Create, insert and delete a node from BST.

Text Books:

1. Data Structures Using C, Reema Thareja, Oxford University Press.
2. Data Structures, Richard F. Gilberg, Forouzan, 2/E, Cengage Learning.

Reference Books:

1. Data Structures And Algorithm Analysis In C, 2nd Ed, Mark Allen Weiss.
2. Data Structures And Algorithms, 2008, G. A.V.Pai, TMH.
3. Data Structures With C, Seymour Lipshutz, TMH.

Web Links:

1. http://scantree.com/Data_Structure/
2. <http://www.studytonight.com/data-structures/>
3. <http://nptel.ac.in/courses/106102064/>
4. <http://www.geeksforgeeks.org/data-structures/>

ENGLISH COMMUNICATION SKILLS LAB-II
(Common to all branches)

II Semester

Course Code: 171HS2L02

L T P C
0 0 3 2

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)	-	-	-	-	2	-	-	-	-	3	-	-
CO2 (K3)	-	-	-	-	3	-	-	-	-	2	-	-
CO3 (K2)	-	-	-	-	2	-	-	-	-	3	-	-
CO4 (K3)	-	-	-	-	3	-	-	-	-	2	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	-	-	-	-
CO2 (K3)	-	-	-	-
CO3 (K2)	2	2	-	-
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.

APPLIED CHEMISTRY LAB
(Common to ECE, CSE & IT)

II Semester

Course Code: 171BS2L03

L	T	P	C
0	0	3	2

Course Objectives:

- COB 1: To demonstrate volumetric, conductometric, potentiometric titrations and P^{H} determination.
- COB 2: To educate students about the preparation of thermosetting plastic such as Bakelite and alternative fuel such as Bio-diesel.

Course Outcomes:

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

- CO 1: Demonstrate Acid – Base Redox & Complexometric titrations by volumetric analysis.
- CO 2: Demonstrate Acid – Base titrations by instrumental analysis.
- CO 3: Prepare polymer like Bakelite.
- 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	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	-	3	-	-
CO2 (K3)	-	3	-	-
CO3 (K3)	-	-	-	-
CO4 (K3)	-	-	-	-

Exercise 1:

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

Exercise 2:

Trial experiment - Determination of HCl using standard Na_2CO_3 solution.

Exercise 3:

Preparation of Phenol - Formaldehyde resin (Bakelite).

Exercise 4:

Determination of KMnO_4 using standard Oxalic acid solution.

Exercise 5:

Determination of ferrous iron using standard $K_2Cr_2O_7$ solution.

Exercise 6:

Preparation of Bio-Diesel.

Exercise 7:

Determination of temporary and permanent hardness of water using standard EDTA solution.

Exercise 8:

Determination of Copper using standard EDTA solution.

Exercise 9:

Determination of Iron by a Colorimetric method using thiocynate as reagent.

Exercise 10:

Determination of pH of the given sample solution using pH meter.

Exercise 11:

Conduct metric titration between strong acid and strong base.

Exercise 12:

Conduct metric titration between strong acid and weak base.

Exercise 13:

Potentiometric titration between strong acid and strong base.

Exercise 14:

Potentiometric titration between strong acid and weak base.

Exercise 15:

Determination of Zinc using standard EDTA solution.

Exercise 16:

Determination of Vitamin – C.

Reference Books:

1. A Textbook Of Quantitative Analysis, Arthur J. Vogel.
2. Dr.Jyotsna Cherukuris (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.

ENGINEERING WORKSHOP AND IT WORKSHOP
(Common to all branches)

II Semester

Course Code: 171ES2L02

L	T	P	C
0	0	3	2

Course Objectives:

- COB 1: To impart hands-on practice on basic engineering trades and skills.
- COB 2: To nurture the students to be able to build various joints used in different trades used for various domestic and Industrial applications.

Course Outcomes:

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

- CO 1: Construct the various wooden joints.
- CO 2: Prepare the various fitting joints.
- CO 3: Experiment with different shapes by black smithy.
- CO 4: Develop components for making the various sheet metal models.
- CO 5: 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	-	1	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	-	1	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	-	1	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	-	1	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	-	1	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	-	-	-	-
CO2 (K3)	-	-	-	-
CO3 (K3)	-	-	-	-
CO4 (K3)	-	-	-	-
CO5 (K3)	-	2	-	-

Trade:

Carpentry:

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

Fitting:

1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

Black Smithy:

1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring:

1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy:

1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

Reference Books:

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

IT WORKSHOP**Course Objectives:**

- COB 1: To nurture the students to identify the basic components of a computer.
- COB 2: To demonstrate the process of assembling and disassembling of computer parts.
- COB 3: To explain the installation of operating systems.
- COB 4: To make the students develop applications like spread sheet, documents, presentation using the software like MS office, LATEX.
- COB 5: To illustrate the usage of internet.

Course Outcomes:

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

- CO 1: Identify various components and its functions.
- CO 2: Apply the knowledge of computer peripherals in assembling, disassembling and troubleshooting of personal computer.
- CO 3: Experiment with installation of operating system and make the computer ready to use.
- CO 4: Prepare word documents, excel sheets and power point presentation.
- CO 5: Develop LaTeX documents to handling equations and images effectively.
- CO 6: Make use of internet to enhance their technical 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 (K1)	1	-	-	-	1	1	-	-	-	-	-	-
CO2 (K3)	3	2	1	1	3	3	-	-	-	-	-	-
CO3 (K3)	3	-	-	-	1	1	-	-	-	-	-	-
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 (K3)	PSO 4 (K4)
CO1 (K1)	1	-	-	-
CO2 (K3)	3	3	3	-
CO3 (K3)	3	3	3	-
CO4 (K3)	3	3	-	3
CO5 (K3)	3	3	3	3
CO6 (K3)	3	3	3	2

Exercise 1

Identification of peripherals of a computer : Block diagram of the CPU along with the configuration of each peripheral and its functions.

Exercise 2

System Assembling and Disassembling : Disassembling the components of a PC and assemble them back to working condition.

Exercise 3

Installation of softwares: Installation of operating Systems: Windows, Linux along with necessary Device Drivers, Installation of application softwares and Tools.

Exercise 4

Troubleshooting (Demonstration): Hardware Troubleshooting: Identification of a problem and fixing a defective PC Software Troubleshooting: Identification of a problem and fixing the PC for any software issues.

Exercise 5

Network Configuration and Internet : Configuring TCP/IP, proxy and firewall settings, Internet and World Wide Web-Search Engines, Types of search engines, netiquette, cyber hygiene.

Exercise 6

MS-Office / Open Office :

- a. Word - Formatting, Page Borders, Reviewing, Equations, symbols.
- b. Spread Sheet - organize data, usage of formula, graphs and charts.
- c. Power point - features of power point, guidelines for preparing an effective Presentation.
- d. Access- creation of database, validate data.

Exercise 7

LaTeX :

LaTeX - basic formatting, handling equations and images.

Reference Books:

1. Computer Hardware, Installation, Interfacing, Troubleshooting And Maintenance, K.L. James,Eastern Economy Edition.
2. Microsoft Office 2007: Introductory Concepts And Techniques, Windows XP Edition By Gary B. Shelly, Misty E. Vermaat And Thomas J. Cashman (2007, Paperback).
3. LATEX- User's Guide And Reference Manual, Leslie Lamport, Pearson, Second Edition LPE.
4. Scott Mueller's Upgrading And Repairing Pcs, Eighteenth Edition, Scott. Mueller, QUE, Pearson, 2008.
5. The Complete Computer Upgrade And Repair Book, Third Edition Cheryl A Schmidt, Dreamtech.
6. Comdex Information Technology Course Tool Kit Vikas Gupta, WILEY Dreamtech.
7. Introduction To Information Technology, ITL Education Solutions Limited, Pearsoneducation.

Web Links:

1. <https://assemblyourpc.net>
2. <https://lifehacker.com>
3. <http://www.teachmsoffice.com>
4. <https://www.latex-tutorial.com/tutorials>

**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE & IT)**

III Semester
Course Code: 171BS3T08

L T P C
3 1 0 3

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.
- COB 3: To make the student know the importance of mathematics in handling real world situations.

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: Apply the principles of number theory and group theory.
- CO 4: Solve recurrence relations by various methods.
- CO 5: Apply the concepts of graph theory to find euler paths, Hamiltonian paths, Spanning trees, minimal spanning trees and chromatic number

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	1	-	-	-	-	-	-	-	-	-
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 (K3)	PSO 4 (K4)
CO1(K3)	3	-	-	-
CO2(K3)	3	-	-	-
CO3(K3)	3	-	-	-
CO4(K3)	3	-	-	-
CO5(K3)	3	-	-	-

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

Algebraic Structures : Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Group, Abelian Group, permutation groups.

Number Theory : Properties of Integers, Division Algorithm, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Addition modulo m, Multiplication modulo m, Congruence modulo m, Fermat's Theorem and Euler's Theorem without proof.

UNIT -IV

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

UNIT -V

Graph Theory : Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrix, Incidence Matrix, Isomorphic Graphs, Paths and Circuits, Trees-Properties, Spanning trees, Euler and Hamilton Graphs, Planar Graphs and Euler's Formula, Graph Colouring, Chromatic Number,BFS Algorithm, DFS Algorithm, Minimal Spanning Trees and Kruskal's Algorithm.

Text Books:

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, Seventh Edition, Tata McGraw Hill.
2. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and R. Manohar, Tata McGraw Hill.
3. Mathematical Foundations of Computer Science, S.Santha, E.V.Prasad, Cengage Publishers.

Reference Books:

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

Web Links:

1. <http://nptel.ac.in/courses/106106094/>
2. <http://mathworld.wolfram.com/classroom/classes/DiscreteMathematics.html>
3. <http://mathworld.wolfram.com/topics/NumberTheory.html>
4. <http://mathworld.wolfram.com/topics/GeneralLogic.html>
5. <https://www.coursera.org/specializations/discrete-mathematics>

DIGITAL LOGIC DESIGN
(Common to CSE & IT)

III Semester
Course Code: 171ES3T23

L T P C
3 1 0 3

Course Objectives:

- COB 1: To make the student understand the common forms of number systems and their conversions.
- COB 2: To explain the Postulates of Boolean Algebra and implementation of logical expressions.
- COB 3: To enable the students simplify switching functions using Karnaugh-Maps.
- COB 4: To provide knowledge on combinational and sequential logic circuits.
- COB 5: To make the students analyze sequential circuits to design basic digital logic systems.

Course Outcomes:

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

- CO 1: Interpret numeric information in different bases, signed integers.
- CO 2: Classify Boolean expressions using postulates of Boolean algebra.
- CO 3: Simplify the given Switching functions in SOP and POS forms using Karnaugh-Map.
- CO 4: Analyze basic combinational and sequential logic circuits with simplified logical functions.
- CO 5: Develop sequential logic circuits with sequential building blocks.

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	2	-	-	-	-	-	-
CO2 (K2)	2	1	-	-	2	2	-	-	-	-	-	-
CO3 (K4)	3	3	2	2	3	3	-	-	-	-	-	-
CO4 (K4)	3	3	2	2	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 (K3)	PSO 4 (K4)
CO1 (K2)	2	2	2	-
CO2 (K2)	2	2	2	-
CO3 (K4)	3	3	3	-
CO4 (K4)	3	3	3	-
CO5 (K3)	3	3	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 Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms, Map Method: Two-Variable K-Map, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't Care Conditions, NAND and NOR Implementation, Exclusive OR Function.

UNIT- III

Combinational Logic: Introduction, Design Procedure, Binary Adder–Subtracter, Decimal Adder, Decoders, Encoders, Multiplexers, Introduction to HDL Models for Combinational Circuits.

UNIT- IV

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

UNIT -V

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

Text Books:

1. Digital Design, M. Morris Mano, Third Edition, Pearson Publications, 2002.
2. Fundamentals Of Logic Design, Charles H. Roth, Jr., Fifth Edition, Cengage Learning, 2004.

References Books:

1. Digital Logic And Computer Design, M.Morris Mano, Fifth Edition, Pearson Publications, 2013.
2. Modern Digital Electronics, R.P. Jain, Fifth Edition, Pearson Publications, 2009.
3. Switching Theory And Logic Design, A.Anand Kumar, Third Edition, Pearson Publications, 2013.

Web Links:

1. <http://nptel.ac.in/courses/117106086/>
2. <http://nptel.ac.in/courses/117105080/>
3. <http://www.nesoacademy.org/electronics-engineering/digital-electronics/digital>
4. <https://www.electrical4u.com/electrical-engineering-articles/digital-electronics/>
5. <https://www.renesas.com/en-in/support/technical-resources/engineer-school.html>

STATISTICS WITH R PROGRAMMING
(Common to CSE & IT)

III Semester

Course Code: 171CS3T02

L T P C
3 0 2 3

Course Objectives:

- COB 1 : To enable the students to learn discrete and continuous random variables and fundamentals of R.
- COB 2 : To demonstrate probability distribution models and R functions for distribution models.
- COB 3 : To discuss sampling distribution, estimation and R functions for constructing confidence intervals.
- COB 4 : To illustrate hypothesis testing for means and variance and related R functions.
- COB 5 : To explain correlation and regression models and R functions for graphics.

Course Outcomes:

At the end of this course, students will be able to:

- CO 1 : Identify discrete and continuous random variables and data structures in R.
- CO 2 : Apply discrete and continuous probability distributions to the given data and execute R-functions for probability distributions.
- CO 3 : Explain sampling distribution, estimation and R-functions for constructing confidence intervals.
- CO 4 : Write R program for standard statistical test.
- CO 5 : Apply the concepts of correlation and regression to the given statistical data using R-function and making use of R-graphic functions to visualize the 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(K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO4(K3)	3	2	1	-	-	-	-	-	-	-	-	-
CO5(K3)	3	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1(K3)	PSO2(K3)	PSO3(K3)	PSO4(K4)
CO1(K3)	3	3	-	-
CO2(K3)	3	3	-	-
CO3(K2)	2	2	-	-
CO4(K3)	3	3	-	-
CO5(K3)	3	3	-	-

UNIT-I

Random Variables and Introduction to R: Random Variables- Discrete, Continuous variables-Expectation, Variance, Moment Generating Function. Introduction to R software – Vectors – Matrices – Arrays – Lists – Data frames – Basic mathematical operations in R, R functions, loops and Control statements, Basic Graphics.

UNIT-II

Probability Distributions: Discrete Probability distributions- Binomial distribution, Poisson distribution, Geometric distribution. Continuous Probability distributions- Normal distribution, Gamma distribution, Exponential distribution. Writing R commands for computing above probability distributions.

UNIT-III

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

Built in R functions for sample statistics, construction of confidence intervals using R.

UNIT-IV

Test of Hypothesis: Hypothesis, one tailed, two tailed test, types of errors in Sampling, Z-test, t-tests, ANOVA. Writing R programming for above statistical tests.

UNIT-V

Correlation and Regression: Correlation-Simple correlation, rank correlation, properties of correlation coefficient. Regression-Method of least squares-fitting a straight line and quadratic equation, multiple linear Regression. Writing R programs for simple linear correlation and regression.

Practice Session:

1. Install R Studio Environment Setup.
2. Implement R Programs to Create data set using Vector, List and Matrices.
3. Implement R Program to Store data using Arrays.
4. Implement R program to store dataset using Data Frame.
5. Implement R Programs for Loops and Control Statements.
6. Implement R program for functions.
7. Implement R Program to Use built in graphical functions.
8. Implement R commands for probability distributions.
9. Implement built in R functions for sample statistics and Statistics tests.
10. Implement R Program to predict data using Linear Regression model.

Text Books:

1. Probability And Statistics, Dr.T.K.V.Iyengar, Dr.B. K. Krishna Gandhi, S. Ranganatham, Dr. M. V.S.S.N. Prasad, S.Chand Publications.
2. G. Jay Kerns, Introduction To Probability And Statistics Using R, First Edition (Free E-Book From R Software Website)

Reference Books:

1. Jay L. Devore, Probability And Statistics For Engineering And Sciences, Eighth Edition, Cengage Learning.
2. R Cookbook, Paul Teator, Oreilly.
3. R In Action, Rob Kabacoff, Manning.
4. R For Everyone, Lander, Second Edition, Pearson.
5. The Art Of R Programming, Norman Matloff, No Starch Press.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc17_ma17/preview
2. https://onlinecourses.nptel.ac.in/noc16_ma03/preview
3. <https://www.tutorialspoint.com/r/>
4. <http://www.stat.umn.edu/geyer/old/5101/rlook.html>
5. <http://www.r-tutor.com/elementary-statistics>

OBJECT ORIENTED PROGRAMMING THROUGH C++
(Common to CSE & IT)

III Semester
Course Code: 171CS3T03

L T P C
3 1 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, destructors and how to overload functions and operators in C++.
- COB 4: To make the students learn applications of inheritance.
- COB 5: To facilitate the students to write various programs using virtual functions and Polymorphism.
- COB 6: To demonstrate Generic Programming with Templates.

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: Summarize the OOPS concepts.
- CO 3: Make use of constructor and destructor to initialize and destroy class objects.
- CO 4: Develop programs using virtual functions and Polymorphism.
- CO 5: Apply inheritance to build real time applications.
- CO 6: Apply Exception handling mechanism to handle runtime errors.
- CO 7: Develop C++ classes with templates and STL.

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	-	-	1	-	-	-	-	-	-	-
CO2 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO3 (K3)	3	-	1	-	-	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO5 (K5)	3	3	3	3	3	3	-	-	-	-	-	-
CO6 (K3)	3	2	1	1	-	-	-	-	-	-	-	-
CO7 (K3)	3	2	1	1	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K4)	-	-	-	-
CO2 (K2)	2	2	2	1
CO3 (K3)	3	-	-	-
CO4 (K3)	3	3	3	-
CO5 (K5)	3	3	3	3
CO6 (K3)	3	3	3	2
CO7 (K3)	3	3	-	-

UNIT-I

An Overview of C++: Difference between C and C++, The Origins of C++, Key Concepts of Object Oriented Programming, A Sample C++ Program, Old Style vs. Modern C++, Namespaces.

Classes and Objects:

Classes, Declaring Objects, Access Specifiers and their Scope, Defining Member Function, Friend functions, Inline Functions, Static Member Variable, Static Member Function, Constructors and Destructors, Scope Resolution Operator, Nested class.

UNIT-II

Function Overloading, Copy Constructor and Default Arguments: Function Overloading, Constructor Overloading, Constructor with Arguments, Copy Constructor, Default Function Arguments, Anonymous Objects, Array of Objects.

Operator Overloading: Creating a Member Operator Function, Operator Overloading using Friend function, Overloading Special Operators.

UNIT-III

Inheritance: Base Class Access Control, Inheritance and protected Members, Types of Inheritance, Pointer to Class, Pointer Object, The this Pointer, Pointer to Derived Classes and Base Class, Virtual Base Classes, Object as a Class Member, Advantages and Disadvantages of Inheritance.

Virtual Functions and Polymorphisms: Virtual Functions, Rules for Virtual Function, Pure Virtual Functions, Using Virtual Functions, Virtual Destructor, Early Vs Late Binding.

UNIT-IV

Templates: Generic Functions, Applying Generic Functions, Generic Classes, Power of Templates, Difference between Templates and Macros.

Exception Handling: Exception Handling, Fundamentals, Handling Derived Class Exceptions, Exception Handling Options, Applying Exception Handling.

UNIT-V

Introducing the Standard Template Library: An Overview of STL, Container Classes, Sequence Containers, Associative Containers, Vectors, Lists, Maps Algorithms.

Text Books:

1. The Complete Reference C++, Herbert Schildt, Fourth Edition, TMH, 2003.
2. The C++ Programming Language, Bjarne Stroustrup, Fourth Edition, Pearson, 2014.

Reference Books:

1. A First Book Of C++, Gary Bronson, Fourth Edition, Cengage Learning, 2012.
2. C++ Primer Plus By Stephen Prata, Sixth Edition, Pearson, 2011.
3. Object Oriented Programming In C++ By E. Balagurusamy, Sixth Edition, Tata McGraw Hill, 2013.
4. Object Oriented Programming Using C++, Joyce Farrell, Fourth Edition, Cengage Learning, 2008.
5. C++ Programming:From Problem Analysis To Program Design, Ds Malik, Eighth Edition, Cengage Learning, 2017.

Web Links:

1. <https://in.udacity.com/course/c-for-programrs--ud210>
2. <https://www.coursera.org/courses?query=c%2B%2B>
3. <http://nptel.ac.in/courses/106105151/>
4. <https://www.javatpoint.com/cpp-oops-concepts>
5. <https://www.tutorialspoint.com/cplusplus/>

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to EEE, ME, ECE, CSE & IT)

III Semester

Course Code: 171HS3T04

L T P C
3 1 0 3

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, to use different forecasting methods for predicting demand for various products and services
- CO 3: Identify the cost behavior, costs useful for managerial decision making and Break Even Point (BEP) of an enterprise.
- CO 4: Outline the different types of business organizations along with basic knowledge on business cycle.
- CO 5: Make use of the process & principles of accounting and prepare Journal, Ledger, Trial Balance, Trading A/c., Profit & Loss A/c. and Balance Sheet of an enterprise.
- 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)	PO 10 (K2)	PO11 (K3)	PO12 (K1)
CO1 (K2)	-	-	-	-	-	-	-	2	-	-	-	-
CO2 (K2)	-	-	-	-	-	-	-	-	-	3	-	-
CO3 (K3)	-	-	-	-	-	-	-	-	-	-	3	-
CO4 (K2)	-	-	-	-	-	-	-	-	-	-	-	3
CO5 (K3)	-	-	-	-	-	-	-	-	-	3	-	-
CO6 (K3)	-	-	-	-	-	-	-	-	-	3	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	-	-	-
CO2 (K2)	-	-	-	-
CO3 (K3)	-	3	-	-
CO4 (K2)	-	-	-	-
CO5 (K3)	-	-	-	-
CO6 (K3)	-	-	-	-

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 of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting

UNIT -II

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

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 – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle.

UNIT-IV

Introduction to Accounting & Financing Analysis: Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements- 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 (payback 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. Managerial Economics and Financial Analysis, A R Aryasri, Fourth Edition, TMH Publication, 2012.
2. Managerial Economics and Financial Analysis, S A Siddiqui & A. S. Siddiqui, First Edition, New Age Publishers, 2012.

Reference Books:

1. Managerial Economics: Principles and Worldwide Applications, Dominick Salvatore, Seventh Edition, Oxford University Press, 2012.
2. Financial Accounting for Management, Ramachandran N, Ram Kumar Kakani, Pearson Education, Second Edition, 2007.
3. Managerial Economics, D N Dwivedi, Eighth Edition, PHI Publication, 2010.
4. Cost and Management Accounting, S P Jain & KL Narang, Third Edition, Kalyani Publishers, 2004.

Web Links:

1. www.managementstudyguide.com
2. www.tutorialspoint.com
3. http://shodhganga.inflibnet.ac.in/bitstream/10603/7277/9/08_chapter%202

ADVANCED DATA STRUCTURES (Common to CSE & IT)

III Semester**Course Code: 171CS3T04**

L	T	P	C
3	1	0	3

Course Objectives:

- COB 1: To impart the knowledge on External Sorting and Hashing Techniques.
- COB 2: To help the students to learn Priority Queues.
- COB 3: To demonstrate the students about the operations of Efficient Binary Search Trees.
- COB 4: To illustrate the concept of various Multiway Search Trees.
- COB 5: To make the students to learn the use of Digital Search Structures.

Course Outcomes:

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

- CO 1: Describe the working principles of K-way Merge Sort.
- CO 2: Apply Hashing Techniques to solve data integrity problems.
- CO 3: Explain the various techniques to implement Priority Queues.
- CO 4: Compare various balanced search Trees.
- CO 5: Compare and contrast B and B+ trees.
- CO 6: Construct various kinds of Tries.

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	-	3	-	-	-	-	-
CO2 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO3 (K2)	2	1	-	-	2	-	3	-	-	-	-	-
CO4 (K2)	2	1	-	-	2	-	3	-	-	-	-	-
CO5 (K2)	2	1	-	-	2	-	3	-	-	-	-	-
CO6 (K6)	3	3	3	3	3	3	3	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	2	2	1
CO2 (K3)	3	3	3	2
CO3 (K2)	2	2	2	1
CO4 (K2)	2	2	2	1
CO5 (K2)	2	2	2	1
CO6 (K6)	3	3	3	3

UNIT-I

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

Hashing: Introduction to Static Hashing, Hash Tables, Hash Functions, Different Hash Functions, Secure Hash Functions, Collision Resolution Techniques, Dynamic Hashing.

UNIT-II

Priority Queues (Heaps): Introduction, Binary Heaps-Model and Simple Implementation, Basic Heap Operations, Other Heap Operations, Applications of Priority Queues, Binomial Heaps (or Queues), Binomial Heap Structure and Implementation, Binomial Queue Operations.

UNIT-III

Efficient Binary Search Trees: Binary Search Trees, Optimal Binary Search Trees, Self-balancing Binary Search Trees, AVL Trees- Operations on AVL Trees, Red-Black Trees- Properties and Representation of Red-Black Trees, Operations on Red-Black Trees, Applications of Red-Black Trees.

UNIT-IV

Multiway Search Trees: M-Way Search Trees-Definition and Properties, Searching an M-Way Search Tree, B-Trees-Definition and Properties, Number of Elements in a B-tree, Searching for an Element in a B-Tree, Inserting a New Element in a B-Tree, Deleting an Element from a B-Tree, B+ Trees - Searching a B+ Tree, Inserting a New Element in a B+ Tree, Deleting an Element from a B+ Tree.

UNIT-V

Digital Search Structures: Introduction to Digital Search Tree, Operations on Digital Search Trees – Insertion, Searching, and Deletion, Binary Tries and Patricia- Binary Tries, Compressed Binary Trie, Patricia, Multiway Tries- Definition, Searching a Trie, Sampling Strategies, Insertion into a Trie, Deletion from a Trie, Keys with Different Length, Height of a Trie, Space Required and Alternative Node Structure, Prefix Search and Applications, Compressed Tries, Compressed Tries with Skip Fields, Compressed Tries with Labeled Edges, Space Required by a Compressed Tries.

Text Books:

1. Advanced Data Structures, Reema Thareja, S. Rama Sree, Oxford University Press, 2017.
2. Fundamentals Of Data Structures In C, Horowitz, Sahni, Anderson-Freed, Second edition, 2008.

Reference Books:

1. Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.
2. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, and J. D. Ullman, Pearson, 2002.
3. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, Third Edition, The MIT Press.
4. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, Pearson.

Web Links:

1. [https://ocw.mit.edu/courses/...and...data structures...notes/MIT6_851S12_L1.pdf](https://ocw.mit.edu/courses/...and...data%20structures...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/notes/heaps-and-priority-queues/>
5. <http://web.stanford.edu/class/archive/cs/cs166/cs166.1146/lectures/09/Small09.pdf>

OBJECT ORIENTED PROGRAMMING LAB
(Common to CSE & IT)

III Semester**Course Code: 171CS3L01**

L	T	P	C
0	0	3	2

Course Objectives:

- COB 1: To impart knowledge on classes, object constructor and destructor.
- COB 2: To illustrate how to overload functions and operators in C++.
- COB 3: To enable the students in developing programming skills using features of C++ such as inline, friend functions, abstraction, encapsulation, polymorphism, this pointer and virtual destructor.
- COB 4: To demonstrate exception handling in C++.
- COB 5: To implement C++ programs using templates.
- COB 6: To make the students understand the importance of STL in C++.

Course Outcomes:

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

- CO 1: Use Control Structures and modular programming in solving complex problems.
- CO 2: Apply object oriented techniques to solve computing problems.
- CO 3: Experiment with the key features of object-oriented programming language.
- CO 4: Develop C++ classes for code reuse through inheritance.
- CO 5: Apply exception handling technique to handle various errors.
- CO 6: Develop C++ programs using Inline, friend functions, Reference variable, this pointer, operator Overloading, static and dynamic binding, template and STL.

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	-	-	-	-	-	-
CO2 (K3)	2	2	1	1	3	3	-	-	3	-	-	-
CO3 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	-	3	3	-	-	-	-	3	-
CO5 (K3)	3	2	1	1	3	3	-	-	-	-	3	3
CO6 (K3)	3	2	1	1	3	3	3	-	-	-	3	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	3	3	3	2
CO2 (K3)	3	3	3	2
CO3 (K3)	2	3	3	2
CO4 (K3)	3	3	3	2
CO5 (K3)	3	3	3	2
CO6 (K3)	3	3	3	2

List of Experiments:

Week 1 (Expressions Control Flow)

- 1.1) Develop a C++ program to find the roots of a quadratic equation.
- 1.2) Develop a C++ program to find factorial of a given number using recursion.

Week 2 (Variables, Scope)

- 2.1) Develop a C++ program to implement call-by-reference.
- 2.2) Develop a C++ program to illustrate scope resolution and namespaces.
- 2.3) Develop a C++ program illustrating Inline Functions.

Week 3 (Classes and Objects)

- 3.1) Develop a C++ program demonstrating a Bank Account with necessary data members and member functions.
- 3.2) Develop a C++ program for illustrating Access Specifiers public and private.
- 3.3) Develop a C++ program to illustrate this pointer.

Week 4 (Functions)

- 4.1) Develop a C++ program illustrate function overloading.
- 4.2) Develop a C++ program to illustrate the use of default arguments.
- 4.3) Develop a C++ program illustrating friend function.

Week 5 (Constructors and Destructors)

- 5.1) Develop a C++ Program to illustrate the use of Constructors and Destructors.
- 5.2) Develop a C++ program illustrating Constructor overloading.
- 5.3) Develop a C++ program illustrating Copy Constructor.

Week 6 (Operator Overloading)

- 6.1) Develop a C++ program to Overload Unary, and Binary Operators using member function.
- 6.2) Develop a C++ program to Overload Unary, and Binary Operators using friend function.
- 6.3) Develop a case study on Overloading Operators and Overloading Functions. (150 Words)

Week 7 (Inheritance)

- 7.1) Develop C++ Programs to incorporate various forms of Inheritance
 - i. Single Inheritance
 - ii. Multiple Inheritances
 - iii. Multi-level inheritance
 - iv. Hierarchical Inheritance
 - v. Hybrid inheritance
- 7.2) Develop a C++ program in C++ to illustrate the order of execution of constructors and destructors in inheritance.

Week 8 (Access)

- 8.1) Develop a C++ program to illustrate object as a class member.
- 8.2) Develop a C++ program to illustrate pointer to a class.
- 8.3) Develop a C++ program to illustrate Virtual Base Class.

Week 9 (Polymorphism)

- 10.1) Develop a C++ program to illustrate virtual functions.
- 10.2) Develop a C++ program to illustrate runtime polymorphism.
- 10.3) Develop a C++ program to illustrate pure virtual function and calculate the area of different shapes by using abstract class.

Week 10(Templates)

- 10.1) Develop a C++ Program illustrating function template.
- 10.1) Develop a C++ Program illustrating template class.
- 10.2) Develop a C++ program to illustrate class templates with multiple parameters.

Week 11(Exception Handling)

- 11.1) Develop a C++ program for handling Exceptions.
- 11.2) Develop a C++ program to illustrate the use of multiple catch statements.

Week 12 (STL)

- 12.1) Develop a C++ program to implement List, Vector and its Operations.
- 12.2) Develop a C++ program to implement Deque and Deque Operations.
- 12.3) Develop a C++ program to implement Map and Map Operations.

List of Augmented Experiments: Week 13 - Week 16

(Any 2 of the following experiments can be performed)

- 13) Develop a C++ program for flight booking system.
- 14) Develop Qt application containing slider and spin box in which a slider responds to changes in the spin box.
- 15) Develop a Qt application to create a calculator.
- 16) Develop a Qt application for creating a text pad.
- 17) Develop a C++ program with maximum of 20 characters, that your user will be guessed and will show only asterisks (*) on the screen. The user will input or enter one character at a time. And for every correct character, the asterisk will be replaced by that character until all the characters or the mystery word/s will reveal. Your program will accept a maximum three (3) errors or mistakes in entering/inputting character otherwise the mystery word/s will be viewed.

Sample Output:

Output: *****

Enter your character: e

Output: ***e**e

Enter your character: a

Output: sorry! the character is not existing. you still have 2 chances\

Enter your character: s

Output: s**e**e

Enter your character: c

Output: sc*e*ce

Enter your character: i

Output: scie*ce

Enter your character: n

Output: science

Reference Books:

1. C++ Primer Plus by Stephen Prata, Sixth Edition, Pearson, 2011.
2. C++ GUI Programming with Qt4, Jasmin Blanchette, Mark Summerfield, Second Edition, Prentice Hall Press, 2008.
3. Object Oriented Programming in C++ by E. Balagurusamy, Sixth Edition, Tata McGraw Hill, 2013.
4. C++ for Programmers, Paul J. Deitel, Harvey M. Deitel, Pearson, 2009.
5. The C++ Programming Language, Bjarne Stroustrup, Fourth Edition, Pearson, 2014.

Web Links:

1. <http://en.cppreference.com/w/cpp/links/libs>
2. <https://www.daniweb.com/digital-media/ui-ux-design/threads/113591/trying-to-run-a-c-program-through-a-web-link>
3. <https://github.com/fffaraz/awesome-cpp>
4. <http://www.yolinux.com/TUTORIALS/LinuxTutorialC++.html>
5. http://www.techsystemsembedded.com/cpp_links.php

ADVANCED DATA STRUCTURES LAB
(Common to CSE & IT)

III Semester
Course Code: 171CS3L02

L	T	P	C
0	0	3	2

Course Objectives:

- COB 1: To demonstrate the Graph traversal techniques.
- COB 2: To make students to learn the concepts of iterative and recursive algorithms.
- COB 3: To impart knowledge on Dictionaries using hashing techniques.
- COB 4: To demonstrate the basic operations on Binary heap, AVL tree, and Red-Black tree.
- COB 5: To enable the students to learn about B-Tree and B+ Tree operations.

Course Outcomes:

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

- CO 1: Construct the graph traversals and minimum spanning tree for a given graph.
- CO 2: Develop program to implement lossless data compression algorithm.
- CO 3: Apply the hashing techniques to implement Dictionary.
- CO 4: Build a Binary Heap using Priority queues.
- CO 5: Analyze various basic operations of AVL tree, Red-Black tree, B-Tree to improve the efficiency.
- CO 6: Identify the appropriate data structure for a given problem.

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	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO4 (K3)	3	-	1	1	3	-	3	-	-	-	-	-
CO5 (K4)	3	3	2	2	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 (K3)	PSO 4 (K4)
CO1 (K3)	3	3	3	2
CO2 (K3)	3	3	3	2
CO3 (K3)	3	3	3	2
CO4 (K3)	3	3	3	2
CO5 (K4)	3	3	3	3
CO6(K3)	3	3	3	2

List of Experiments:**Week 1**

- 1) Develop a recursive program to implement Breadth First Search and Depth First Search.

Week 2

- 2) Develop a non recursive program to implement Breadth First Search and Depth First Search.

Week 3

- 3) Develop a program to generate a minimum-cost spanning tree using Prim's algorithm.

Week 4

- 4) Develop a program to generate a minimum-cost spanning tree using Kruskal's algorithm.

Week 5

- 5) Develop a program to implement Huffman coding.

Week 6

- 6) Develop a program to implement functions of dictionary using Hashing Techniques (division method, digit folding and mid square method).

Week 7

- 7) Develop a program to implement Collision Resolution Techniques (Linear Probing, Quadratic Probing and Double Hashing) in Hash Table.

Week 8

- 8) Develop a program to perform binary heap operations.

Week 9

- 9) Develop a program to perform AVL tree operations.

Week 10

- 10) Develop a program to perform Red-Black tree operations.

Week 11

- 11) Develop a program to implement B-Tree operations.

Week 12

- 12) Develop a program to implement B+ Tree operations.

List of Augmented Experiments: Week 13 – Week 16

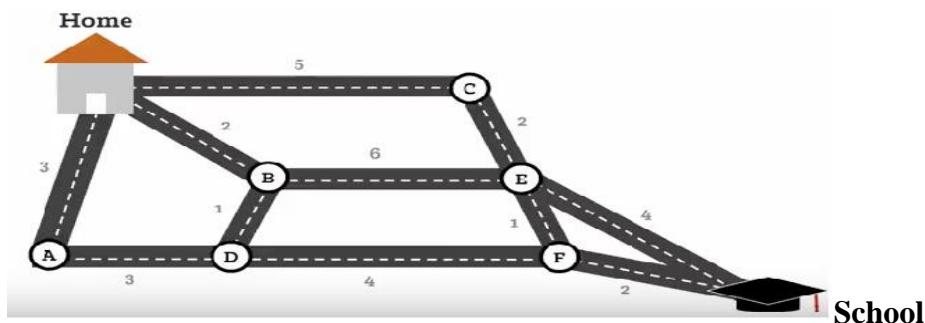
(Any 2 of the following experiments can be performed)

- 13) Raju created an authentication system which allows users to get authenticated by their passwords. In this system when an user enters a password, the system tries to match it with the password that was earlier created by the user. To keep the system simple Raju stored the passwords set by users in a file in plain in the system.

We all know such system is not secure. Can you help Raju in improving the system using your knowledge on hashing techniques.

- 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) Monk and Cursed Tree: Binary Search Tree.

Monk has an array A having N distinct integers and a Binary Search Tree which is initially empty. He inserts all the elements of the array from index 1 to N in the BST in the order given in the array. But wait! The tree so formed turns out to be cursed. Monk is having some weird experiences since he made that tree. So, now to stop all that, Monk has two options, to destroy the BST or to pray to God and ask for a solution. Now since Monk has to use this BST in a Code Monk Challenge, he cannot destroy it. So he prays to God. God answer his prayers and sends an angel named Micro. Now, Micro asks Monk to find something. He tells him two values, X and Y, present in the BST and ask him to find the maximum value that lie in the path between node having value X and node having value Y. (including X and Y).

Now since, Monk is very afraid of that tree he asks for your help.

Input:

First line consists of a single integer denoting N. Second line consists of N space separated integers denoting the array A. Third line consists of two space separated integers denoting X and Y.

Output:

Print the maximum value that lie in the path from node having value X and node having value Y in a new line. It is ensured that values X and Y are present in the array.

- 16) Print unique rows in a given boolean matrix.

Given a binary matrix, print all unique rows of the given matrix.

Input:

```
{0, 1, 0, 0, 1}
{1, 0, 1, 1, 0}
{0, 1, 0, 0, 1}
{1, 1, 1, 0, 0}
```

Output:

```
0 1 0 0 1  
1 0 1 1 0  
1 1 1 0 0
```

(Use Trie data structure)

Since the matrix is boolean, a variant of Trie data structure can be used where each node will be having two children one for 0 and other for 1. Insert each row in the Trie. If the row is already there, don't print the row. If row is not there in Trie, insert it in Trie and print it.

Reference Books:

1. Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.
2. Data Structures And Algorithms, A. V. Aho, J. E. Hopcroft, And J. D. Ullman, Pearson, 2002.
3. Introduction To Algorithms, Thomas H. Cormen, Charles E. Leiserson And Ronald L. Rivest, Third Edition, The Mit Press.
4. Data Structures And Algorithm Analysis In C, Mark Allen Weiss, Second Edition, Pearson.

Web Links:

1. <https://ocw.mit.edu/courses/...and.../6-006-introduction-to-algorithms-spring-2008/>
2. <https://www.coursera.org/specializations/data-structures-algorithm>
3. <https://in.udacity.com/course/intro-to-algorithms--cs215>
4. <https://www.alljntuworld.in/jntu-lab-manuals/>

PROFESSIONAL ETHICS AND HUMAN VALUES
(Common to All Branches)

III Semester
Course Code: 171HS3A09

L T P C
2 0 0 0

Course Objectives:

- COB 1: To demonstrate ethical Theories to students.
- COB 2: To paraphrase human rights and quote examples on values and morals.
- COB 3: To infer ethical thinking abilities through experimental learning.
- COB 4: To help an engineer to identify what is wrong and right in engineering profession.
- COB 5: To prepare an engineer personally and professionally with ethics.

Course Outcomes:

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

- CO 1: Make use of values, morals and ethics in their day to day life.
- CO 2: Identify what is right and wrong through moral ethics.
- CO 3: Analyze experimental learning while developing the society with ethos.
- CO 4: Apply ethical principles to resolve the problems that arise in work place.
- CO 5: Apply adequate knowledge on global code of conduct.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I

Human Values: Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT-II

Principles for Harmony: Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

UNIT-III

Engineering Ethics and Social Experimentation: History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry – Kohlberg’s Theory - Gilligan’s Argument –Heinz’s Dilemma - Comparison with Standard Experiments — Learning from the Past –Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

UNIT-IV

Engineers’ Responsibilities towards Safety and Risk: Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/s Involuntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/s Immediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis- Accidents.

UNIT-V

Engineers’ Duties and Rights: Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights –Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes- Industrial Espionage- Price Fixing-Whistle Blowing Globalization and MNCs –Cross Culture Issues.

Text Books:

1. A Text Book On Professional Ethics And Human – R.S.Naagarazan.
2. Professional Ethics And Human Values By – M.P.Raghavan’s – Scitech Publications (Indian Pvt., 2013).

References:

1. Engineering Ethics & Human Values By M.Govindarajan, S.Natarajan And V.S.Senthil Kumar-PHI Learning Pvt. Ltd – 2009.
2. Human Values And Professional Ethics By Jayshree Suresh And B. S. Raghavan, S.Chand Publications.
3. Professional Ethics And Human Values By Prof.D.R.Kiran-Tata Mcgraw-Hill – 2013.
4. Engineering Ethics By Harris, Pritchard And Rabins, Cengage Learning, New Delhi.

Web Links:

1. <https://nptel.ac.in/courses/109104068>
2. <https://www.reelnreel.com/roles-and-responsibilities-of-a-typical-video-engineer/>
3. <http://nptel.ac.in/courses/109104068/30>
4. http://nptel.ac.in/courses/122106031/Pdfs/2_1.pdf

EMPLOYABILITY SKILLS - I
(Common to all branches)

III Semester
Course Code: 171HS3A10

L T P C
0 0 2 0

Course Objectives:

- COB 1 : To provide necessary training to impart employability skills.
- COB 2 : To ensure the students secure placements.
- COB 3 : To make the students feel comfortable to face several competitive examinations with confidence and competence.
- COB 4 : To make the student more likely to be employed.

Course Outcomes:

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

- CO 1 : Identify the number and letter series techniques in different models.
- CO 2 : Demonstrate the basic grammatical skills.
- 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 : Ignite creative thinking abilities.
- CO 6 : Identify the direction and distance of the objects.

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(K1)	1	-	-	-	-	-	-	-	-	-	-	-
CO 2(K2)	2	-	-	-	-	-	-	-	-	3	-	-
CO 3(K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO 4(K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 5(K3)	3	-	-	-	-	-	-	-	-	2	-	-
CO 6(K3)	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO 1(K1)	1	-	-	-
CO 2(K2)	-	2	-	-
CO 3(K2)	2	-	-	-
CO 4(K3)	3	-	-	-
CO 5(K3)	3	-	-	-
CO 6(K3)	3	-	-	-

UNIT-I

Aptitude: Number series

Soft Skills: Importance-Changing Industry Needs English ,Functional Grammar– Significance, Articles Usage of A, An, The Definition –rules-examples , Prepositions Definition - Importance - types - usage - rules

UNIT-II

Aptitude: Number Analogy

Soft Skills: Tenses, Voice- Importance - Definitions - usage - rules - types - structures-signal words - examples

UNIT-III

Aptitude: Letter series, Letter Analogy

Soft Skills: Speech Definition - importance - conversion rules - usage - structures - examples

UNIT-IV

Aptitude: Coding & Decoding

Soft Skills: Creative product speaking, Auxiliaries A. Primary B. Secondary

UNIT-V

Aptitude: Direction Test

Soft Skills: Sentences –simple, complex, compound, Sentence Improvement,

Text Books:

1. A Modern Approach to Verbal & Non-Verbal Reasoning- Dr. R.S. Aggarwal, S CHAND
2. 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. A New Approach to Objective English -R.S. Dhillon DGP Publications

Web Links

1. <https://www.indiabix.com>
2. <https://www.indianstudyhub.com>

EMPLOYABILITY SKILLS - I
(Revised Syllabus for batches admitted from 2018 - 2019)
 (Common to all branches)

III Semester	L	T	P	C
Course Code: 171HS3A10	0	0	2	0

Course Objectives:

- COB 1: To provide necessary training to impart employability skills.
- COB 2: To ensure the students secure placements.
- COB 3: To make the students feel comfortable to face several competitive examinations with confidence and competence.
- COB 4: To make the student more likely to be employed.

Course Outcomes:

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

- CO 1: Identify the number and letter series techniques in different models.
- CO 2: Demonstrate the basic grammatical skills.
- 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: Ignite creative thinking abilities.
- CO 6: Identify the direction and distance of the objects.

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(K1)	1	-	-	-	-	-	-	-	-	-	-	-
CO 2(K2)	2	-	-	-	-	-	-	-	-	3	-	-
CO 3(K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO 4(K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 5(K3)	3	-	-	-	-	-	-	-	-	3	-	-
CO 6(K3)	3	2	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K4)	PSO 2 (K4)	PSO 3(K6)	PSO 4 (K3)
CO 1(K1)	-	-	-	1
CO 2(K2)	-	1	-	-
CO 3(K2)	-	-	-	2
CO 4(K3)	-	-	-	3
CO 5(K3)	-	-	-	3
CO 6(K3)	-	-	-	-

UNIT-I

Aptitude: Number series

Soft Skills: Importance-Changing Industry Needs English, Functional Grammar–Significance, Articles Usage of A, An, The Definition –rules-examples , Prepositions Definition - Importance - types - usage - rules

UNIT-II

Aptitude: Number Analogy

Soft Skills: Tenses, Voice- Importance - Definitions - usage - rules - types - structures-signal words - examples

UNIT-III

Aptitude: Letter series, Letter Analogy

Soft Skills: Speech Definition - importance - conversion rules - usage - structures - examples

UNIT-IV

Aptitude: Coding & Decoding

Soft Skills: Creative product speaking, Auxiliaries A. Primary B. Secondary

UNIT-V

Aptitude: Direction Test

Soft Skills: Sentences –simple, complex, compound, Sentence Improvement,

Text Books:

1. A Modern Approach to Verbal & Non-Verbal Reasoning- Dr. R.S. Aggarwal, S CHAND
2. 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. A New Approach to Objective English -R.S. Dhillon DGP Publications

Web Links

1. www.indiabix.com
2. <https://www.indianstudyhub.com>

SOFTWARE ENGINEERING
(Common to CSE & IT)

IV Semester

Course Code: 171CS4T05

L T P C
3 1 0 3

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: Demonstrate an understanding of the key facts, concepts, principles and theories of software engineering.
- CO 2: Analyze the effective software engineering process, based on knowledge of widely used development lifecycle models.
- CO 3: Capture, document and analyze software requirements.
- CO 4: Explain the various responsibilities and activities of project management.
- CO 5: Translate a requirements specification into an implementable design, following a structured and organized process.
- CO 6: Examine a testing strategy for a software system using different testing techniques.
- CO 7: Discuss about software reliability, quality management, software maintenance and reusability.

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 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO6 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO7 (K2)	2	1	-	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	2	2	1
CO2 (K4)	3	3	3	3
CO3 (K4)	3	3	3	3
CO4 (K2)	2	2	2	1
CO5 (K2)	2	2	2	1
CO6 (K4)	3	3	-	-
CO7 (K2)	2	2	2	1

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 using function point analysis for a real time project.

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.

Text Books:

1. Software Engineering – Concepts and Practices: Ugrasen Suman, Cengage Learning, 2013.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, 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. An integrated approach to Software Engineering, Pankaj Jalote, Springer Narosa.
4. Software Engineering: A practitioner's approach, Roger S. Pressman, Seventh Edition, McGraw Hill.

Web Links:

1. <http://nptel.ac.in/courses/106101061/>
2. <https://www.coursera.org/learn/software-processes-and-agile-practices>
3. <http://www.rspa.com/spi/process-generic.html>
4. <http://www.geeksforgeeks.org/software-engineering-gq/>
5. https://www.tutorialspoint.com/software_engineering/

FORMAL LANGUAGES AND AUTOMATA THEORY

IV Semester
Course Code: 171CS4T06

L T P C
3 1 0 3

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 the Course, Student will be able to:

- CO 1: Describe types of Finite Automaton.
- CO 2: Discuss the need and use of Regular expressions.
- CO 3: Summarize Chomsky Hierarchy of languages.
- CO 4: Compare the powers of different kinds of automaton.
- CO 5: Summarize decidability and undecidability concepts.
- CO 6: Employ 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 (K2)	2	1	-	-	-	2	-	-	-	-	-	-
CO3 (K2)	-	1	-	-	-	-	3	-	-	-	-	-
CO4 (K4)	3	-	-	2	-	3	-	-	-	-	-	-
CO5 (K2)	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 (K3)	PSO 4 (K4)
CO1 (K2)	2	2	2	1
CO2 (K2)	2	2	2	1
CO3 (K2)	2	2	2	1
CO4 (K4)	3	3	3	3
CO5 (K2)	2	2	2	1
CO6 (K3)	3	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, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekharan, Third Edition, PHI, 2007.

Reference Books:

1. Elements of Theory of Computation, H.R. Leis and C.H. Papadimeteru, Prentice Hall Publishers.
2. Introduction to Languages and Theory of Computation, John C Martin, TMH.
3. Automata and Computability, Dexter C. Kohen, Springer Publishers.
4. Introduction to the theory of computation, Michael Sipser, PWS Publishing.

Web Links:

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

JAVA PROGRAMMING
(Common to CSE & IT)

IV Semester
Course Code: 171CS4T07

L T P C
3 1 0 3

Course Objectives:

- COB 1: To introduce java buzz words.
- COB 2: To provide knowledge on classes, inheritance, interfaces and packages.
- COB 3: To make the students to understand exception handling 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 this course the student will be able to:

- CO 1: Describe the basic concepts and building blocks of Java.
- CO 2: Solve complex problems using the concepts of class, inheritance, interface and packages.
- CO 3: Test for runtime exceptions arise in java applications.
- CO 4: Make use of threads to create multithreaded java applications.
- CO 5: Summarize different types of Streams in java.
- CO 6: Compare java applets with standalone applications.
- CO 7: 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 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	-	3	-	3	-	-	-	-	-
CO3 (K3)	3	2	1	-	3	-	3	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO5 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO6 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO7 (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 (K3)	PSO 4 (K4)
CO1 (K2)	2	2	2	1
CO2 (K3)	3	3	3	2
CO3 (K3)	3	3	3	2
CO4 (K3)	3	3	3	2
CO5 (K2)	2	2	2	1
CO6 (K2)	2	2	2	1
CO7 (K3)	3	3	3	2

UNIT-I

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

Building Blocks of Java: Variables, primitive data types, identifiers, literals, Operators, expressions, precedence rules and associativity, 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: Basics of I/O, Streams, Byte Streams and Character Streams, Predefined Streams, Reading Console inputs- Reading characters, Reading Strings, Writing Console Output- PrintWriter class, Reading and writing Files.

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

UNIT-V

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

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

Swing: Introduction, Swing Components- JFrame, JPanel, Layout Managers, JList, JTable, JTree, Dialog Box.

Text Books:

1. The Complete Reference Java, Herbert Schildt, Eighth Edition, TMH, 2011.
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. Programming in JAVA, Sachin Malhotra, Saurabh Choudary, Oxford, 2013.
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>

DATABASE MANAGEMENT SYSTEMS
(Common to CSE & IT)

IV Semester
Course Code: 171CS4T08

L T P C
3 1 0 3

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: Summarize the database characteristics.
- CO 2: Identify various database architectures.
- CO 3: Interpret relational database using SQL.
- CO 4: Examine issues in data storage and query processing for appropriate solutions.
- CO 5: Make use of normalization techniques for database design.
- CO 6: Illustrate the mechanisms of transaction management.
- CO 7: Build database system for real world problems.

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	1	1	3	-	3	-	-	-	-	-
CO3 (K2)	2	1	-	-	-	-	3	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO5 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO6 (K2)	2	1	-	-	2	-	3	-	-	-	-	-
CO7 (K3)	3	2	1	-	-	-	3	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	2	2	2
CO2 (K3)	3	-	3	2
CO3 (K2)	2	2	2	1
CO4 (K3)	3	3	3	2
CO5 (K3)	3	-	3	1
CO6 (K2)	2	2	2	1
CO7 (K3)	3	-	3	2

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, 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, Third Edition, TMH, 2003.
2. Database Systems, Ramez Elmasri and Shamkant B. Navathe, Sixth Edition, Pearson Education, 2010.

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. <https://www.lynda.com/Databases-training-tutorials/1458-0.html>
5. <https://beginnersbook.com/2015/05/normalization-in-dbms/>

PRINCIPLES OF PROGRAMMING LANGUAGES

IV Semester

Course Code: 171CS4T09

L	T	P	C
3	1	0	3

Course Objectives:

- COB 1: To describe the programming language's evolution, syntax and semantics.
- COB 2: To impart the knowledge on data, data types, basic statements and control structures used in various programming languages.
- COB 3: To demonstrate sub programs, call-return architecture and ways of implementing them.
- COB 4: To illustrate object-orientation, concurrency, and event handling in programming languages.
- COB 5: To create awareness on non-procedural programming paradigms.

Course Outcomes:

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

- CO 1: Summarize the programming language evaluation.
- CO 2: Describe syntax and semantics of programming languages.
- CO 3: Explain binding and control structures of various programming languages.
- CO 4: Apply subprogram constructs for optimization in programming.
- CO 5: Demonstrate concurrency levels, objects and their design issues.
- CO 6: Develop small programs using Scheme, ML, and Prolog languages.

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 (K2)	1	-	-	-	2	-	-	-	-	-	-	-
CO3 (K2)	2	1	-	1	-	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO5 (K2)	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 (K3)	PSO 4 (K4)
CO1 (K2)	2	2	2	1
CO2 (K2)	2	2	2	1
CO3 (K2)	2	2	2	1
CO4 (K3)	3	3	3	2
CO5 (K2)	2	2	2	1
CO6 (K3)	3	3	3	2

UNIT-I

Preliminary concepts: Reasons for studying concepts of programming languages, programming domains .Evolution of programming languages, describing syntax and semantics.

Data, data types, and basic statements: names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and Boolean expressions , assignment statements , mixed mode assignments, control structures – selection, iterations, branching, guarded Statements.

UNIT-II

Subprograms and implementations: Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping.

UNIT-III:

Object- orientation, concurrency and event handling:

Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores, monitors, message passing, threads, statement level concurrency, exception handling, event handling.

UNIT-IV

Functional programming languages: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, Programming with ML

UNIT-V

Logic programming languages: Introduction to logic and logic programming, Programming with Prolog, multi - paradigm languages.

Text Books:

1. Concepts of Programming Languages, Robert W. Sebesta, Tenth Edition, Addison Wesley, 2012.
2. Programming Languages, Principles & Paradigms, Allen B Tucker, Robert E Noonan, Second Edition, TMH, 2014.

Reference Books:

1. The Scheme programming language, R. Kent Dybvig, Fourth Edition ,MIT Press, 2009.
2. Elements of ML programming, Jeffrey D. Ullman, Second Edition ,Prentice Hall, 1998.
3. The craft of Prolog, Richard A. O'Keefe, MIT Press, 2009.
4. Programming in Prolog: Using the ISO Standard, W. F. Clocksin and C. S. Mellish, Fifth Edition ,Springer, 2003.

Web Links:

1. <http://nptel.ac.in/courses/106102067/>
2. <https://www.cs.cmu.edu/~rwh/courses/ppl/>
3. <https://www.cs.ox.ac.uk/teaching/courses/principles/>
4. <http://pl.cs.jhu.edu/pl/index.shtml>
5. <http://freevideolectures.com/Course/2249/Principles-of-Programming-Languages>

COMPUTER ORGANIZATION
(Common to CSE & IT)

IV Semester

Course Code: 171CS4T10

L T P C
3 1 0 3

Course Objectives:

- COB 1: To provide knowledge on basic structure of Computers and machine instructions.
- COB 2: To impart knowledge on various arithmetic operations and processing unit.
- COB 3: To describe memory system and the need for memory hierarchy.
- COB 4: To make the students to understand the Interrupt and Input/Output organization.
- COB 5: To illustrate the concepts of pipelining.

Course Outcomes:

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

- CO 1: Describe the basic structure of Computers.
- CO 2: Identify various addressing modes, Arithmetic, logic and shift instructions.
- CO 3: Make use of arithmetic operations to solve various computational problems.
- CO 4: Compare hardwired control with micro programmed control unit.
- CO 5: Summarize the memory hierarchy, mapping techniques and secondary storage devices.
- CO 6: Compare the various modes of data transfer.
- CO 7: Categorize the Standard IO Interfaces.
- CO 8: Make use of the pipelining concepts to improve the performance of computer.

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 (K3)	3	-	1	1	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO4 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO5 (K2)	2	-	-	-	2	-	-	-	-	-	-	-
CO6 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO7 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO8 (K3)	3	2	1	1	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 3 (K4)
CO1 (K2)	2	2	2	1
CO2 (K3)	3	3	3	2
CO3 (K3)	3	3	3	2
CO4 (K4)	3	3	3	3
CO5 (K2)	2	2	2	1
CO6 (K4)	3	3	3	3
CO7 (K4)	3	3	3	3
CO8 (K3)	3	3	3	2

UNIT-I

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus structures, Software, Performance, Historical Perspective.

Machine Instruction and Programs: Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Additional Instructions.

Case Study: ARM, Motorola and Intel Instruction sets.

UNIT-II

Arithmetic : Addition and Subtraction of Signed Numbers, Signed-Operand Multiplication, Floating-Point Numbers and Operations – IEEE Standard for Floating-Point Numbers, Arithmetic Operations on Floating-Point Numbers.

Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Micro programd Control - Microinstructions, Micro program Sequencing, Wide Branch Addressing, Microinstructions with Next –Address Field.

UNIT-III

The Memory System: Some Basic Concepts, Read-Only Memories - ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size and Cost, Cache Memories - Mapping Functions, Replacement Algorithms, Performance considerations – Interleaving, Hit Rate and Miss Penalty, Virtual Memories, Memory Management Requirements, Secondary Storage.

UNIT-IV

Input/Output Organization: Accessing I/O Devices, Interrupts - Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, modes of transfer –Programd I/O, Interrupt initiated I/O & Direct Memory Access, Buses - Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interfaces - Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).

UNIT-V

Pipelining : Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets, Datapath and Control Considerations, Superscalar Operation.

Text Books :

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Fifth Edition, McGraw Hill, 2011.
2. Computer System Architecture, M.Morris Mano, Third Edition, Pearson Education, 2016.

Reference Books :

1. Computer Architecture and Organization, John P. Hayes, McGraw Hill, 1998.
2. Computer Organization and Architecture, William Stallings, Eighth Edition, Pearson, 2012.
3. Computer System Organization and Architecture, John D. Carpinelli, Pearson Education, 2012.
4. Structured Computer Organization, Andrew S Tanenbaum, Todd Austin, Sixth Edition, Pearson Education, 2013.
5. Computer Systems Architecture, Aharon Yadin, CRC Press, 2016.

Web Links :

1. <http://nptel.ac.in/courses/106106092/>
2. <http://nptel.ac.in/courses/106103068/2>
3. https://onlinecourses.nptel.ac.in/noc17_cs35/preview
4. <https://www.coursera.org/learn/comparch>
5. <http://www.studytonight.com/computer-architecture/>

JAVA PROGRAMMING LAB

(Common to CSE & IT)

IV Semester
Course Code: 171CS4L03

L T P C
0 0 3 2

Course Objectives:

- COB 1: To introduce various Object Oriented Concepts.
- 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 I/O and applet concepts.
- COB 5: To train the students to implement event handlers, AWT and Swing components.

Course Outcomes:

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

- CO 1: Apply OOP concepts to solve real time problems.
- CO 2: Make use of class, inheritance, interface and packages to develop solutions for complex problems.
- CO 3: Develop a solution for a real time problem using Exception handling.
- CO 4: Build java applications using Threads.
- CO 5: Apply applets and event handling to create interactive applications.
- CO 6: Design GUI using 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)	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	3	3	-	-	-	-	-	-
CO5 (K3)	3	2	1	-	3	3	-	-	-	-	-	-
CO6 (K6)	3	3	-	3	3	3	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4(K4)
CO1 (K3)	3	3	3	2
CO2 (K3)	3	3	3	2
CO3 (K3)	3	3	3	2
CO4 (K3)	3	3	3	2
CO5 (K3)	3	3	3	2
CO6 (K6)	3	3	3	3

List of Experiments:**Week 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.

Week 2 (Control Flow Statements)

- 2.1) Write a Java program to select all the prime numbers within the range of 1 to 10000.
- 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 N digit number is Armstrong or not.

Week 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.

Week 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.
- 4.3) Write a Java program to sort the elements using Quick sort.

Week 5 (Strings)

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

Week 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.

Week 7 (Packages)

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

Week 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.

Week 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.

Week 10 (Applets)

- 10.1) Write a Java program to demonstrate the Life Cycle of an applet.
- 10.2) Write a Java program to draw different shapes and fill each shape with a colour using applets.

Week 11 (Event Handling)

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

Week 12 (AWT & Swings)

- 12.1) Write a Java program to generate a simple calculator using AWT components.
- 12.2) Write a Java program to create a single ball bouncing inside a JPanel.

List of Augmented Experiments: Week 13 - Week 16

(Any 2 of the following experiments can be performed)

- 13) Create an interface which consists of methods with the name's no of watt's consumable, luminescent value, efficiency in percentage. Write classes for different categories of bulbs like LED, tube light and find out which light is efficient in terms of consumption.
- 14) Write a Java program to display analog clock using Applet.
- 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. Core Java: An Integrated Approach – R. Nageswara Rao, First Edition, John Wiley and Sons Inc., 2015.
2. Java Tutorial: A Short Note on Basics - Sharon Biocca Zakhour, Soumya Kannan, Raymond Gallardo – Fifth Edition, Oracle Corp, 2012.
3. Object Oriented Programming using Java – Simon Kendal, First Edition, 2009.
4. 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>

DATABASE MANAGEMENT SYSTEMS LAB

(Common to CSE & IT)

IV Semester

L T P C

Course Code: 171CS4L04

0 0 3 2

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.
- CO 7: Build GUI applications using 4GL.

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	-	-	-	-	-
CO7 (K3)	3	2	1	1	1	-	3	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	3	3	3	2
CO2 (K3)	3	-	3	2
CO3 (K3)	3	3	3	2
CO4 (K3)	3	3	3	3
CO5 (K3)	3	3	3	2
CO6 (K3)	3	-	3	2
CO7 (K3)	3	-	-	2

List of Experiments:**SQL:****Week 1**

1) Queries for Creating, Altering and Dropping Tables, Views and Constraints.

Week 2

2) Queries to Retrieve and Change Data: Select, Insert, Delete and Update.

Week 3

3.1) Queries to facilitate acquaintance of Built-in Functions: String Functions, Numeric Functions, Date Functions and Conversion Functions.

3.2) Queries using operators in SQL.

Week 4

4.1) Queries using Group By, Order By, and Having Clauses.

4.2) Queries on Controlling Data: Commit, Rollback, and Save point.

Week 5

5) Queries on Joins and Correlated Sub-queries.

Week 6

6) Queries on Working with Index, Sequence, Synonyms.

Week 7

7) Queries to Build Views.

PL/SQL**Week 8**

8) Write a PL/SQL Code using Basic Variables and Usage of Assignment Operation.

Week 9

9) Write a PL/SQL Code to Bind and Substitute variables in PL/SQL.

Week 10

10) Write a PL/SQL block using SQL and Control Structures.

Week 11

11) Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types.

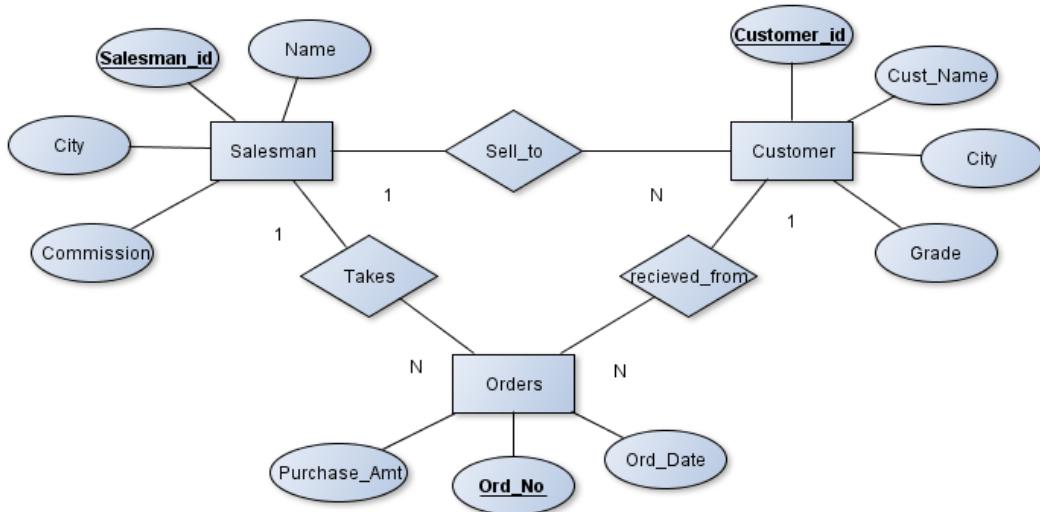
Week 12

12) Write a PL/SQL Code using Procedures, Functions, Packages.

List of Augmented Experiments: Week 13 - Week 16

(Any 2 of the following experiments can be performed)

13) For a Sales Order Database System, based on the given E-R diagram.



- 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)
- a. Draw the E-R diagram and show the necessary multiplicity and associations among them.
 b. 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

DEPARTMENT DATA:

DeptNo	DName	HOD_EMPID
1	CSE	1240
2	IT	1245

PROJECT DATA:

ProjNo	PName	DeptNo
100	IoT	1
101	CLOUD	1
102	BIGDATA	2
103	NETWORKS	2
104	IOT	2
105	NETWORKS	1

WORKS_ON DATA:

EMPID	ProjNo	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

- To Show the resulting salaries if every employee working on the ‘IoT’ project is given a 10 percent raise.
- 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

- List the titles of all movies directed by ‘STEVEN SPIELBERG’.
- Find the movie names where one or more actors acted in two or more movies.
- List all actors who acted in a movie before 2015 and also in a movie after 2015 (use JOIN operation).

4. 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

MOVIE_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.Deshpande, Dreamtech 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/>

INTELLECTUAL PROPERTY RIGHTS AND PATENTS
(Common to CE, CSE, IT, Min.E, PT & Ag.E)

IV Semester
Course Code: 171HS4A08

L T P C
0 0 2 0

Course Objectives:

- COB 1: To outline and classify Intellectual property.
- COB 2: To enable the students to study issues relating to an Intellectual Property right.
- COB 3: To explain Intellectual Property Law to find out solution in relation to Intellectual Property rights in the interest of original owner of Intellectual Property.
- COB 4: To illustrate the Institutions and agencies that grants, protects and works for Intellectual properties in India and abroad.
- COB 5: To impart knowledge of Intellectual property rights on trademarks, copyrights and patents.

Course Outcomes:

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

- CO 1: Compare various Intellectual Property rights.
- CO 2: Discuss on Intellectual Property and infer rights on such Intellectual Property owners.
- CO 3: Relate with International Intellectual Property Law.
- CO 4: Interpret the legal issues on Intellectual Property Rights and cyber laws.
- CO 5: Apply for trade mark, copyrights and patents.
- CO 6: Summarize the ways to protect trade secrets.

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)	-	-	-	-	-	-	-	2	-	3	-	3
CO 2(K2)	-	-	-	-	-	-	-	2	-	3	-	3
CO 3(K2)	-	-	-	-	-	-	-	2	-	3	-	3
CO 4(K2)	-	-	-	-	-	-	-	2	-	3	-	3
CO 5(K3)	-	-	-	-	-	-	-	3	-	3	-	3
CO 6(K2)	-	-	-	-	-	-	-	2	-	3	-	3

Mapping of Course Outcomes with Program Specific Outcomes

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

UNIT-I

Introduction to Intellectual Property Rights (IPR): Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO – Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge – Emerging Areas of IPR – Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

UNIT-II

Copyrights and Neighboring Rights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works – Rights of Distribution – Rights of Performers – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act.

UNIT-III

Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Double Patenting — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

UNIT-IV

Trademarks and Trade secrets: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing off Action - Introduction to Trade Secrets – General Principles - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements.

UNIT-V

Cyber Law and Cyber Crime : Introduction to Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions - E-commerce - Data Security – Authentication and Confidentiality - Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers. Relevant Cases Shall be dealt where ever necessary.

Text Books:

1. Fundamentals of IPR for Engineers- Kompal Bansal & Parishit Bansal, B. S. Publications (Press), 2013.
2. Intellectual Property -Deborah E.Bouchoux, Third Edition, Cengage Learning, New Delhi, 2012.

References Books:

1. Intellectual property rights- Prabuddha Ganuli, Tata Mcgraw hill, 2012.
2. Intellectual property rights M.Ashok kumar and Mohd.Iqbal Ali:, Serials Publications, 2015
3. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi, 2015.
4. Intellectual Property- Richard Stim, Cengage Learning, New Delhi, 2012.

Web links:

1. <http://www.wipo.int/portal/en/index.html>
2. <https://indiankanoon.org/>
3. <http://www.ipindia.nic.in/patents.htm>
4. <http://www.ipindia.nic.in/trade-marks.htm>
5. <http://copyright.gov.in>

EMPLOYABILITY SKILLS - II

(Common to all branches)

IV Semester
Course Code: 171HS4A11

L T P C
0 0 2 0

Course Objectives:

- COB 1: To provide necessary training to impart employability skills.
- COB 2: To ensure the students to secure placements.
- COB 3: To make the students to feel comfortable to face several competitive examinations with confidence and competence.
- COB 4: To make the student more likely to be employed.

Course Outcomes:

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

- CO 1: Examine the symbols, notations and Venn -diagrams.
- CO 2: Demonstrate the basic grammatical skills.
- CO 3: Relate different types of blood relations.
- CO 4: Apply the logics in the puzzles and arrangements.
- CO 5: Identify the logic in the cubes and dice.
- CO 6: Build the typical write-up 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)	3	-	-	-	-	-	-	-	-	-	-	-
CO 2(K3)	3	-	-	-	-	-	-	-	-	3	-	-
CO 3(K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO 4(K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 5(K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 6(K3)	3	-	-	-	-	-	-	-	-	3	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I**Aptitude:**

Aptitude: Symbols & Notations.

Soft Skills: Subject-Verb- Agreement, Personality Development.

UNIT-II

Aptitude: Venn Diagrams, Blood Relations.

Soft Skills: Adjectives, Degree of Comparisons.

UNIT-III

Aptitude: Puzzle test, Time and Date (Group Reasoning)

Soft Skills: Art of Communication, Words Often Confused.

UNIT-IV

Aptitude: Cubes & Dice

Soft Skills: Word Analogy, Effective Listening.

UNIT-V

Aptitude: Seating Arrangements

Soft Skills: Paragraph Writing, non-verbal communication.

Text Books:

1. A Modern Approach to Verbal & Non-Verbal Reasoning- Dr. R.S. Aggarwal, S CHAND.
2. 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. A New Approach to Objective English -R.S. Dhillon DGP Publications

Web Links:

1. <https://www.indiabix.com>
2. <https://www.indianstudyhub.com>

EMPLOYABILITY SKILLS - II
(Revised Syllabus for batches admitted from 2018 - 2019)
(Common to all branches)

IV Semester

Course Code: 171HS4A11

L T P C
0 0 2 0

Course Objectives:

- COB 1: To provide necessary training to impart employability skills.
- COB 2: To ensure the students to secure placements.
- COB 3: To make the students to feel comfortable to face several competitive examinations with confidence and competence.
- COB 4: To make the student more likely to be employed.

Course Outcomes:

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

- CO 1: Identify the symbols, notations and Venn-diagrams.
- CO 2: Demonstrate the basic grammatical skills.
- CO 3: Relate different types of blood relations.
- CO 4: Apply the logics in the puzzles and arrangements.
- CO 5: Identify the logic in the cubes and dice.
- CO 6: Build the typical write-up 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(K1)	1	-	-	-	-	-	-	-	-	-	-	-
CO 2(K2)	2	-	-	-	-	-	-	-	-	3	-	-
CO 3(K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO 4(K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 5(K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO 6(K3)	3	-	-	-	-	-	-	-	-	3	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K4)	PSO 2 (K4)	PSO 3(K6)	PSO 4 (K3)
CO 1(K1)	-	-	-	1
CO 2(K2)	-	1	-	-
CO 3(K2)	-	-	-	2
CO 4(K3)	-	-	-	3
CO 5(K3)	-	-	-	3
CO 6(K3)	-	-	-	-

UNIT-I

Aptitude: Symbols & Notations.

Soft Skills: Subject-Verb- Agreement, Personality Development.

UNIT-II

Aptitude: Venn Diagrams, Blood Relations.

Soft Skills: Adjectives, Degree of Comparisons

UNIT-III

Aptitude: Puzzle test, Time and Date (Group Reasoning)

Soft Skills: Art of Communication, Words Often Confused

UNIT-IV

Aptitude: Cubes & Dice

Soft Skills: Word Analogy, Effective Listening

UNIT-V

Aptitude: Seating Arrangements

Soft Skills: Paragraph Writing, non-verbal communication

Text Books:

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

Reference Books:

1. General Intelligence and Test of Reasoning, S.CHAND Publications
2. Logical Reasoning, Arun Sharma, Mc Graw Hill Publications.
3. A New Approach to Objective English, R.S. Dhillon DGP Publications.

Web Links:

1. www.indiabix.com
2. <https://www.indianstudyhub.com>

COMPILER DESIGN

V Semester
Course Code: 171CS5T11

L T P C
3 1 0 3

Course Objectives:

- COB 1: To demonstrate the phases of a Compiler.
- COB 2: To impart the knowledge on regular expressions and grammars.
- COB 3: To make the students learn lexical analysis using finite automata.
- COB 4: To provide knowledge on the basic concepts of different parsing techniques.
- COB 5: To demonstrate the various forms of intermediate code generation.
- COB 6: To explain the need of code optimization techniques and their implementation.

Course Outcomes:

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

- CO 1: Analyze the different phases and passes of Compiler.
- CO 2: Classify different types of parsers.
- CO 3: Construct different Types of parsing tables (LL, SLR, CLR and LALR).
- CO 4: Design Syntax Directed translations for various language constructs.
- CO 5: Construct the various forms of Intermediate Codes.
- CO 6: Explain various run time environment techniques.
- CO 7: Discuss on the Techniques for code optimization.
- CO 8: Develop the code generation algorithm.

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 (K4)	-	3	-	2	-	-	-	-	-	-	-	-
CO2 (K2)	-	1	-	-	2	-	-	-	-	-	-	-
CO3(K3)	3	2	1	-	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	-	-	-	-	-	-	-	-	-
CO5(K3)	3	2	-	1	3	-	-	-	-	-	-	-
CO6 (K2)	2	1	-	-	2	2	-	-	-	-	-	-
CO7 (K2)	-	1	-	-	2	-	-	-	-	-	-	-
CO 8(K3)	3	2	-	1	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K4)	-	-	-	-
CO2 (K2)	-	-	-	-
CO3 (K3)	-	-	-	-
CO4 (K3)	-	-	-	-
CO5 (K3)	-	-	-	-
CO6 (K2)	-	2	2	-
CO7 (K2)	2	2	2	1
CO8 (K3)	3	3	3	2

UNIT-I

Overview of language processing: Pre-processors, compiler, assembler, interpreters, pre-processors, linkers & loaders, structure of a compiler, phases of a compiler. Lexical Analysis, Role of Lexical Analysis, Lexical Analysis Vs. Parsing, Token, patterns and Lexemes, Lexical Errors, Regular Expressions ,Regular definitions for the language constructs, Strings, Sequences, Comments, Transition diagram for recognition of tokens, Reserved words and identifiers, Examples.

UNIT -II

Syntax Analysis: Discussion on CFG, LMD,RMD, parse trees, Role of a parser, classification of parsing techniques, Brute force approach, left recursion, left factoring, Top down parsing: First and Follow, LL(1) Grammars, Non-Recursive predictive parsing, Error recovery in predictive Parsing.

UNIT-III

Bottom up parsing approach: Types of Bottom up approaches; Introduction to simple LR: Why LR Parsers, Model of an LR Parsers, Operator Precedence, Shift Reduce Parsing, Difference between LR and LL Parsers, Construction of SLR Tables. More powerful LR parses, construction of CLR (1), LALR Parsing tables, Dangling ELSE Ambiguity, Error recovery in LR Parsing. Comparison of all bottoms up approaches with all top down approaches.

UNIT-IV

Semantic analysis: SDT Schemes, evaluation of semantic rules. Intermediate code, three address code, quadruples, triples, abstract syntax trees. Types and declarations, type Checking.

Symbol tables: Use and need of symbol tables. Runtime Environment: storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms.

UNIT-V

Code generation: Issues, target language, Basic blocks & flow graphs, Simple code generator, Peephole optimization, Register allocation and assignment, Machine independent code optimization – semantic preserving transformations, global common sub expression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization. Instruction scheduling, inter procedural optimization

Text Books:

1. Compilers, Principles Techniques and Tools. Alfred V Aho, Monical S. Lam, Ravi Sethi Jeffery D. Ullman, 2nd Edition, Pearson, 2007
2. Principles of compiler design, 3rd Edition, Nandhini Prasad, K.S, CENGAGE.

Reference Books:

1. Compiler Construction, Principles and practice, Kenneth C Louden, CENGAGE.
2. Implementations of Compiler, A New approach to Compilers including the algebraic methods, Yunlinsu, 1st Edition, SPRINGER,2011
3. Modern compiler design, Dick Grune, Henri E. Bal, 1st Edition, Wiley, 2000.

Web Links:

1. <http://nptel.ac.in/courses/106104072/>
2. <http://nptel.ac.in/courses/106108113/>
3. <http://www.cse.iitd.ernet.in/~sak/courses/cdp/slides.pdf>
4. <https://in.udacity.com/course/compilers-theory-and-practice--ud168>

PYTHON PROGRAMMING

(Common to CSE & IT)

V Semester

Course Code: 171CS5T12

L T P C
3 1 0 3

Course Objectives:

- COB 1: To impart the knowledge on Scripting Languages.
- COB 2: To facilitate the students, apply control statements and functions in Python Scripts.
- COB 3: To make the students learn lists, tuples and dictionaries in Python.
- 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: Apply fundamental concepts of Python programming language.
- CO 2: Develop programs using control statements.
- CO 3: Use data structures in Python to solve various problems.
- CO 4: Develop programs using functions, strings and files.
- CO 5: Make Use of Standard libraries like math, turtle, tkinter, re etc. in building real time applications.
- CO 6: Discuss on Object Oriented Programming concepts and Exceptions.
- CO 7: Design various applications 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	-	-	3	-	-	-	-	-	-	-
CO2(K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO3(K3)	-	2	1	1	-	-	-	-	-	-	3	-
CO4(K3)	3	-	-	-	3	-	-	-	-	-	-	3
CO5(K3)	-	-	-	1	3	-	-	-	-	-	3	3
CO6(K2)	-	1	-	-	2	-	-	-	-	-	2	3
CO7(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 (K3)	PSO 4 (K4)
CO1(K3)	3	-	-	-
CO2(K3)	-	-	3	-
CO3(K3)	3	3	3	-
CO4(K3)	-	-	-	-
CO5(K3)	-	-	-	2
CO6(K2)	-	2	2	-
CO7(K3)	3	3	3	2

UNIT-I

Instant Hacking: The Basics: Installing Python, The Interactive Interpreter, Numbers and Expressions, variables, statements, Getting input from the user, Saving and Executing your programs, Strings.

Conditionals, loops and Some Other statements: More about print and import, Assignment magic, The joy of indentation, Conditions and conditional statements: if clause, else clause, elif clause, nesting blocks, loops: while, for, breaking out of loops, else clause 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.

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

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, turtle, tkinter.

UNIT-IV

Object Oriented Programming: The self, Classes, Methods, The init Method, class and object variables, Inheritance.

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.

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:

6. Beginning Python: from Novice to Professional, Lie Hetland, Magnus, 2nd Edition.
7. A Byte of Python, Swaroop C H, 3rd Edition.
8. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.

Reference Books:

6. Think Python, Allen Downey, Green Tea Press.
7. Python for Everybody Exploring Data in Python 3, Charles Russell Severance, Sue Blumenberg.
8. Learning Python, Mark Lutz, Orielly.
9. Introduction to Python, Kenneth A. Lambert, Cengage.
10. Python Programming-using problem solving approach, Reema Thareja, Oxford.

Web Links:

7. https://onlinecourses.nptel.ac.in/noc18_cs35
8. <https://www.Python.org/>
9. <http://www.geeksforgeeks.org/Python/>
10. <https://www.coursera.org/courses?query=Python%20programming>
11. <https://www.learnPython.org/>
12. <https://www.techbeamers.com/python-tutorial-step-by-step/>

DESIGN AND ANALYSIS OF ALGORITHMS

V Semester

Course Code: 171CS5T13

L	T	P	C
3	1	0	3

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: Analyze time and space complexities of an algorithm.
- CO 3: Construct sorting and searching algorithms using Divide and Conquer approach.
- CO 4: Apply Greedy method with heuristic approach in tracing the global optimal solution from local optimal solutions.
- CO 5: Compare the benefits of using Dynamic programming over Greedy method.
- CO 6: Solve problems using Backtracking strategy.
- CO 7: Relate real time problems that exploit Branch and Bound method.

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)
CO 1(K3)	3	2	1	1	3	-	-	-	3	-	-	-
CO 2(K4)	3	3	2	2	-	3	-	-	-	3	-	-
CO 3(K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO 4(K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO 5(K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO 6(K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO 7(K2)	2	1	-	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3(K3)	PSO 4 (K4)
CO 1(K3)	3	3	3	2
CO 2(K4)	3	3	-	3
CO 3(K3)	3	3	3	2
CO 4(K3)	3	-	-	2
CO 5(K4)	-	-	-	-
CO 6(K3)	-	-	-	2
CO 7(K2)	-	-	-	-

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://nptel.ac.in/courses/106101060/18>
2. <https://www.coursera.org/lecture/delivery-problem/branch-and-bound-UyBJC>
3. <https://www.coursera.org/lecture/advanced-algorithms-and-complexity/3-sat-backtracking-2fbII>
4. <https://discrete.gr/complexity/>
5. <https://people.eecs.berkeley.edu/~vazirani/algorithms/chap2.pdf>

OPERATING SYSTEMS
(Common to CSE & IT)

V Semester

Course Code: 171CS5T14

L T P C
3 1 0 3

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 concurrency management and deadlocks.
- COB 4: To illustrate the concept of Memory management.
- COB 5: To discuss the concepts of Storage management.

Course Outcomes:

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

- CO 1: Interpret the basic structure, services, system calls and architectural components of Operating Systems.
- CO 2: Analyze various Process Scheduling algorithms.
- CO 3: Demonstrate 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: Summarize the virtual memory concepts.
- CO 7: 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	-	-	-	-	-	-	-
CO7(K2)	2	1	-	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	-	-	-	-
CO2 (K4)	3	-	-	-
CO3 (K2)	2	2	2	1
CO4 (K4)	3	3	3	-
CO5 (K3)	-	-	-	-
CO6 (K2)	-	-	-	1
CO7(K2)	-	3	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, 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,

Multithread Programming: Overview, Benefits, Multithreading Models.

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

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 Silberschatz, Peter B Galvin and Greg Gagne, 9th Edition, John Wiley and Sons Inc., 2016.
2. Operating Systems - Internals and Design Principles, William Stallings, 6th Edition, Prentice Hall.

Reference Books:

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

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>

UNIX AND SHELL PROGRAMMING
(Professional Elective-I)

V Semester

Course Code: 171CS5E01

L T P C
3 1 0 3

Course Objectives:

- COB 1: To discuss about UNIX Operating System Architecture and File Structure.
- COB 2: To demonstrate UNIX file handling commands.
- COB 3: To impart the knowledge on various commands to control system resources.
- COB 4: To illustrate the concepts of data management commands with Regular Expressions.
- COB 5: To enable the students, write shell scripting and awk scripting.
- COB 6: To make the students learn the concepts of File management and Process Management.

Course Outcomes:

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

- CO 1: Describe UNIX Operating System Architecture and Command Structure.
- CO 2: Make use of various commands in UNIX to control the resources like disk, file and network.
- CO 3: Apply GREP and EGREP Commands with wild card and regular expressions to perform Data Manipulation Tasks.
- CO 4: Develop Shell Script using Shell commands.
- CO 5: Utilize Filter commands to work on files and documents.
- CO 6: Experiment with AWK Scripts.
- CO 7: Test various scenarios using Shell programming.
- CO 8: Apply System Calls for file management and Process Management tasks.

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	-	-	-	-	-	-	-	-	-	-	3
CO2 (K3)	3	2	-	-	3	-	-	-	-	-	-	3
CO3 (K3)	3	2	-	-	3	-	-	-	-	-	-	3
CO4 (K3)	3	2	-	-	3	-	-	-	-	-	-	3
CO5 (K3)	3	2	-	-	3	-	-	-	-	-	-	3
CO6 (K3)	3	2	-	-	3	-	-	-	-	-	-	3
CO7 (K6)	3	3	-	-	3	-	-	-	-	-	-	-
CO8 (K3)	3	2	-	-	3	-	-	-	-	-	-	3

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	-	-	-
CO2 (K3)	3	3	3	-
CO3 (K3)	3	3	-	2
CO4 (K3)	3	3	3	-
CO5 (K3)	3	-	-	2
CO6 (K3)	3	3	-	2
CO7 (K6)	3	-	-	-
CO8 (K3)	3	3	3	2

UNIT- I

Introduction to Unix: The UNIX Operating System, A brief history of UNIX, The UNIX Architecture and Command structure usage, Basic Characteristics of UNIX. The File System -Types of Files, Directories and Files, Absolute and relative pathnames, UNIX File System, File attributes. General Purpose Utilities-cal, date, man, echo, bc, clear, script, tty, passwd, who. File Handling Utilities-pwd, cd, mkdir, rmdir, cat, cp, ls, wc, rm, mv, nl, pg, more, chmod, chown, chgrp Disk Utilities – du, df, mount, umount. Process Utilities – ps, fg, bg, kill, stop, wait Networking Utilities – ping, telnet, rlogin, ftp, arp, finger

UNIT-II

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

UNIT-III

Filters: The Grep Family-Other Filters- Regular expressions: Atoms, operators .The Stream Editor Sed.AWK: Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in AWK, Applications, AWK and GREP.

UNIT-IV

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

UNIT-V

File Management: File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat) Directory API: opendir, readdir, closedir, mkdir, rmdir, umask.

Process Management: The Process –The Meaning -Parent and Child Processes-Types of Processes-Internal and External Commands-Process Creation-The Kill Command-job Control

Text Books:

1. The Unix programming Environment, Brian W. Kernighan & Rob Pike, Pearson.
2. Unix Shell Programming, M.G.Venkateshmurthy, Pearson.
3. Advanced Programming in UNIX Environment, W.Richard Stevens, Stephen, Rago, 3rd Edition.

Reference Books:

1. Unix and shell programming by B.M. Harwani, OXFORD university press.
2. Your Unix the ultimate guide, Sumitabha Das, 2nd Edition, TMH.
3. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg. Thomson

Web Links:

1. www.webreference.com › Programming
2. www.iu.hio.no/~mark/unix/unix.html
3. <http://www.tutorialspoint.com/unix/>
4. www.learnshell.com
5. <https://www.informationvine.com>

ADVANCED COMPUTER ARCHITECTURE
(Professional Elective-I)
(Common to CSE & IT)

V Semester
Course Code: 171CS5E02

L T P C
3 1 0 3

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 Multivector 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)	PSO 4 (K4)
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:

4. Advanced Computer Architecture: Parallelism, Scalability, and Programmability, Kai Hwang, Naresh Jotwani, 2nd Edition, TMH, 2010.
5. Computer Architecture- A Quantitative Approach, Hennessy Patterson, 5th Edition, Elsevier, 2011.

Reference Books:

4. Parallel Computer Architecture, Culler, Singh, Gupta, Morgan Kauffman, 2nd Edition, 1997.
5. Computer Systems Design and Architecture, Vincent P. Heuring, Harry F. Jordan, 2nd Edition, PHI, 2003.

6. Computer Organization and Architecture: Designing for Performance, William Stallings, 8th 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>

COMPUTER GRAPHICS
(Professional Elective -I)
(Common to CSE & IT)

V Semester
Course Code: 171CS5E03

L T P C
3 1 0 3

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 this course the 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 the various Visual Surface detection Methods in 3D Graphics.
- CO 5: Apply OpenGL for General Computer Animations.
- CO 6: Analyze different object and color modeling techniques.
- CO 7: Classify Fractals and Ray tracing in computer Graphics

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 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO6 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO7 (K2)	2	1	-	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K2)	PSO 4 (K4)
CO1 (K3)	-	-	3	2
CO2 (K4)	-	-	-	-
CO3 (K3)	3	3	3	-
CO4 (K2)	-	2	3	-
CO5 (K3)	-	3	3	2
CO6 (K4)	-	-	-	-
CO7 (K2)	-	-	-	-

UNIT-I

Introduction: Applications of Computer Graphics, Video Display Devices-CRT, Raster-Scan and Random-Scan systems.

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 coordinates 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.

3-D 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.

Practice Session:

1. Write a C program to draw a line using DDA Algorithm.
2. Write a C program to draw a line using Bresenham's Algorithm.
3. Write a C program to draw a circle using mid-point circle Algorithm.
4. Write a C program to implement window to view port transformation in 2D Graphics.
5. Write a C program to show line clipping.
6. Implement basic graphics primitives in OpenGL.

7. Implement Line Drawing using DDA algorithm in OpenGL.
8. Implement Line Drawing using Bresenham's algorithm in OpenGL.

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, Solomon, 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--cs291>
4. http://www.cse.iitm.ac.in/~vplab/computer_graphics.html
5. <http://www.graphics.cornell.edu/online/links.html>

SOFTWARE TESTING METHODOLOGIES
(Professional Elective-I)
(Common to CSE & IT)

V Semester
Course Code: 171CS5E04

L T P C
3 1 0 3

Course Objectives:

- COB 1: To teach the basic concepts of software testing.
- COB 2: To illustrate the difference between Verification and Validation Activities.
- COB 3: To demonstrate various levels of software Testing.
- COB 4: To discuss the need of test suite management.
- COB 5: To create awareness on various Automation Testing tools.

Course Outcomes:

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

- CO 1: Explain the fundamentals of software testing.
- CO 2: Compare SDLC with STLC
- CO 3: Summarize verification and validation activities.
- CO 4: Design the test cases using different testing strategies.
- CO 5: Outline the importance of static testing.
- CO 6: Illustrate the various levels of software testing.
- CO 7: Discuss about various Automation Testing tools.

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	-	-	-	-	-	-	-	-	-	-
CO3 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO4 (K6)	3	3	3	3	3	-	-	-	-	-	-	-
CO5 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO6 (K2)	2	-	-	-	2	-	-	-	-	-	-	-
CO7 (K6)	3	3	3	3	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1(K3)	PSO 2(K3)	PSO 3(K3)	PSO 4(K4)
CO1 (K2)	2	2	2	-
CO2 (K4)	3	3	3	-
CO3 (K2)	-	2	2	-
CO4 (K6)	-	-	3	-
CO5 (K2)	-	-	-	-
CO6 (K2)	2	-	2	-
CO7 (K6)	3	3	3	3

UNIT-I

Software Testing: Introduction, Evolution, Myths & Facts, Goals, Psychology, Definition, Model for testing, Effective Vs Exhaustive Software Testing.

Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, relate STLC to SDLC, Software Testing Methodology.

UNIT-II

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation.

Dynamic Testing I: Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing.

UNIT-III

Dynamic Testing II: White-Box Testing: need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing.

Static Testing: Inspections, Structured Walkthroughs, Technical reviews.

UNIT-IV

Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing.

Regression testing: Progressives Vs regressive testing, Regression testability, Objectives of regression testing, When regression testing done?, Regression testing types, Regression testing techniques.

UNIT-V

Software Testing Tools: Introduction to Testing, need for Automated Testing, Taxonomy of Testing tools, Regression and performance Testing tools, Testing management tools, Source code testing tools, How to select a testing tool. Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner, Using Win runner, Mapping the GUI, Recording Test, working with Test, Enhancing Test, Checkpoints, Test Script Language, putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

Text Books:

1. Software Testing, Principles and Practices, Naresh Chauhan, 2nd Edition, Oxford.
2. Software Testing Tools, Dr. K V K K Prasad, Dreamtech press.

Reference Books:

1. Software Testing- Yogesh Singh, Camebridge.
2. Software Testing, Principles, techniques and Tools, M G Limaye, TMH 3.
3. Effective Methods for Software testing, Willian E Perry, Wiley.
4. The Art of Software Testing, Glenford J.Myers, Tom Badgett, Corey Sandler, John Wiley & Sons publication.
5. Software testing, Ron Patton, Pearson education.

Web Links:

6. <https://www.guru99.com/software-testing-lifecycle>
7. <http://www.softwaretestinghelp.com/what-is-verification-and-validation/>
8. <http://nptel.ac.in/courses/106105150/>
9. <http://www.cigniti.com/blog/top-3-regression-testing-types-how-to-execute>
10. <https://www.atest.com/search-result/tag/Tools>

EMPLOYABILITY SKILLS-III

(Common to all branches)

V Semester
Course Code: 171HS5T06

L T P C
2 0 0 1

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 profession abilities.

Course Outcomes:

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

- CO 1 : Calculate the L.C.M and H.C.F of numbers by simple methods.
- CO 2 : Discuss about different numbers and its applications.
- CO 3 : Breakdown the typical write-up skills.
- CO 4 : Apply different types of models on ratio & proportion, average, ages and percentages.
- 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)	3	-	-	-	3	3	3	3	-	-	-	3
CO 2(K2)	2	1	-	-	-	2	3	2	3	-	-	3
CO 3(K4)	3	3	-	-	-	3	3	-	-	-	-	-
CO 4(K3)	3	-	-	-	-	-	-	-	-	3	-	-
CO 5(K3)	3	-	-	-	-	-	-	3	-	3	-	3

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I:

Aptitude: L.C.M & H.C.F,

Soft Skills: Group discussion.

UNIT-II:

Aptitude: Problems on Numbers, Simple Equations

Soft Skills: Resume writing, Personalized Resume preparation, Compose and Prepare a cover letter.

UNIT-III:

Aptitude: Ratio & proportion

Soft Skills: E-mail -Writing & Etiquette, Business Etiquette.

UNIT-IV:

Aptitude: Average, Ages

Soft Skills: Interviewing skills-1, Do's & don'ts in an interview, Interview Demonstration Videos, Interview Preparation.

UNIT-V:

Aptitude: Percentages

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
2. www.bankersadda.com

OPERATING SYSTEM AND LINUX LAB

V Semester

Course Code: 171CS5L05

L T P C
0 0 3 2

Course Objectives:

- COB 1: To enable the students design and apply the process management concepts.
- COB 2: To impart the knowledge of System calls.
- COB 3: To demonstrate the memory management concepts.
- COB 4: To create awareness on UNIX environment.
- COB 5: To enable the students work with various basic UNIX commands
- COB 6: To facilitate the students develop Shell Scripts.
- COB 7: To impart the knowledge on concepts of UNIX internals.

Course Outcomes:

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

- CO 1: Make use of Unix utilities and perform basic shell control operations on the Unix utilities.
- CO 2: Simulate various process scheduling algorithms.
- CO 3: Demonstrate the working of various system calls, dead locks avoidance and memory management algorithms.
- CO 4: Make use of various commands in UNIX to control various resources like file, network, disk etc.
- CO 5: Develop Shell Script using Shell commands.
- CO 6: Construct AWK Script using AWK commands.
- CO 7: Apply system calls for File Management, Process Management and IPC

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 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO5 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO6 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO7 (K3)	3	2	1	1	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 3 (K4)
CO1 (K3)	3	3	3	-
CO2 (K3)	3	-	-	-
CO3 (K2)	2	2	2	-
CO4 (K3)	3	3	3	-
CO5 (K3)	-	-	-	-
CO6 (K3)	-	-	-	-
CO7 (K3)	3	3	3	-

List of Experiments:**OPERATING SYSTEMS LAB****1) CPU scheduling algorithms**

- 1.1) Simulate the FCFS CPU scheduling algorithm.
- 1.2) Simulate the SJF CPU 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 Dead Lock 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 a fixed 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.

LINUX PROGRAMMING LAB**7) Study of Unix/Linux general purpose utility commands.**

- 7.1) man, who, cat, cd, cp.
- 7.2) ps, ls, mv, rm, mkdir, rmdir.

8) Study of Unix/Linux general purpose utility commands.

- 8.1) echo, more, date, time.
- 8.2) kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.
- 8.3) Use the vi command to correct any errors in the file, my table.
- 8.4) Use the sort command to sort the file my table according to the first field. Call the sorted file my table (same name).
- 8.5) Print the file my table.

9) Shell Script

- 9.1) Write a shell script that takes a command –line argument and reports on whether it is directory, a file or something else.
- 9.2) Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase provided they exist in the current directory.
- 9.3) Write a shell script that determines the period for which a specified user is working on the system.

9.4) Write a shell script that accepts a file name starting and ending line numbers as arguments and displays all the lines between the given line numbers.

10) Shell Script

10.1) Write a shell script that computes the gross salary of an employee according to the following rules: i) If basic salary is < 1500 then HRA =10% of the basic and DA =90% of the basic. ii) If basic salary is ≥ 1500 then HRA =Rs500 and DA=98% of the basic .The basic salary is entered interactively through the key board.

10.2) Write a shell script that accepts two integers as its arguments and computes the value of first number raised to the power of the second number.

11) Shell Script-File

11.1) Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the user for the necessary information, such as the file name, new name and so on.

11.2) Write shell script that takes a login name as command – line argument and reports when that person logs in.

11.3) Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.

12)

12.1) Write a C program that takes one or more file or directory names as a command line input and reports the following information on the file:

i) File type ii) Number of links iii) Read, write and execute permissions iv) Time of last access (Note : Use stat/fstat system calls).

12.2) Write a C program which supports that child process inherits environment variables, command line arguments, opened' files.

List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

- 13) Simulate Best-Fit contiguous memory allocation technique.
- 14) Simulate Sliding Window Protocol for Selective Repeat.
- 15) Write a shell script to change the ownership of processes.
- 16) Write a C program to illustrate inter process communication via message queues or pipes.

Reference Books:

1. Operating Systems: A Modern Perspective, Gary J. Nutt.
2. Operating Systems: Design and Implementation, Andrew S. Tanenbaum, Albert S. Woodhu, 2nd Edition.,
3. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg. Thomson.

4. Your Unix the ultimate guide, Sumitabha Das, 2nd Edition, TMH.

Web Links:

1. <https://www.programming9.com/programs/c-programs/285-page-replacement-programs-in-c>
2. <http://www.geeksforgeeks.org/program-fcfs-scheduling-set-1/>
3. <http://www.tutorialspoint.com/unix/>
4. [http:// www.learnshell.com](http://www.learnshell.com)

PYTHON PROGRAMMING LAB
(Common to CSE & IT)

V Semester

Course Code: 171CS5L06

L	T	P	C
0	0	3	2

Course Objectives:

- COB 1: To make the students learn the fundamentals of Python programming and the standard Python libraries.
- COB 2: To train students utilize functions and data structures in Python.
- COB 3: To enable the students apply the Control Structures.
- 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: Build basic programs in Python.
- CO 2: Develop programs using conditional and iterative statements.
- CO 3: Make use of different data structures in solving complex problems.
- CO 4: Apply standard libraries in building real time applications.
- CO 5: Analyze the Object Oriented concepts in Python
- CO 6: Solve real world problems using database connectivity.
- CO 7: Develop programs using GUI 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 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	-	3	-	-	-	-	-	-	3
CO3 (K3)	-	2	1	1	3	-	-	-	-	-	-	3
CO4 (K3)	-	-	1	1	3	-	-	-	-	-	-	3
CO5 (K4)	-	-	2	2	3	-	-	-	-	-	-	3
CO6 (K6)	-	-	3	3	3	-	-	-	-	-	-	3
CO7 (K6)	-	3	3	3	3	-	-	-	-	-	-	3

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	3	-	-	-
CO2 (K3)	-	-	3	-
CO3 (K3)	-	3	3	2
CO4 (K3)	3	3	3	-
CO5 (K4)	-	3	3	3
CO6 (K6)	-	3	3	3
CO7 (K6)	-	-	-	-

List of Experiments:

1) Basics

- 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 input 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 to cast vote or not.
- 3.2) Implement a Python script using a 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
Ouput : Four Five Three

Input : 1000
Ouput : One Zero Zero Zero

4) Control Flow - Continued

- 4.1) Find the sum of all the prime numbers upto 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 Structures

- 5.1) Implement a Python script to count frequency of characters in a given string.
- 5.2) 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
Ouput : 5
 ytsenoH si eht tseb ycilop

- 5.3) 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)
Ouput : [45,19,23,34,9]

6) Functions

6.1) 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) <= (sum of their radii) then (they are colliding)

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

7) Functions - Continued

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

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

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

8) Functions - Problem Solving

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 and LCM of two numbers. Each function shouldn't exceed one line.

9) OOP

9.1) Implement a Python script to illustrate constructor.

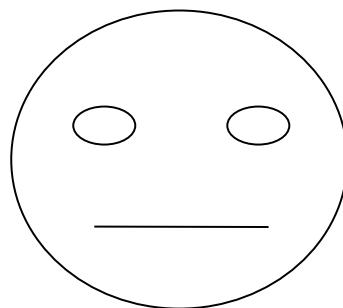
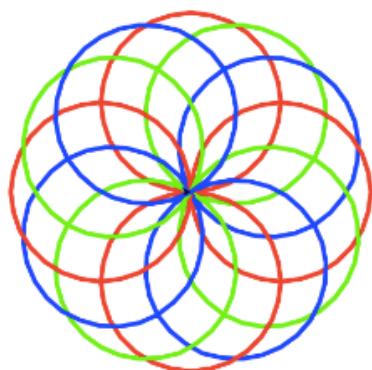
9.2) Implement a Python script on Class variables, instance variable and illustration of the self variable.

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.

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) Guess the Number

The Goal: This project uses the random module in Python. The program will first randomly generate a number unknown to the user. The user needs to guess what that number is. (In other words, the user needs to be able to input information.) If the user's guess is wrong, the program should return some sort of indication as to how wrong (e.g. The number is too high or too low). If the user guesses correctly, a positive indication should appear. You'll need functions to check if the user input is an actual number, to see the difference between the inputted number and the randomly generated numbers, and to then compare the numbers.

14) Hangman

The Goal: Despite the name, the actual "hangman" part isn't necessary. The main goal here is to create a sort of "guess the word" game. The user needs to be able to input letter guesses. A limit should also be set on how many guesses they can use. This means you'll need a way to grab a word to use for guessing. (This can be grabbed from a pre-made list. No need to get too fancy.) You will also need functions to check if the user has actually inputted a single letter, to check if the inputted letter is in the hidden word (and if it is, how many times it appears), to print letters, and a counter variable to limit guesses.

15) Write a program to find the greatest number that can be formed by using given set of numbers

16) 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: $4+6+8+3=21 \Rightarrow 2+1=3$)
Ouput : 3

17) Write a program to count how many times each word present in a file

Reference Books:

1. Python for Everybody Exploring Data in Python 3, Charles Russell Severance, Sue Blumenberg.
2. Learning Python, Mark Lutz, Orieilly.
3. Introduction to Python, Kenneth A. Lambert, Cengage.

Web Links:

1. <https://www.hackerrank.com/>
2. <https://www.codechef.com/>
3. <https://www.topcoder.com/>
4. <https://code-cracker.github.io/>

SOFTWARE TESTING LAB
(Common to CSE & IT)

V Semester

Course Code:171CS5L07

L	T	P	C
0	0	3	2

Course Objectives:

- COB 1: To facilitate the students study different testing tools.
- COB 2: To demonstrate the working of software testing tools with JAVA language
- COB 3: To impart knowledge on testing tools.
- COB 4: To make the students develop test cases for various applications

Course Outcomes:

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

- CO 1: Experiment with various JAVA programs for writing test cases.
- CO 2: Construct manual test cases for different software modules.
- CO 3: Develop test cases for various Case studies.
- CO 4: Apply any testing tool for implementing automation testing.
- CO 5: Design the test cases for checking GUI objects.

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	-	-	-	-	-
CO2 (K6)	3	3	3	3	3	-	3	-	-	-	-	-
CO3 (K3)	3	2	-	-	-	-	3	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	3	-	-	-	-	-
CO5 (K6)	3	3	3	3	3	-	3	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes

CO / PSO	PSO 1(K3)	PSO 2(K3)	PSO 3(K3)	PSO 4(K4)
CO1 (K3)	3	3	-	-
CO2 (K6)	3	3	-	-
CO3 (K3)	3	3	-	2
CO4 (K3)	3	3	3	2
CO5 (K6)	3	3	3	3

List of Experiments:

- 1) Write programs in ‘JAVA’ Language to demonstrate the working of the following constructs:
 - i) if...else
 - ii) switch
 - iii) for
 - iv) while....do
 - v) do...while

- 2) A Program demonstrates the next date in the calendar. Its input is entered in the form of <ddmmyyyy> with the following range:

1≤mm≤12

1≤dd≤31

1900≤yyyy≤2025

Its output would be the next date or it will display ‘invalid date’. Design test cases for this program using BVC, robust testing, and worst-case testing methods.

- 3) “A program written in JAVA language for Matrix Multiplication fails” Introspect the causes for its failure and write down the possible reasons for its failure.
- 4) Write a JAVA Program for implementing simple insertion sort using array in ascending order and apply the following to the given Program:
- i) Draw the program graph for given program segment
 - ii) Determine the DD path graph
 - iii) Calculate the cyclomatic complexity of the program using all the methods.
 - iv) Determine the independent paths
 - v) Generate the test cases for each independent path
- .
- 5) Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
- 6) Write the test cases for any known application (e.g. Banking application)
- 7) Create a test plan document for any application (e.g. Library Management System)
- 8) Study of Selenium Testing Tool and its implementation
- i) Configuring selenium and Web-driver.
 - ii) How Selenium identifies GUI (Graphical User Interface) objects in an application (Google).
 - iii) Write a Simple automation test case for Google search Field.
- 9) Implement the following using Selenium Testing Tool
- i) How to synchronize a test when the application responds slowly.
 - ii) How to create a test that checks GUI objects.
 - iii) Write the automation test cases for Student data form.
 - iv) How to Create Data-Driven Tests which supports to run a single test on several sets of data from a data table.

- 10) Implement any real time application using Selenium testing tool.
- 11) Study of Jenkins (Continuous Integration) tool and its implementation (Installation and Configuring Jenkins-Automated Testing)
- 12)**
- 12.1) integrate any selenium automated test case using Jenkins.
- 12.2) How to create a Sanity and Regression test suite.

List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

- 13) Design and develop a program in a language of your choice to solve the triangle problem defined as follows:

Accept three integers which are supposed to be the three sides of triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all.

Derive test cases for your program based on boundary value analysis, execute the test cases and discuss the results. (Using BVC, ECP)

- 14) (Quick Sort-Path Testing)

/*Design, develop, code and run the program in any suitable language to implement the quicksort algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.*/

- 15) Consider the program given below. Draw its control flow graph and data flow graph for each variable used in the program, and Derive data flow testing paths with all the strategies.

```

main( )
{
    int work;
1.     double payment=0;
2.     scanf("%d",work);
3.     if(work>0) {
4.         payment=40;
5.         if(work>20)
6.             {
7.                 if(work<=30)
8.                     payment=payment+(work-5)*0.5;
9.                 else
10.                {
11.                    payment=payment+50+(work-30)*0.1;
12.                    if(payment>=3000)
13.                        payment=payment*0.9;
14.                }
15.            }
16.        }
17.     printf("Final payment",payment);

```

16) Write an Automation Script for Registration Form (Using Selenium Tool), input as an excel sheet (Data-driven Test cases).

17) Write an Automation Script for LOGIN Form (Using Selenium Tool).

Reference Books:

1. Software Automation Testing Tools For Beginners, Rahul Shende, Shroff Publishers & Distributors Pvt. Ltd.,
2. The Art of Application Performance Testing: From Strategy to Tools, Ian Molyneaux, O'Reilly Media,
3. Managing the Testing Process: Practical Tools and Techniques for Managing Hardware and Software Testing, Rex Black, WILEY

Web Links:

1. <http://www.aptest.com/resources.html>
2. <http://www.softwaretestinghelp.com/test-case-template-examples/>
3. <https://www.guru99.com/automation-testing.html>
4. <https://www.guru99.com/selenium-tutorial.htm>
5. <https://www.tutorialspoint.com/jenkins/>

COMPILER DESIGN LAB

V Semester
Course Code: 171CS5L08

L T P C
0 0 3 2

Course Objectives:

- COB 1: To design the lexical analyzer
- COB 2: To simulate different types of parsers in c
- COB 3: To demonstrate the LEX tool and YACC tool

Course Outcomes:

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

- CO 1: Make use of LEX and YACC tools to simulate various operations of compilers.
- CO 2: Construct top down parsing tables.
- CO 3: Construct bottom up parsing table.
- CO 4: Develop various Optimization techniques.

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	-	-	-	3	-	-	-	-	-	-	-
CO2(K3)	3	-	-	-	-	-	-	-	-	-	-	-
CO3(K3)	3	-	-	-	-	-	-	-	-	-	-	-
CO4(K3)	3	2	1	1	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1(K3)	3	-	-	-
CO2(K3)	-	-	-	-
CO3(K3)	-	-	-	-
CO4(K3)	3	3	3	2

List of Experiments:

1) lexical analysis using lex tool

- 1.1) Write a lex program whose output is same as input.
- 1.2) Write a lex program which removes comments from its input file

2) lexical analysis using lex tool

- 1.1) Write a lex program which removes white spaces from its input file
- 1.2) Write a lex program to identify the patterns in the input file

3) Syntax analysis using YAAC tool

- 3.1) Write a YACC program to generate intermediate code for the given Arithmetic expression
- 3.2) Write a YACC program to convert infix expression into postfix expression

3.3)Write a YACC program to evaluate simple arithmetic operation

4) Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines.

5) Simulate First and Follow of a Grammar.

6) Develop an operator precedence parser for a given language.

7) Construct a recursive descent parser for an expression.

8) Construct a LL(1) parser for an expression

9) Design predictive parser for the given language

9.1) Implementation of shift reduce parsing algorithm.

10) Design a LALR bottom up parser for the given language.

10.1) Convert the BNF rules into YACC form and write code to generate abstract syntax tree

11) Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating tools

12) Optimization phase

12.1) Write a program to perform loop unrolling.

12.2) Write a program for constant propagation

List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

- 13) Write a C program to identify whether a given line is a comment or not
- 14) Write a C program to simulate lexical analyzer for validating operators.
- 15) Write a C program to test whether a given identifier is valid or not.
- 16) Write a YACC program which computes the decimal equivalent of a given binary number.
- 17) Write a YACC program to evaluate arithmetic expressions using the following ambiguous grammar.

Reference Books:

1. Engineering a compiler, Keith D.Cooper & Linda Torczon, Morgan, 2nd Edition, 2011.
2. Compiler Design, K. Muneeswaran, 2nd Edition ,Oxford, 2013

Web Links:

1. <http://dinosaur.compilertools.net/yacc/index.html>
2. <http://nptel.ac.in/courses/106108052/1>
3. <https://www.scribd.com/doc/26657257/Compiler-Design-Lab-Manual>
4. <https://www.slideshare.net/mknkjk/compiler-design-lab-programs>

COMPUTER NETWORKS

VI Semester
Course Code: 171CS6T15

L T P C
3 1 0 3

Course Objectives:

- COB 1: To teach the 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 provide knowledge on various protocols involved in data communications.
- COB 4: To illustrate the basic concepts of various routing algorithms and Congestion control techniques.
- COB 5: To make 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: Summarize the concepts of physical layer and switching techniques.
- CO 4: Discuss the design issues of data link layer services.
- CO 5: Demonstrate the concept of MAC and Channelization.
- CO 6: Apply various routing algorithms and Congestion control techniques.
- CO 7: Utilize the services provided by the transport layer and application layer.

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)
CO 1(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 2(K4)	3	3	-	-	3	-	-	-	-	-	-	-
CO 3(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 4(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 5(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 6(K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO 7(K3)	3	2	1	1	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO 1(K2)	2	-	2	-
CO 2(K4)	3	-	3	-
CO 3(K2)	2	2	2	-
CO 4(K2)	2	2	2	-
CO 5(K2)	2	2	2	-
CO 6(K3)	3	3	3	-
CO 7(K3)	3	3	3	2

UNIT- I

Introduction: Applications of Computer Network, Reference Models: OSI overview and TCP , Example Networks-The Internet, Network Topologies, LAN, WAN MAN,ARPANET, Novel Netware.

Physical Layer: Fourier Analysis-Bandwidth Limited Signals – The Maximum Data Rate of a Channel – Guided Transmission Media, Wireless Transmission, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing, and Switching: Circuit switched Network, Datagram Network, and Virtual Circuit Networks.

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.

UNI T- III

Medium Access Control Sublayer: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, 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.

Text Books:

1. Computer Networks — Andrew S Tanenbaum and David J Wetherall, 5th Edition, Pearson Education, 2011.
2. Data Communications and Networking – Behrouz A. Forouzan, 5th Edition, McGraw Hill Education, 2012.

Reference Books:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education.
3. Understanding communications and Networks, W.A. Shay, Thomson, 3rd Edition.
4. Computer Networks - A Systems Approach, Larry L. Peterson and Bruce S. Davie, 5th Edition, Morgan Kaufmann/ Elsevier.
5. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 6th Edition, Pearson Education, 2013.
6. Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press, 2013.

Web Links:

1. <http://nptel.ac.in/courses/106105081/1>.
2. <https://www.coursera.org/learn/fundamentals-network-communications>.
3. http://www.tutorialspoint.com/data_communication_computer_network/.
4. <http://www.scribd.com/doc/58478622/Computer-Networks-Forouzan>.
5. <https://in.udacity.com/course/computer-networking--ud436>.

WEB TECHNOLOGIES
(Common to CSE & IT)

VI Semester

Course Code: 171CS6T16

L T P C
3 1 0 3

Course Objectives:

- COB 1 : To make the students create web pages using HTML, CSS and JavaScript.
- COB 2 : To enable the students learn DTD, Schema and validating the same using parsing tools.
- COB 3 : To train the students in creating dynamic web pages using PHP.
- COB 4 : To facilitate the students develop real time applications using database.
- COB 5 : To illustrate the concepts of PERL language with simple applications.
- COB 6 : To teach the basic concepts of Ruby.

Course Outcomes:

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

- CO 1 : Develop web pages using HTML, CSS and JavaScript.
- CO 2 : Summarize DTD, Schema and Parsing tools of XML documents.
- CO 3 : Build web applications using PHP and MySQL database.
- CO 4 : Discuss the integration of PHP with AJAX.
- CO 5 : Develop simple applications using PERL.
- CO 6: Apply basic features of Ruby in various 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)
CO 1 (K3)	3	2	1	1	3	3	-	-	-	-	-	-
CO 2 (K2)	2	1	-	-	2	2	-	-	-	-	-	-
CO 3 (K3)	3	2	1	1	3	3	3	-	-	-	-	-
CO 4 (K2)	2	1	-	-	2	2	-	-	-	-	-	-
CO 5 (K3)	3	2	1	1	3	3	3	-	-	-	-	-
CO 6 (K3)	3	2	1	1	3	3	3	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT- I

HTML: Introducing HTML Document Structure, Working with Links, Images, Tables and Frames. Introduction to Forms and HTML Controls, Cascading Style Sheets.

The Basics of JavaScript: Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Arrays, Functions, Pattern Matching using Regular Expressions, Events and Event Handling.

UNIT-II

XML: Document type Definitions, XML Schemas, XSLT Style Sheets, Document Object Model, DOM and SAX Approaches.

UNIT-III

PHP Programming: Introducing PHP: Creating PHP script, Running PHP Script, **Working with variables and constants:** Using variables, Using constants, Data types, Operators, **Controlling program flow:** Conditional Statements, Looping Statements, **Working with Arrays,** functions, Files, Directories, **Working with forms and Databases:** <form> Tag and Form Elements, using PHP and MySQL.

AJAX: A New Approach, Integrating PHP and AJAX.

UNIT-IV

PERL: A Brief History of Perl, Perl Variables, Arithmetic and String Operators, Conditional Statements, Perl I/O, Perl Iterations, functions, The Perl CGI Module, Pattern Matching in Perl, Simple Page Search.

UNIT-V

Introduction to Ruby: Scalar Types and Their Operations, Simple Input and Output, Control Statements, Fundamentals of Arrays, Hashes, Methods, Classes, Blocks and Iterators, Pattern Matching.

Text Books:

1. Programming the World Wide Web, Robert W.Sebesta, 7th Edition, Pearson.
2. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
3. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.

Reference Books:

1. Web Technologies, Uttam K Roy, 1st Editon, Oxford University Press, 2010.
2. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, MacIntyre, Morrissey, Cengage Learning.
3. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, CurtHibbs, O'reilly, 2006.
4. Programming Perl, Tom Christiansen, Jonathan Orwant, O'reilly, 2012.

Web Links:

1. <https://in.udacity.com/course/web-development>
2. <http://www.upriss.org.uk/perl/PerlCourse.html>
3. <http://www.developphp.com>
4. http://www.nptelvideos.com/php/php_video_tutorials.php
5. <http://w3schools.com>

DATA WAREHOUSING AND DATA MINING
(Common to CSE & IT)

VI Semester
Course Code: 171CS6T17

L T P C
3 1 0 3

Course Objectives:

- COB 1: To enable the students, learn the basic concepts of data mining.
- COB 2: To illustrate the KDD process and Data Mining applications.
- COB 3: To impart the knowledge on data preprocessing and data warehouse architecture.
- COB 4: To make the students, learn data mining tasks.
- COB 5: To demonstrate classification and clustering of data.
- COB 6: To illustrate pattern analysis and web mining concepts.

Course Outcomes:

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

- CO 1: Analyze OLTP and OLAP.
- CO 2: Illustrate the Database technologies useful for data mining.
- CO 3: Make use of data pre processing techniques in KDD Process.
- CO 4: Apply decision tree algorithm for classification problems.
- CO 5: Develop classification model for a given dataset.
- CO 6: Apply association rule mining for predicting patterns.
- CO 7: Compare different types of clustering algorithms.

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	-	-	-	-	-	-	-
CO2 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO3 (K3)	3	-	1	-	-	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO5 (K5)	3	3	3	3	3	3	-	-	-	-	-	-
CO6 (K3)	3	2	1	1	-	-	-	-	-	-	-	-
CO7 (K5)	3	3	3	3	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K4)	-	-	-	-
CO2 (K2)	2	2	2	1
CO3 (K3)	3	3	-	2
CO4 (K3)	3	3	3	2
CO5 (K5)	3	3	3	3
CO6 (K3)	3	3	3	2
CO7 (K5)	3	3	-	3

UNIT- I

Introduction: Need for Data Mining, Data Mining—Kinds of Data, Data Mining Functionalities—Kinds of Patterns Can Be Mined, Are All of the Patterns Interesting. Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining.

Data Preprocessing: Need for Preprocessing the Data Descriptive, Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

UNIT-II

Data Warehouse and OLAP Technology An Overview: Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

UNIT-III

Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Decision Tree Working , Building a Decision Tree, Methods for expressing attribute test conditions, Measures for selecting the best split, Algorithm for decision tree induction, Model Over fitting: Overfitting Due to Presence of Noise, Overfitting Due to Lack of Representative Samples, Evaluating the performance of classifier: Holdout method, Random sub sampling, Cross-validation, Bootstrap.

UNIT-IV

Association Analysis: Basic Concepts and Algorithms: Problem Definition, Frequent Item Set generation, Rule Generation, Compact Representation of frequent item sets, FP-Growth Algorithm.

UNIT-V

Cluster Analysis: Basic Concepts and Algorithms: Cluster Analysis, Different Types of Clustering, Different Types of Clusters, K-means, The Basic K-means Algorithm, K-means: Additional Issues, Bisecting K-means, K-means and Different Types of Clusters, Strengths and Weaknesses, K-means as an Optimization Problem, Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm, Specific Techniques, DBSCAN, Traditional Density: Center-Based Approach, The DBSCAN Algorithm, Strengths and Weaknesses.

Text Books:

1. Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, 2nd Edition, Elsevier.
2. Introduction To Data Mining: Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Addison Wesley, 2006.

Reference Books:

1. Data Mining: Introductory and Advanced Topics, Margaret H. Dunham, 1st Edition Pearson Edn.
2. Data Mining Techniques and Applications An Introduction, Hongbo Du, 1st Edition, Cengage India, 2013.
3. Data Warehousing, Data Mining and OLAP, Alex Berson, Stephen J. Smith, McGraw-Hill series .
4. Data Mining Techniques, Arun K Pujari, Universities Press.

Web Links:

1. <https://nptel.ac.in/courses/106105174/>
2. <https://www.kdnuggets.com/>
3. <https://www.import.io/post/data-scientists-vs-data-analysts-why-the-distinction-matters/>
4. <http://www.computerscijournal.org/vol8no1/a-comparative-study-of-classification-techniques-in-data-mining-algorithms/>
5. <https://www.techopedia.com/definition/30306/association-rule-mining.>

SOFTWARE QUALITY ASSURANCE
(Professional Elective – II)
(Common to CSE & IT)

VI Semester
Course Code: 171CS6E05

L T P C
3 1 0 3

Course Objectives:

- COB 1: To enable the students understand the software quality.
- COB 2: To make the students evaluate the system based on the chosen quality model.
- COB 3: To discuss on various components of Quality assurance Infrastructure.
- COB 4: To illustrate various components of Quality assurance Management.
- COB 5: To make the students analyze different quality standards.

Course Outcomes:

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

- CO 1: Explain various components of Quality assurance system.
- CO 2: Summarize various Testing Strategies.
- CO 3: Demonstrate various components of Quality assurance Infrastructure.
- CO 4: Illustrate various components of Quality assurance Management.
- CO 5: Analyze various Standards and Certifications in SQA.
- CO 6: Outline the role of Management in SQA.

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	-	-	-	2	-
CO2 (K2)	-	-	-	-	-	-	-	-	-	-	2	-
CO3 (K2)	-	-	-	-	2	-	3	-	-	3	2	-
CO4 (K2)	-	-	-	-	2	-	3	-	-	3	2	-
CO5 (K4)	-	3	-	-	3	-	-	-	-	-	-	3
CO6 (K2)	-	-	-	-	-	-	3	-	-	3	2	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	-	-	2	-
CO2 (K2)	-	-	2	-
CO3 (K2)	-	-	2	-
CO4 (K2)	-	-	2	-
CO5 (K4)	-	-	3	-
CO6 (K2)	-	-	2	-

UNIT-I

Introduction: The Software Quality Challenge, Software Quality, Software Quality Factors: The Components of the Software Quality Assurance System – Overview.

UNIT-II

SQA Components in the Project Life Cycle: Integrating Quality Activities in the Project Life Cycle, Reviews, Software Testing – Strategies, Software Testing – Implementation, Assuring the Quality of Software Maintenance components

UNIT-III

Software Quality Infrastructure Components: Procedures and Work Instructions. Supporting Quality Devices, Staff Training and Certification, Preventive and Corrective Actions.

UNIT-IV

Software Quality Management Components: Project Progress Control: Software Quality Metrics, Software Quality Costs

UNIT-V

Standards, Certification and Assessment: Quality Management Standards, SQA project process standards – IEEE software engineering standards.

Organizing for Quality Assurance: Management and its Role in Quality Assurance.

Text Books:

1. Software Quality Assurance, Theory of implementation-Daniel Galin, Pearson.
2. Software Testing and Analysis. Process, Principles, and Techniques, Mauro Pezze and Michal Young, John Wiley, 2008.

Reference Books:

1. Software Testing Techniques, Boriz Beizer 2nd Edition, DreamTech, 2009.
2. Foundations of Software Testing, Aditya P. Mathur, Pearson, 2008.
3. Metrics and Models in Software Quality Engineering, Stephen H. Kan, 2nd Edition, Pearson, 2003.
4. Software Testing and Quality Assurance: Theory and Practice, Kshirasagar Naik, Priyadarshi Tripathy (Eds), John Wiley, 2008.

Web Links:

1. www.softwaretestinghelp.com/web-application-testing
2. www.computersciencezone.org/software-quality-assurance/
3. <http://www.softwareqatest.com/>
4. <https://dl.acm.org/citation.cfm?id=811110>
5. <https://testinginstitute.com/display.php>

BIO-INFORMATICS
(Professional Elective – II)

VI Semester
Course Code: 171CS6E06

L T P C
3 1 0 3

Course Objectives:

- COB 1: To introduce practical techniques of Bioinformatics.
- COB 2: To Emphasis the applications of bioinformatics and biological databases.
- COB 3: To impart basic knowledge of Computer Networks and Security.
- COB 4: To demonstrate Machine learning techniques to solve complex biological problems.
- COB 5: To show Data Visualization and Simulation Techniques.

Course Outcomes:

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

- CO 1: Describe the basic concepts of biology and Database Technology.
- CO 2: Identify the various Communication Models, Transmission Technologies, and Protocols.
- CO 3: Make use of Data Visualization Techniques to display biological data in various forms.
- CO 4: Apply Statistical Methods to solve complex biological problems.
- CO 5: Utilize Pattern Matching Techniques to represent Protein and DNA Sequence data.
- CO 6: Illustrate simulation tools to predict the secondary and tertiary structures of protein.

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	1	-	-	-	-	-	-	-	-	-	-
CO2(K3)	3	2	1	-	3	-	3	-	-	-	-	-
CO3(K3)	3	2	1	1	3	3	3	-	3	3	-	-
CO4(K3)	3	2	1	1	3	3	3	-	3	3	-	-
CO5(K3)	3	2	1	1	3	3	3	-	3	3	-	3
CO6(K2)	2	1	-	-	2	2	3	-	3	3	-	3

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	-	-	-
CO2 (K3)	3	-	-	-
CO3 (K3)	3	3	3	2
CO4 (K3)	3	3	-	2
CO5 (K3)	3	3	-	2
CO6 (K2)	2	-	-	-

UNIT – I

The Central Dogma: The Killer Application, Parallel Universes, Watson's Definition, Top Down Versus Bottom up, Information Flow, Convergence.

Databases: Data Management, Data Life Cycle, Database Technology, Interfaces, Implementation.

UNIT- II

Networks: Geographical Scope, Communication Models, Transmissions Technology, Protocols, Bandwidth, Topology, Hardware, Contents, Security, Ownership, Implementation, Management.

UNIT – III

Data Visualization: Sequence visualization, structure visualization, user Interface, Animation Versus simulation, General Purpose Technologies.

Statistics: Statistical concepts, Microarrays, Imperfect Data, Quantifying Randomness, Data Analysis, Tool selection, statistics of Alignment.

UNIT – IV

Pattern Matching: Fundamentals, Dot Matrix analysis, Substitution matrices, Dynamic Programming, Word Methods, Bayesian Methods, Multiple Sequence Alignment, Tools, Utilities, Sequence Databases.

UNIT- V

Modeling and Simulation: Drug Discovery, Fundamentals, Protein structure, Systems Biology, Tools.

Text Books:

1. Bio Informatics Computing, Bryan Bergeron, 2003, PHI.
2. Bio Informatics: Managing scientific Data, Zeo Lacroix, Terence Critchlow, 1st Edition, Elsevier, 2003.

Reference Books:

1. Introduction to Bio Informatics, Terasa K Attwood, David J.Perry- Smith, Pearson Education, 1999.
2. Bio-Informatics, D Srinivasa Rao, 2010, Biotech.
3. Bio-Informatics Methods and Applications, Rastogi, Mendiratta, Rastogi, 4th Edition, PHI.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc17_bt07/unit?unit=12&lesson=161.
2. <https://www.edx.org/micromasters/bioinformatics>
3. <http://coursera.org/specializations/bioinformatics> .
4. https://onlinecourses.nptel.ac.in/noc17_bt11/announcements?force=true.

Human Computer Interaction (Professional Elective – II)

VI Semester
Course Code:171CS6E07

L T P C
3 1 0 3

Course Objectives:

- COB 1: To enable the students learn with functionality of interactive systems.
- COB 2: To impart the knowledge on various design paradigms.
- COB 3: To illustrate the concepts on Business Functions.
- COB 4: To demonstrate GUI components such as Menus, Forms, Dialog boxes.
- COB 5: To teach the essence of good screen design & advanced design concepts.
- COB 6: To make the students learn the online documentation concepts, information retrieval & its presentation.

Course Outcomes:

At the end of the course students will be able to:

- CO 1: Outline the importance of human computer interaction for a good design.
- CO 2: Develop a GUI application for Understanding of Users.
- CO 3: Distinguish Online Vs Paper documentation in various development processes and social networking.
- CO 4: Analyze screen design of various applications in GUI and Web.
- CO 5: Compare Device based and Screen based controls.
- CO 6: Summarize effective feedback guidance and assistance.

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	-	-	-	2	2	3	-	-	-	-	-
CO2 (K3)	3	2	1	1	3	3	3	-	-	-	-	-
CO3 (K4)	3	3	-	-	3	3	3	-	-	-	-	-
CO4 (K4)	3	3	2	2	3	3	3	-	-	-	-	-
CO5 (K4)	3	3	2	2	3	3	3	-	-	-	-	-
CO6 (K2)	2	1	-	-	2	2	3	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	-	2	-
CO2 (K3)	3	-	-	-
CO3 (K4)	-	-	-	-
CO4 (K4)	3	3	-	-
CO5 (K4)	-	-	-	-
CO6 (K2)	2	-	-	-

UNIT-I

The User Interface: Introduction, Importance of the User Interface, Importance and benefits of Good Design History of Human Computer Interface. Characteristics of Graphical and Web User Interface: Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI. Web User Interface, popularity of web, Characteristics of Web Interface, Merging of Graphical Business systems& the Web, Principles of User Interface Design.

UNIT-II

The User Interface Design Process: Obstacles and Pitfall in the development Process, Usability, The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding of Users.

UNIT-III

Understanding Business Functions: Business Definitions & Requirement analysis, Determining Business Functions, Design standards or Style Guides, System Training and Documentation.

UNIT-IV

Principles of Good Screen Design: Human considerations in screen Design, interface design goals, test for a good design, screen meaning and purpose, Technological considerations in Interface Design System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, Phrasing and Selecting, Navigating of Menus, Kinds of Graphical Menus Windows Interface: Windows characteristic, Components of Window, Windows Presentation Styles, Types of Windows, Window Management, Web systems.

UNIT-V

Device and Screen-Based Control: Device based controls, Operable Controls, Text entry/read-only Controls, Section Controls, Combining Entry/Selection Controls, Other Operable Controls and Presentation Controls, Selecting proper controls.

Effective Feedback Guidance and Assistance: Providing the Proper Feedback, Guidance and Assistance Effective Internationalization and Accessibility-International consideration, Accessibility, Create meaningful Graphics, Icons and Images, Colors-uses, possible problems with colors, choosing colors.

Text Books:

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

References Books:

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

Web Links:

1. https://www.ics.uci.edu/~kobsa/courses/ICS104/_notes/start.htm
2. https://onlinecourses.nptel.ac.in/noc18_cs23
3. <https://www.scribd.com/interest/Human-Computer-Interaction/docs>
4. <https://www.interaction-design.org/courses/human-computer-interaction>

SOCIAL NETWORKS AND SEMANTIC WEB
(Professional Elective – II)
(Common to CSE & IT)

VI Semester

Course Code: 171CS6E08

L T P C
3 1 0 3

Course Objectives:

- COB1: To discuss with students how the Web contributes information services that benefit human productivity.
- COB2: To make the students learn knowledge representation for Semantic Web.
- COB3: To impart the knowledge on ontology engineering.
- COB4: To enable the students learn Semantic Web Applications, Services and Technology.
- COB5: To illustrate the concept of social network analysis and semantic web.

Course Outcomes:

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

- CO 1: Summarize the concepts of semantic web and social network analysis.
- CO 2: Describe the knowledge representation on the Semantic web.
- CO 3: Make use of ontology engineering in semantic web.
- CO 4: Identify the architectures and challenges in building social networks.
- CO 5: Compare various survey methods of social networks.
- CO 6: Analyze the performance of social networks using electronic 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)	2	1	-	-	2	-	-	-	-	-	-	-
CO2(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO3(K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO4(K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO5(K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO6(K4)	3	3	2	2	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	-	-	-
CO2 (K2)	2	2	-	-
CO3 (K3)	3	3	3	-
CO4 (K3)	-	3	3	-
CO5 (K4)	-	-	-	-
CO6 (K4)	-	-	-	-

UNIT- I

Web Intelligence: Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web.

Machine Intelligence: Artificial Intelligence, Machine Intelligence, Ontology, Inference engines, Software Agents.

Berners-Lee: World Wide Web, Berners-Lee, Semantic web Road Map, Logic on the semantic Web.

UNIT-II

Knowledge Representation on the Semantic Web: Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web: Resource Description Framework (RDF) and RDF Schema, Ontology Web Languages (OWL), UML, XML/XML Schema.

UNIT-III

Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT-IV

Semantic Web Applications: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base.

Web Ontology Languages for Services: XML Based Web Services, Creating an OWL-S Ontology for Web Services.

Semantic Search Technology: Semantic Search Technology, Web Search Agents and Semantic Methods.

UNIT-V

Social Network Analysis: social Networks analysis concepts, development of the social networks analysis.

Electronic Sources for Network Analysis: Electronic Discussion networks, Blogs and Online Communities, Web Based Networks.

Building social-semantic applications: Building Semantic Web Applications with social network features.

Text Books:

1. Thinking on the Web, Berners Lee, Gödel and Turing, Wiley inter science, 2008.
2. Social Networks and the Semantic Web, Peter Mika, 1st Edition, Springer, 2007.

Reference Books:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, R.Studer, P.Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services, Liyang Lu Chapman and Hall, CRC Publishers, (Taylor & Francis Group).
3. Information sharing on the semantic Web, Heiner Stuckenschmidt, Frank Van Harmelen, Springer Publications.

4. Programming the Semantic Web, T.Segaran, C.Evans, J.Taylor, First Edition, O'Reilly.

Web Links:

1. <https://www.w3.org/standards/semanticweb/>
2. https://onlinecourses.nptel.ac.in/noc18_cs56/preview
3. <https://mycourses.aalto.fi/course/view.php?id=16942§ion=1>
4. <https://open.hpi.de/courses/semanticweb>

PATTERN RECOGNITION
(Professional Elective – III)

VI Semester
Course Code: 171CS6E09

L T P C
3 1 0 3

Course Objectives:

- COB 1: To impart the knowledge on machine learning concepts and artificial intelligence.
- COB 2: To nurture the students with the principles on probability in pattern matching arena.
- COB 3: To enable the students learn the usage of Estimation & Likelihood concepts in pattern estimation.
- COB 4: To demonstrate the ideas of Supervised and Unsupervised learning with reference to clustering.
- COB 5: To make the students learn the precepts of Hidden Markov Models and the usage of Decision trees.

Course Outcomes:

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

- CO 1: Interpret the fundamental concepts of machine perception and Bayesian decision theory in machine learning.
- CO 2: Inspect parameter estimation in relatively complex probabilistic models using Maximum likelihood and Bayesian approaches.
- CO 3: Apply unsupervised and supervised learning in simple pattern matching problems.
- CO 4: Summarize the principles of pattern recognition using Hidden Markov Models.
- CO 5: Examine the benefits of Decision Trees in Pattern construction and classification.

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

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I

Introduction: Machine perception, an example, Pattern Recognition Systems, the Design cycle, learning and adaptation.

Bayesian Decision Theory: Introduction, Bayesian Decision Theory -Continuous Features, Minimum Error-rate classification, Classifiers, Discriminant functions, and Decision Surfaces.

UNIT-II

Bayesian Decision Theory (Continuation): The Normal Density, Discriminant functions for the normal Density, Bayes decision theory – discrete features, Compound Bayesian decision theory and context.

UNIT-III

Maximum likelihood and Bayesian parameter estimation: Introduction, Maximum-Likelihood Estimation, and Bayesian estimation, Bayesian Parameter Estimation: Gaussian case.

UNIT-IV

Un-supervised learning and clustering: Introduction, Mixture densities and identifiability, Maximum likelihood estimates, Application to normal mixtures: K-means clustering, Data description and Clustering, Criterion functions for clustering.

UNIT-V

Hidden Markov Models: Hidden Markov Models for classification, HMM Parameters, Learning HMMs, Classification using HMMs, Classification of test patterns.

Decision Trees: Introduction, Decision trees for Pattern classification, Construction of decision trees, Measures of Impurity, Splitting at the Nodes, When to stop Fitting, over fitting and Pruning, Examples of decision tree induction.

Text Books:

1. Pattern classifications, Richard O. Duda, Peter E. Hart, David G. Stroke, 2nd Edition, Wiley student edition, 2000.
2. Pattern Recognition, An Algorithmic Approach, M Narsimha Murthy, V Susheela Devi, 1st Edition, Springer University Press, 2011.

Reference Books:

1. Pattern Recognition and Machine Learning, Christopher, 1st Edition, M.Bishop, Springer, 2016.
2. Pattern Recognition, Sergious Theodoridis, Konstantinos Koutroumbas, 4th Edition, Elsevier, 2009.
3. Neural Networks for pattern Recognition, Christopher M. Bishop, 1st Edition, Oxford University Press, 2005.
4. Pattern Recognition and Machine Learning, Yuochiro Anzai, 1st Edition, Academic press, 1992.

Web Links:

1. <https://nptel.ac.in/courses/117108048/>
2. <https://ocw.mit.edu/courses/media-arts-and-sciences/mas-622j-pattern-recognition-and-analysis-fall-2006/>
3. <https://www.robots.ox.ac.uk/~az/lectures/ml/index.html>
4. https://www.cfa.harvard.edu/~xliu/presentations/SRS1_project_report.PDF
5. [shttp://nptel.ac.in/courses/117105101/40](http://nptel.ac.in/courses/117105101/40)

PARALLEL COMPUTING
(Professional Elective – III)
(Common to CSE & IT)

VI Semester
Course Code: 171CS6E10

L T P C
3 1 0 3

Course Objectives:

- COB 1: To discuss on parallel processing and basic parallel random access machine learning algorithms.
- COB 2: To explain features of Processor Arrays, Multi processors and multi computers and scheduling algorithms.
- COB 3: To demonstrate elementary Parallel algorithms and Fast Fourier transform algorithms.
- COB 4: To teach different types of processors.
- COB 5: To explain Parallel sorting methods and Parallel Search operations

Course Outcomes:

At the end of this course, students will be able to:

- CO 1: Describe the need of parallel processing and parallel approaches.
- CO 2: Make use of PRAM algorithms to solve various applications.
- CO 3: Demonstrate different networks of processor organizations.
- CO 4: Discuss on elementary parallel algorithms.
- CO 5: Compare Matrix multiplication using different models.
- CO 6: Interpret sorting, dictionary operations, and graph search algorithms.

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	-	-	-	-	-	-	-	-	-	-	3
CO2(K3)	3	-	-	-	-	-	-	-	-	-	-	-
CO3(K3)	3	2	-	1	-	-	-	-	-	-	-	3
CO4(K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO5(K4)	3	3	-	-	-	-	-	-	-	-	-	3
CO6(K3)	3	2	1	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1(K3)	PSO2(K3)	PSO3(K3)	PSO4(K4)
CO1(K2)	2	2	2	-
CO2(K3)	3	-	-	-
CO3(K3)	3	-	-	-
CO4(K2)	2	-	-	-
CO5(K4)	3	3		3
CO6(K3)	3	3	-	-

UNIT- I

Introduction: Computational demand of modern science, advent of parallel processing, parallel processing terminology, the sieve of Eratosthenes.

UNIT-II

PRAM Algorithms: PRAM model and its variants, EREW and CREW PRAM algorithms for different applications, Reducing the number of processors-cost optimality algorithm- Brent's theorem and its importance.

UNIT- III

Processor Organizations: Mesh networks ,Binary tree networks, Hyper tree networks ,pyramid network ,Butterfly network and hypercube networks, Cube Connected Cycles networks, Shuffle exchange network, and de Bruijin Network ,FLYNN'S taxonomy.

UNIT- IV

Elementary Parallel algorithms: Classifying MIMD algorithms, Reduction, Broadcast.

Matrix Multiplication: Sequential Matrix Multiplication, Matrix Multiplication on the 2-D Mesh SIMD model, Hyper cube SIMD model, Row-Column Oriented algorithm.

UNIT -V

Sorting algorithms: Quick-sort based algorithms: Parallel quick sort, hyper quick sort.

Dictionary Operations: Dictionary operation-Searching on multi processors-Ellis's algorithm.

Graph Algorithms: Searching a graph –P-Depth Search, Breadth-Depth Search, and Breadth-First Search.

Text Books:

1. Parallel computing theory and practice, Michel J.Quinn, 2nd Edition, McGraw-Hill Education. 1994.
2. Algorithms Sequential & Parallel: A Unified Approach, Miller, R. and Boxer, 2nd Edition, Charles River Media.

Reference Books:

1. Computer Algorithms: C++, Horowitz, E., Sahni, S. and Rajasekaran, S., 2nd Edition Galgotia Publications.
2. Algorithms and Parallel Computing, Fazay Gebali, John Wiley & Sons.
3. Parallel Algorithm And Computation, Virendra Kumar, 1st Edition, Khanna Publishing, 2013.

Web Links:

6. https://onlinecourses.nptel.ac.in/noc17_cs39/preview
7. <https://www.coursera.org/learn/parprog1>
8. https://www.tutorialspoint.com/parallel_algorithm/parallel_algorithm_introduction.htm
9. https://computing.llnl.gov/tutorials/parallel_comp/
10. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.363.5046&rep=rep1&type=pdf>

STORAGE AREA NETWORKS
(Professional Elective – III)

VI SEMESTER
Course Code: 171CS6E11

L T P C
3 1 0 3

Course Objectives:

- COB 1: To enable the students know the importance of data storage and its management.
- COB 2: To impart the knowledge on Storage structures and RAID levels.
- COB 3: To make the students learn Storage Area Networks characteristics and components.
- COB 4: To Illustrate the students on data availability and monitoring.
- COB 5: To discuss with students about data recovery techniques in failures.
- COB 6: To demonstrate the students storage security and virtualization.

Course Outcomes:

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

- CO 1: Summarize the data storage and data management.
- CO 2: Discuss on storage system environment.
- CO 3: Compare various RAID levels.
- CO 4: Describe Intelligent storage system.
- CO 5: Choose appropriate storage network and virtualization techniques for real time applications.
- CO 6: Identify business continuity methods.

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	1	-	-	-	-	-	-	-	-	-	-
CO2 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO3 (K2)	2	-	-	-	-	-	-	-	-	-	-	-
CO4 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	-	3	-	-	-	-	-	-	-
CO6 (K3)	3	2	1	-	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	2	-	-
CO2 (K2)	2	-	-	-
CO3 (K2)	2	2	-	-
CO4 (K2)	2	2	-	-
CO5 (K3)	3	-	-	-
CO6 (K3)	3	3	-	-

UNIT-I

Introduction to Information Storage and Management Information storage, Evolution of Storage Technology and Architecture, Data Centre Infrastructure, Key Challenges in Managing Information, Information Lifecycle.

Storage System Environment: Components of a Storage System Environment, Components of a Storage System Environment , Disk Drive Components, Disk Drive Performance, Fundamental Laws Governing Disk Performance, Logical Components of the Host, Application Requirements and Disk Performance.

UNIT-II

Data Protection: RAID Implementation of RAID , RAID Array Components, RAID Levels: Striping, Mirroring, Parity, RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, RAID Comparison. RAID Impact on Disk Performance.

Intelligent Storage System: Components of an Intelligent Storage System, Intelligent Storage Array.

Direct-Attached Storage and Introduction to SCSI: Types of DAS, DAS Benefits and Limitations, Disk Drive Interfaces, Introduction to Parallel SCSI, SCSI Command Model.

UNIT -III

Storage Area Networks: Fibre Channel: Overview, The SAN and Its Evolution, Components of SAN, FC Connectivity, Fibre Channel Ports, Fibre Channel Architecture, Zoning, Fibre Channel Login Types, FC Topologies.

Network-Attached Storage: General-Purpose Servers vs. NAS Devices, Benefits of NAS, NAS File I/O, Components of NAS, NAS Implementations, NAS File-Sharing Protocols, NAS I/O Operations, Factors Affecting NAS Performance and Availability.

IP SAN: iSCSI, FCIP.

UNIT -IV

Storage Virtualization: Forms of Virtualization, SNIA Storage Virtualization Taxonomy, Storage Virtualization Configurations, Storage Virtualization Challenges, Types of Storage Virtualization.

Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions.

UNIT- V

Backup and Recovery: Backup Purpose, Backup Considerations, Recovery Considerations, Backup Methods, Backup Process, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

Local Replication: Source and Target, Uses of Local Replicas, Data Consistency, Local Replication Technologies, Restore and Restart Considerations, Creating Multiple Replicas, Management Interface.

Remote Replication: Modes of Remote Replication, Remote Replication Technologies, Network Infrastructure

Securing the Storage Infrastructure: Storage Security Framework, Risk Triad, Storage Security Domains, and Security Implementations in Storage Networking.

Text Books:

1. EMC Corporation, Information Storage and Management, Wiley.
2. Storage Networks: The Complete Reference, Robert Spalding, Tata McGraw Hill, Osborne, 2003.

Reference Books:

1. Building Storage Networks, Marc Farley, Tata McGraw Hill, Osborne, 2001.
2. Storage Area Network Fundamentals, Meeta Gupta, Pearson Education Limited.

Web Links:

1. <http://www.tsmtutorials.com/p/storage-area-network-san-basic-tutorials.html>
2. <http://nptel.ac.in/courses/106103069/26>
3. https://education.emc.com/academicalliance/.../EAA_ISM_course_one-pager.pdf
4. <http://nptel.ac.in/syllabus/106108058/>
5. www.iitk.ac.in/cc/workshop29-8/hp2.ppt

E – COMMERCE
(Professional Elective – III)
(Common to CSE & IT)

VI Semester**Course Code: 171CS6E12**

L	T	P	C
3	1	0	3

Course Objectives:

- COB 1: To provide knowledge on E-Commerce framework, E-Commerce applications and Mercantile Process Models.
- COB 2: To discuss on different payment methods in E-Commerce, Inter-Organizational aspects and Intra-Organizational aspects of E-Commerce.
- COB 3: To provide knowledge on various methods of marketing in E-Commerce applications and to maintain and manage digital documents.
- COB 4: To illustrate the basic concepts of search and information discovery paradigms through E-Commerce catalogues.
- COB 5: To make students learn how multimedia plays a key role in E-Commerce applications.

Course Outcomes:

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

- CO 1: Explain the fundamentals of E-Commerce and its applications in different orientations.
- CO 2: Compare mercantile process models of different perspectives.
- CO 3: Contrast on different payment models in E-Commerce applications.
- CO 4: Discuss on design issues of Intra-Organizational E-Commerce and Inter-Organizational E-Commerce.
- CO 5: Identify different types of digital documents and their features, advantages and disadvantages.
- CO 6: Summarize the concepts of digital document management.
- CO 7: Describe the concepts of marketing strategies in E-Commerce.
- CO 8: Illustrate different concepts of information search and discovery.
- CO 9: Utilize different services offered by multimedia to E-Commerce firms

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)
CO 1(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 2(K4)	3	3	-	-	3	-	-	-	-	-	-	-
CO 3(K4)	3	3	-	-	3	-	-	-	-	-	-	-
CO 4(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 5(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 6(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 7(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 8(K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO 9(K3)	3	2	1	1	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO 1(K2)	2	2	-	-
CO 2(K4)	-	-	-	-
CO 3(K4)	-	-	3	-
CO 4(K2)	2	2	2	-
CO 5(K2)	2	2	-	-
CO 6(K2)	-	-	-	-
CO 7(K2)	2	2	-	-
CO 8(K3)	3	3	3	-
CO 9(K3)	-	-	-	-

UNIT-I

Introduction to E-Commerce: Electronic Commerce Framework, Anatomy of E-Commerce Applications, E-Commerce Consumer Applications, E-Commerce Organization Applications.

Consumer Oriented E-Commerce: Mercantile Process Models, Mercantile Models from the Consumer's Perspective, Mercantile Models from the Merchant's Perspective.

UNIT-II

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

Inter-Organizational Commerce: EDI, EDI Applications in Business, EDI and E-Commerce, EDI Standardization, EDI Software Implementation, Value-Added Networks.

Intra-Organizational E-Commerce: Internal Information Systems, Work-Flow Automation and Coordination, Customization and Internal Commerce, Supply Chain Management.

UNIT-III

Corporate Digital Library: Dimensions of Internal E-Commerce Systems, Making a Business Case for Document Library, Digital Document Types, Issues behind Document Infrastructure, Corporate Data Warehouses.

Advertising and Marketing - Information Based Marketing, Advertising on the Internet, Online Marketing Process, Market Research.

UNIT-IV

Consumer Search and Resource Discovery: Search and Resource Discovery Paradigms, Information Search and Retrieval, E-Commerce Catalogues or Directories, Information Filtering, Emerging Tools in Consumer-Data Interface.

UNIT-V

Multimedia and Digital Video: Key Multimedia Concepts, Digital Video and E-Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books:

1. Frontiers of Electronic Commerce, Ravi Kalakota, Andrew B. Whinston, 1st Edition, Pearson India, 2011.
2. E-Commerce, strategy, Technology, and Implementation - Gary P. Schneider, 9th Edition, Cengage Learning India, 2012.

Reference Books:

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley, 2001.
2. E-Commerce, S.Jaiswal, Galgotia, 2003.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
4. Electronic Commerce, Gary P.Schneider, 12th Edition, Cengage Learning US, 2016.
5. E-Commerce – Business, Technology, Society, Kenneth C.Taudon, Carol Guyerico Traver, Pearson/Addison Wesley, 2004.

Web Links:

1. <https://ecommerceguide.com/guides/what-is-e-commerce/>
2. <https://bigcommerce.com/blog/e-commerce/>
3. <https://www.britannica.com/technology/e-commerce>
4. <https://feinternational.com/blog/what-is-e-commerce-an-introduction-to-the-industry/>
5. <https://www.managementstudyguide.com/e-commerce-and-internet.htm>

EMPLOYABILITY SKILLS-IV

(Common to all branches)

VI Semester
Course Code: 171HS6T07

L T P C
2 0 0 1

Course Objectives:

- COB 1 : To equip the students to utilize the emerging trends in learning.
- COB 2 : To equip the students with critical analytical, conceptual and other skills.
- COB 3 : To enable students to work in different professions-teaching, software, research, administration, etc.
- COB 4 : To provide skills fit for job and fit for life and make them experts in their respective area of study.

Course Outcomes:

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

- CO 1 : Find profit and loss, simple and compound interest for different models.
- CO 2 : Identify leadership and make use of group dynamic skills.
- CO 3 : Calculate solutions for time and work, time and distance and data interpretation.
- CO 4 : Define and focus on Interview 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(K1)	1	-	-	-	1	1	2	1	-	-	-	3
CO 2(K2)	2	-	-	-	-	2	3	-	3	-	-	-
CO 3(K3)	3	2	-	-	3	3	3	3	-	-	-	3
CO 4(K1)	1	1	-	-	-	1	2	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO 1(K1)	1	-	-	-
CO 2(K2)	2	-	-	-
CO 3(K3)	3	-	-	-
CO 4(K1)	1	-	-	-

UNIT-I:

Aptitude: Profit And Loss

Soft Skills: Group discussion -2, Importance-Definition-Objective-Types-Skills Developed-Myths- Do's And Don'ts-Parameters of Evaluation- Process.

UNIT-II:

Aptitude: Simple Interest and Compound Interest.

Soft Skills: Speech- Debate -JAM -Importance -Do's & Don'ts.

UNIT-III:

Aptitude: Time and Work, Pipes and Cisterns.

Soft Skills: Voice and Accent, Voice modulation, Phonetic training-Neutral Accent Practice.

UNIT-IV:

Aptitude: Time and Distance, Trains, Boats and Streams.

Soft Skills: Leadership & Social Influence, flexibility, Group Dynamics.

UNIT-V:

Aptitude: Data Interpretation.

Soft Skills: Interview Skills-2, Mock Interviews, Evaluation-Feedback.

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
2. www.bankersadda.com

COMPUTER NETWORKS LAB

VI Semester
Course Code: 171CS6L09

L T P C
0 0 3 2

Course Objectives:

- COB 1: To impart knowledge on the design concepts of computer networks.
- COB 2: To enable the students design and apply data link layer framing techniques.
- COB 3: To demonstrate the routing algorithms, error correction and detection techniques.
- COB 4: To discuss on various Application Layer Protocols.
- COB 5: To make the students learn encryption techniques to secure data in transit across data networks.

Course Outcomes:

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

- CO 1: Explain about fundamental concepts of computer networks.
- CO 2: Develop data link layer services of dynamic framing.
- CO 3: Demonstrate the working of various routing algorithms, error detection and correction techniques.
- CO 4: Discuss on various protocols for network security to protect against the threats in the networks.
- CO 5: Make use of ARP/RARP protocols.

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 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO4 (K3)	3	2	-	-	-	-	-	-	-	-	-	-
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 (K3)	PSO 4 (K4)
CO1 (K3)	3	-	3	-
CO2 (K3)	3	-	3	-
CO3 (K2)	2	-	2	-
CO4 (K3)	3	-	2	-
CO5 (K3)	3	-	3	-

List of Experiments:**1. Framing Method**

- 1.1) Implement data link layer framing method of Character stuffing.
- 1.2) Implement data link layer framing method of Bit stuffing.

2. Cyclic Redundancy Check

- 2.1) Implement CRC 12.
- 2.2) Implement CRC 16.
- 2.3) Implement CRC CCIT.

- 3) Implement Dijkstra's algorithm to compute the shortest path through a graph.
- 4) Implement distance vector routing algorithm.
- 5) Implement subnet of hosts to obtain Broadcasting.
- 6) Implementation of link state routing algorithm.
- 7) Program to simulate routing using Flooding.
- 8) Write a program to implement break DES coding.
- 9) Write a program to implement RSA algorithm to encrypt a text data and decrypt the same.

- 10) Write a program to implement SMTP.
- 11) Write a program to implement FTP.
- 12) Implement Sliding Window Protocol for Go – Back N.

List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

- 13) Implement Sliding Window Protocol for Selective Repeat.
- 14) Write a code simulating ARP /RARP protocols.
- 15) Generate the Subnet Address for the given IP Address.
- 16) Write a program to implement HTTP.

Reference Books:

1. Data Communications and Networking – Behrouz A.Forouzan, 5th Edition, McGraw Hill Education, 2012.
2. Operating Systems: Design and Implementation, Andrew S. Tanenbaum, Albert S. Woodhu, 2nd Edition.,
3. Computer Networking: A Top-Down Approach 5th Edition (English, Paperback, James F. Kurose).

4. Computer Networks – A system's approach, Larry L Peterson, Bruce S Davie, 5th Edition, Elsevier, 2011.

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.html>
4. <http://www.scribd.com/doc/58478622/Computer-Networks-Forouzan>.
5. <http://www.technolamp.co.in/2010/08/computer-networks-tanenbaum-powerpoint.html>.

DATA WAREHOUSING AND DATA MINING LAB
(Common to CSE & IT)

VI Semester
Course Code: 171CS6L10

L T P C
0 0 3 2

Course Objectives:

- COB 1: To impart knowledge on data warehouses and creation of warehouses.
- COB 2: To illustrate dimensional modeling technique for designing a data warehouse.
- COB 3: To enable the students in Describing the data mining tasks and study their well known techniques.
- COB 4: To demonstrate association rule mining and correlation analysis.
- COB 5: To implement decision trees classification algorithms.
- COB 6: To make the students understand importance of clustering in data mining.

Course Outcomes:

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

- CO 1: Determine different steps for pre-processing in Data mining.
- CO 2: Use data mining software system for solving data mining problems.
- CO 3: Test real data sets using popular data mining tools such as WEKA.
- CO 4: Apply algorithms for Association rule mining.
- CO 5: Apply Classification methods for data mining.
- CO 6: Demonstrate the Clustering basics and approaches in data mining.

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	-	-	-	-	-	-
CO2(K3)	3	2	1	1	3	3	-	-	3	-	-	-
CO3(K1)	-	-	-	-	-	-	-	-	-	-	-	-
CO4(K3)	3	2	1	-	3	3	-	-	-	-	3	-
CO5(K3)	3	2	1	1	3	3	-	-	-	-	3	3
CO6(K3)	3	2	1	1	3	3	3	-	-	-	3	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	3	3	3	2
CO2 (K3)	3	3	3	2
CO3 (K1)	1	-	-	-
CO4 (K3)	3	3	3	2
CO5 (K3)	3	3	3	2
CO6 (K3)	3	-	-	2

List of Experiments:

- 1) Illustrate KDD process and explore the Data Mining tool WEKA for Data Preprocessing, Classification and Clustering.
- 2) Construct a data warehouse related to weather data in WEKA.
- 3) Apply Pre-Processing for training data set related to Weather data.
- 4) Demonstrate preprocessing on Student's Academic Performance dataset.
- 5) Demonstrate classification rule process on dataset iris.arff using id3 algorithm.
- 6) Demonstrate classification rule process on Student's Academic Performance Data student.arff using j48 algorithm.
- 7) Demonstrate Association rule generation on market basket data using apriori algorithm.
- 8) Demonstrate Association rule generation on credit card data using apriori algorithm.
- 9) Demonstrate Association rule process on contactlenses .arff using FP-Growth Algorithm.
- 10) Demonstrate clustering process on dataset iris.arff using simple k-means
- 11) Demonstrate clustering process on dataset student.arff using Density Based Cluster Algorithm.
- 12) Apply Hierarchical clustering for clustering Employee data.

List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

- 13) Write a procedure for cross-validation using J48 Algorithm for weather table.
(Cross-validation, sometimes called rotation estimation, is a technique for assessing how the results of a statistical analysis will generalize to an independent data set. It is mainly used in settings where the goal is prediction, and one wants to estimate how accurately a predictive model will perform in practice. One round of cross-validation involves partitioning a sample of data into complementary subsets, performing the analysis on one subset (called the training set), and validating the analysis on the other subset (called the validation set or testing set).)
- 14) Write a procedure for Visualization of Banking data in WEKA.
For successful data mining you must “know your data”; examine it in detail in every possible way. Weka’s Visualize panel lets you look at a dataset and select different attributes – preferably numeric ones – for the x- and y-axes. Instances are shown as points, with different colors for different classes. You can sweep out

a rectangle and focus the dataset on the points inside it. You can also apply a classifier and visualize the errors it makes by plotting the “class” against the “predicted class”.

- 15) Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm. ‘**Naive Bayes**’, which can be extremely fast relative to other classification algorithms. It works on Bayes theorem of probability to predict the class of unknown data set. A Naive Bayes classifier assumes that the presence of a particular feature in a class is unrelated to the presence of any other feature.

- 16) Case Study on Text Mining.

To perform the text mining using Weka tool. Data mining in text is to find something useful and surprising from a text collection. Text mining, also referred to as text data mining, roughly equivalent to text analytics, is the process of deriving high-quality information from text. High-quality information is typically derived through the devising of patterns and trends through means such as statistical pattern learning. Text mining usually involves the process of structuring the input text (usually parsing, along with the addition of some derived linguistic features and the removal of others, and subsequent insertion into a database), deriving patterns within the structured data, and finally evaluation and interpretation of the output. 'High quality' in text mining usually refers to some combination of relevance, novelty, and interestingness. Typical text mining tasks include text categorization, text clustering, concept/entity extraction, production of granular taxonomies, sentiment analysis, document summarization, and entity relation modeling (i.e., learning relations between named entities). Example dataset to apply text mining Spam.arff.

- 17) Case Study on web mining for classifying web pages (using weka tool).WEB MINING Use of data mining techniques to automatically discover interesting and potentially useful information from Web documents and services. Web mining may be divided into three categories. i) Web content mining. ii) Web structure mining. iii) Web usage mining.refer web logs dataset and apply classification of web pages

Sample WEKA data sets in arff format.

contact-lens.arff, diabetes.arff, glass.arff, iris.arff, labor.arff, supermarket.arff, weather.arff, weather.nominal.arff.

Reference Books:

1. Data Mining: Introductory and Advanced Topics, Margaret H. Dunham, 1st Edition, Pearson Education.
2. Data Mining Techniques and Applications an Introduction, Hongbo Du, 1st edition Cengage India, 2013.
3. Data Warehousing, Data Mining and OLAP, Alex Berson, Stephen J. Smith, McGraw-Hill series.
4. Data Mining Techniques, Arun K Pujari, Universities Press.

Web Links:

1. <https://nptel.ac.in/courses/106105174/>
2. <https://www.cs.waikato.ac.nz/ml/weka/>
3. <https://hackernoon.com/what-steps-should-one-take-while-doing-data-preprocessing-502c993e1caa>
4. <https://www.kdnuggets.com/>
5. <https://www.kaggle.com/aljarah/xAPI-Edu-Data/version/2/home>

WEB TECHNOLOGIES LAB
(Common to CSE & IT)

VI Semester
Course Code: 171CS6L11

L T P C
0 0 3 2

Course Objectives:

- COB 1: To provide knowledge on HTML, Java Script and XML to develop web pages.
- COB 2: To enable the students, develop real time applications using PHP and MySQL database.
- COB 3: To train the students implement the basic concepts of Ruby and Perl.

Course Outcomes:

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

- CO 1 : Develop web pages using HTML, CSS and JavaScript.
- CO 2 : Apply DTD to validate the XML Document.
- CO 3 : Build real time applications using PHP and MySQL.
- CO 4 : Construct basic programs using Ruby and Perl.

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	3	-	-	-	-	-
CO4(K3)	3	2	-	-	3	3	3	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1(K3)	PSO 2 (K3)	PSO 3(K3)	PSO 4 (K4)
CO1 (K3)	-	-	3	2
CO2 (K3)	3	-	3	2
CO3 (K3)	3	3	3	2
CO4 (K3)	-	-	3	2

List of Experiments:

- 1) Create web pages using Basic HTML Tags, Table, List, Image, and Frame Tags.
- 2) Using Form Tags,
 - 2.1). Create a Login form
 - 2.2). Create a “registration form” with the following fields

- a) Name (Text field)
- b) Password (password field)
- c) E-mail id (text field)
- d) Phone number (text field)
- e) Sex (radio button)
- f) Date of birth (3 select boxes)
- g) Languages known (check boxes – English, Telugu, Hindi, Tamil)
- h) Address (text area)

3) CSS & Java Script

- 3.1) Design a web page using CSS (Cascading Style Sheets) which includes the following:
- 3.1.1) Use different font, styles: In the style definition you define how each selector should work (font, color etc). Then, in the body of your pages, you refer to these selectors to activate the styles.
 - 3.1.2) Set a background image for the web page and control the repetition of the image with the background-repeat property.
 - 3.1.3) Define styles for link as visited, active, hover & link.
- 3.2) Write a JavaScript that takes a number from one text field in the range of 0-999 and display it in other text field in words. If the number is out of range, it should show “out of range” and if it is not a number, it should show “not a number” message in the result box.

4) Java Script & XML

- 4.1) Write a JavaScript to validate the following fields in a registration page created in week 2
- a. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)
 - b. Password (it allows alphanumeric, special symbols and should not be less than 6 characters)
 - c. E-mail (should not contain invalid email addresses)
- 4.2) Write an XML file which will display the Book information which includes the following:
- a) Title of the book
 - b) Author Name
 - c) ISBN number
 - d) Publisher name
 - e) Edition
 - f) Price

Write a Document Type Definition (DTD) to validate the above XML file and display the details in a table (to do this use XSL).

5) PHP

- 5.1) Write a PHP script to get the first and last day of a month from a specified date.
- 5.2) Write a PHP script to calculate and display average temperature, five lowest and highest temperatures for the following recorded temperatures.
- Recorded temperatures : 78, 60, 62, 68, 71, 68, 73, 85, 66, 64, 76, 63, 75, 76, 73, 68, 62, 73, 72, 65, 74, 62, 65, 64, 68, 73, 75, 79, 73

Expected Output :

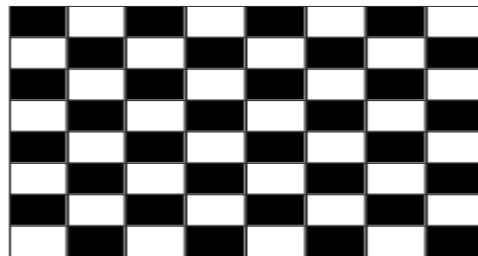
Average Temperature is : 70.6

List of five lowest temperatures : 60, 62, 63, 63, 64,

List of five highest temperatures : 76, 78, 79, 81, 85

- 5.3) Write a PHP script using nested for loop that creates a chess board as shown below.

Use table width="240px" and take 30px as cell height and width.

**6) PHP Programs**

- 6.1) Write a PHP script to sort the following associative array.

```
array("Sophia"=>"31","Jacob"=>"41","William"=>"39","Ramesh"=>"40") in
a) ascending order sort by value
b) ascending order sort by Key
c) descending order sorting by Value
d) descending order sorting by Key
```

- 6.2) Write a PHP script to generate simple random password [do not use rand() function] from a given string.

Sample string:

'1234567890ABCDEFGHIJKLMNPQRSTUVWXYZabcefghijklmnopqrstuvwxyz
xyz'

Note: Password length may be 6, 7, 8 etc.

- 6.3) Install a database (MySQL).

Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form).

- 6.3.1) Write a PHP code to insert the details of the users, whenever a new user clicks the submit button in the registration page (Week 2).

7) PHP-Database Programs

- 7.1) Write a PHP program to connect to the database and extract data from the tables and display them.

- 7.2) Write a PHP which does the following job: Insert the details of the 3 or 4 users who register by using the registration form. Authenticate the user when he/she submits the login form using the user name and password from the database.

8) PHP-Database Programs

- 8.1) Write a PHP code to connect to the database and update the password using username.
- 8.2) Write a PHP code to connect to the database and perform deletion operation in the table using username.
- 8.3) **User Authentication:** Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.
 - 8.3.1) Create a Cookie and add these four user id's and passwords to this Cookie.
 - 8.3.2) Read the user id and passwords entered in the Login form (week 2) and authenticate with the values (user id and passwords) available in the cookies.

If he/she is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display “You are not an authenticated user”.

9) PERL Programs

- 9.1) Write a program to store 5 employee salaries using associative arrays in Perl, where employee name is a key and salary being used as a value and find the total salary and average salary paid by the company to the employees and display the same.
- 9.2) Write Perl program takes set names along the command line and prints whether they are regular files or special files.
- 9.3) Write a Perl programs to do the following
 - 9.3.1) Program to define a subroutine
 - 9.3.2) Passing Lists and Hashes to a subroutine
 - 9.3.3) Returning value from a subroutine

10) PERL Programs

- 10.1) Write a Perl program to implement UNIX `password' program.
- 10.2) Create a CGI form that inputs user name and outputs Hello followed by username.

11) RUBY Programs

- 11.1) Write a Ruby program reads a number and calculates the factorial of it and display it.
- 11.2) A vehicle number is fancy, when the four digit number has all the digits same or it is fancy when a digit is immediate next to the other in the number system. Write a Ruby program to find the given vehicle number is fancy or not.
- 11.3) Write a Ruby program which counts number of lines in a text files using its regular expressions.
- 11.4) Write a Ruby program that uses iterator to find out the length of a given string.

12) RUBY Programs

- 12.1) Write a Ruby program which uses Math module to find area of a triangle.
- 12.2) Write a program to store marks of three students in three subjects using associative arrays and display the same in Ruby.
- 12.3) Define complex class in Ruby and do write methods to carry operations on complex objects.

List of Augmented Experiments

(Any 2 of the following experiments can be performed)

- 13) Develop the web application for Online Book Store, which includes the following web pages

13.1) **Homepage:** The home page must contain three **frames**.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left frame: At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link “MCA” the catalogue for MCA Books should be displayed in the Right frame.

Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

Logo	Web Site Name				
	Home	Login	Registration	Catalogue	Cart
mca mba BCA				Description of the Web Site	

13.2) Login Page (Week 2)

13.3) Registration page (Week 2)

13.4) Create a table in the database which contains the details of items (books in our case like Book Name, Author, Price, Quantity, and Amount) of each category. Write PHP code that connect to the database and extract data from the tables and display them in the catalogue page of respective links in the category. i.e When you click the link “MCA” the catalogue for MCA Books should be displayed in the Right frame.

13.5) **Catalogue Page:**

Write a PHP code that connect to the database and extract data from the tables and display them in the catalogue page. The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following:

- a) Snap shot of Cover Page.
- b) Author Name.
- c) Publisher.
- d) Price.
- e) Add to cart button.

Logo Home	Web Site Name			
	Login	Registration	Catalogue	Cart
MCA		Book : XML Bible Author : Winston Publication : Wiley	\$ 40.5	
MBA				
BCA		Book : AI Author : S.Russel Publication : Princeton hall Book : Java 2 Author : Watson Publication : BPB publications Book : HTML in 24 hours Author : Sam Peter Publication : Sam	\$ 63 \$ 35.5 \$ 50	

14) Develop the web site for Online Notice Board System.

(Online Notice Board is one of the applications to improve the usage of notice board of the organization by making it available online. It mainly has two modules, Admin can manage users and send the notices to the multiple users, users of the system can view the notifications sent by admin by online).

15) Develop the web site for Leaves Management System.

(Leaves Management System is used to applying leaves by online in the any organization. It mainly has two modules, employee can apply leave, view the leave status and admin can manage leaves applied by employees (accept/reject)).

16) Develop the web site for Online Blood Bank Management System.

(Blood Bank Management System includes two modules, admin can manage blood groups, donors list, update the database and a user (donor) can register him/her self using registration form, view the donors list).

17) Create a simple application that allows users to search matching words, while a user type characters in an input text field using PHP and AJAX.

Reference Books:

1. Beginning Web Programming with HTML, XHTML, and CSS, Jon Duckett, 2nd Edition.
2. Programming Perl, Tom Christiansen, Jonathan Orwant, 4th Edition, O'reilly, 2012.
3. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, DreamTech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning

Web Links:

1. <https://www.phpgurukul.com>
2. <https://www.lynda.com/Perl-training-tutorials/278-0.html>
3. <https://www.phptpoint.com>
4. <http://programmingzen.com/ruby-books/>
5. <http://www.w3schools.com>

CRYPTOGRAPHY AND NETWORK SECURITY
(Common to CSE & IT)

VII Semester
Course Code: 171CS7T18

L T P C
3 1 0 3

Course Objectives:

- COB 1: To teach the basic concepts of the classical systems, symmetric block ciphers (DES, AES, and other contemporary symmetric ciphers).
- COB 2: To discuss with students on Public-key cryptography (RSA, discrete logarithms).
- COB 3: To provide knowledge on various algorithms and discrete logarithms, cryptographic protocols, hash functions, authentication.
- COB 4: To illustrate the basic concepts of key management, key exchange techniques.
- COB 5: To make 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 network security fundamentals and various public key cryptographic algorithms.
- CO 2: Compare various symmetric encryption techniques.
- CO 3: Summarize the concepts of asymmetric encryption techniques.
- CO 4: Discuss the functioning of digital signature standards and data integrity.
- CO 5: Utilize the services provided by the PGP, S/MIME & SSL, TLS.
- CO 6: Demonstrate the concept of IP Security.

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

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT- I

Basic Principles: Security Goals, Cryptographic Attacks, Services and Mechanisms, Mathematics of Cryptography

UNIT- II

Symmetric Encryption: Mathematics of Symmetric Key Cryptography, Introduction to Modern Symmetric Key Ciphers, Data Encryption Standard, Advanced Encryption Standard.

UNIT- III

Asymmetric Encryption: Mathematics of Asymmetric Key Cryptography, Asymmetric Key Cryptography

UNIT- IV

Data Integrity, Digital Signature Schemes & Key Management: Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature, Key Management.

UNIT –V

Network Security-I: Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS

Network Security-II: Security at the Network Layer: IPSec, System Security

Text Books:

1. Cryptography and Network Security principles and practice, William Stallings, 5th Edition, Pearson publications, 2011.
2. Cryptography and Network Security, Behrouz A Forouzan, Debdeep Mukhopadhyay, 2nd Edition, Tata McGraw-Hill, 2010.
3. Everyday Cryptography: Fundamental Principles and Applications, Keith M. Martin, 2nd Edition, Oxford publications, 2017.

Reference Books:

1. Network Security and Cryptography, Bernard Menezes, 1st Edition, Cengage Learning, 2010.
2. Cryptography and Network Security by Atul Kahate, 2nd Edition, Tata McGraw-Hill, 2008.

Web Links:

1. <http://nptel.ac.in/courses/106105031/>
2. [https://www.cs.northwestern.edu/~ychen/classes/cs395-w05/lectures.html.](https://www.cs.northwestern.edu/~ychen/classes/cs395-w05/lectures.html)
3. [https://www.cse.iitb.ac.in/~cs406/Resources.htm.](https://www.cse.iitb.ac.in/~cs406/Resources.htm)
4. http://www.cse.iitm.ac.in/~chester/courses/16e_cns/slides/01_Introduction.pdf
5. <http://williamstallings.com/Crypto/Crypto4e.html>

UML AND DESIGN PATTERNS

VII Semester
Course Code: 171CS7T19

L T P C
3 1 0 3

Course Objectives:

- COB 1: To focus on design rather than implementation.
- COB 2: To Introduce the Unified Process and showing how UML can be used within the process.
- COB 3: To Present Modeling diagrams on different aspects for industrial-strength development.
- COB 4: To enable the students learn different case studies with modeling aspects.
- COB 5: To Introduce design patterns and provide practical experience with a selection of central patterns.

Course Outcomes:

At the end of the course Student will be able to:

- CO 1: Identify the purpose and methods of use of common object-oriented design patterns.
- CO 2: Prepare documents for the purpose of capturing software requirements and specification.
- CO 3: Represent the data dependencies of a simple program using UML.
- CO 4: Represent user and programmatic interactions using UML
- CO 5: Create the documentation designing by outlining the testable and complete the design of a simple program.
- CO 6: Select and apply these patterns in their own designs for simple programs.
- CO 7: Produce plans to limit risks specific to software designed for use in a particular social context.

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)
CO 1(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 2(K3)	3	2	-	-	3	-	-	-	-	-	-	-
CO 3(K4)	3	3	-	-	3	-	-	-	-	-	-	-
CO 4(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 5(K3)	3	2	-	-	3	-	-	-	-	-	-	-
CO 6(K3)	3	2	-	-	3	-	-	-	-	-	-	-
CO 7(K3)	3	2	-	-	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO 1(K2)	2	-	-	-
CO 2(K3)	3	-	-	-
CO 3(K4)	-	-	-	-
CO 4(K2)	-	-	-	-
CO 5(K3)	3	3	-	-
CO 6(K3)	3	-	-	-
CO 7(K3)	-	3	-	-

UNIT- I

Introduction to UML: Importance of modeling, principles of modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

Use Case Modeling and Structural Modeling: Use cases, Use case Diagrams, Classes, Relationships, common Mechanisms, and diagrams, Object diagrams: common modeling techniques.

UNIT- II

Behavioral Modeling: Interactions, Interaction diagrams, Activity Diagrams, state machines, state chart diagrams.

Architectural Modeling: Components, Deployment, Component diagrams and Deployment diagrams, Common modeling techniques for component and deployment diagrams.

UNIT- III

Design patterns Introduction : Design Pattern, Design Patterns in Smalltalk MVC, Describing Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton.

UNIT – IV

Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Proxy.

UNIT – V

Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Mediator, Iterator, Observer, Strategy, Expectation from Design Patterns.

Text Books:

1. The unified Modeling language user guide by Grady Booch, James Rumbaugh, Ivar Jacobson, PEA.
2. Design Patterns By Erich Gamma, Pearson Education.

Reference Books:

1. Satzinger: Object Oriented Analysis and Design, CENGAGE
2. Applying UML and patterns, Craig Larman, Pearson.

Web Links:

1. https://onlinecourses.nptel.ac.in/noc16_cs19
2. <https://repository.genmymodel.com/okasha/udacity>
3. <https://www.coursera.org/learn/object-oriented-design/lecture/6GJtg/1-1-3-object-oriented-modeling>
4. <https://www.geeksforgeeks.org/unified-modeling-language-uml>

CLOUD COMPUTING (Common to CSE & IT)

VII Semester
Course Code: 171CS7T20

L T P C
3 1 0 3

Course Objectives:

- COB 1: To create awareness on different computing paradigms and software environments.
- COB 2: To demonstrate the students on computing environment and Virtualization.
- COB 3: To help the students learn cloud services and deployment models (IaaS, PaaS, SaaS).
- COB 4: To impart knowledge on cloud applications in real clouds.
- COB 5: To make the students understand Cloud Security, privacy and risks.

Course Outcomes:

At the end of this course, students will be able to:

- CO1: Explain the fundamentals of computing paradigm and cloud computing.
- CO2: Demonstrate the basic concepts of virtualization and implementation levels of Virtualization
- CO3: Illustrate the architecture of cloud computing.
- CO4: Apply the Cloud programming and software environments on any real cloud service.
- CO5: Analyze the Cloud Security risks and Mechanisms.

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

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1(K3)	PSO2(K3)	PSO3(K3)	PSO4(K4)
CO1(K2)	2	2	-	-
CO2(K2)	2	2	-	-
CO3(K2)	2	2	-	-
CO4(K3)	3	3	3	-
CO5(K4)	3	3	-	3

UNIT-I

Systems modeling, Clustering and virtualization: Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency.

UNIT-II

Virtual Machines and Virtualization of Clusters and Data Centers: Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT-III

Cloud Platform Architecture: Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management, Service Oriented Architecture, Message Oriented Middleware.

UNIT-IV

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

UNIT-V

Cloud Security: Cloud Security Risks, Security: The Top Concern for Cloud Users, Privacy and Privacy Impact Assessment, Trust, Operating System Security, Virtual Machine Security, Security of Virtualization.

Text Books:

1. Distributed and Cloud Computing, Kai Hwang, Geoffrey C. Fox, Jack J.Dongarra, 1st Edition, MK Elsevier, 2011
2. Cloud Computing, Theory and Practice, Dan C Marinescu, 1st Edition, MK Elsevier, 2013.

Reference Books:

6. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, 1st Edition, TMH, 2010.
7. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, 1st Edition, TMH, 2013.
8. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, 1st Edition, University Press, 2013.
9. Cloud Computing Black book, Kailash Jayaswal, Jagannath kallakurchi, Donald J.Houde, Dr.Deven shah, 1st Edition, Dreamtech Press, 2014.

10. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, 1st Edition, O'Reilly Media, 2009.

Web Links:

1. <https://aws.amazon.com/getting-started/tutorials/>
2. <http://nptel.ac.in/courses/106106129/28>
3. <https://www.coursera.org/learn/cloud-computing/lecture/VOIHP/introduction-to-cloud-computing-concepts-part-1>
4. <https://www.udemy.com/amazon-web-services-for-web-hosting-cloud-computing/>
5. <https://www.lynda.com/Cloud-Computing-training-tutorials/1385-0.html>

MANAGEMENT SCIENCE

VII Semester
L T P C
Course Code: 171HS7T05
3 1 0 3
Course Objectives:

- COB 1 : To make the students understand the principles, functions, theories and practices of different management areas.
- COB 2 : To equip the students with a systematic and critical understanding of organizational structures.
- COB 3 : To impart knowledge on conceptual models of strategic management and to familiarize with the tools of operations and project management.
- COB 4 : To make the students aware the role of human relations in the management of operations.
- COB 5 : To nurture the students with the contemporary practices of management.

Course Outcomes:

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

- CO 1 : Apply management and motivation theories to renovate the practice of management.
- CO 2 : Explain concepts of quality management and use process control charts, concepts and tools of quality engineering in the design of products and process controls.
- CO 3 : Appraise the functional management challenges associated with high levels of change in the organizations.
- CO 4 : Identify activities with their interdependency and use scheduling techniques of project management PERT/CPM.
- CO 5 : Develop global vision and management skills both at strategic level and interpersonal level.

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	-
CO 2(K3)	-	-	-	-	-	-	-	-	-	3	-	-
CO 3(K2)	-	-	-	-	-	-	-	-	3	-	-	-
CO 4(K3)	-	-	-	-	-	-	-	3	-	-	-	-
CO 5(K3)	-	-	-	-	-	-	3	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

Unit-I

Introduction to Management: Concept nature and importance of Management, Generic Functions of Management, and Evaluation of Management thought, Theories of Motivation, Decision making process, Designing organization structure, Principles of organization & Organizational typology.

Unit-II

Operations Management : Principles and Types of Management, Work study-, Statistical Quality Control, Control charts (P-chart, R-chart, and C-chart) Simple problems, Material Management: Need for Inventory control, EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis), Justin- Time(JIT) system, Total Quality, Management(TQM), Six sigma, supply chain management

Unit-III

Functional Management : Concept of HRM, HRD and PMIR, Functions of HR Manager, Wage payment plans(Simple Problems) ,Job Evaluation and Merit Rating ,Marketing Management, Functions of Marketing, strategies based on product Life Cycle, Channels of distributions.

Unit-IV

Project Management: Development of Network, Difference between PERT and CPM, Identifying Critical Path, Probability, Project Crashing (Simple Problems).

Unit-V

Strategic Management : Vision, Mission, Goals, Strategy, Elements of Corporate Planning Process ,Environmental Scanning ,SWOT analysis, Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives, Basic concepts of MIS, ERP, Capability Maturity Model(CMM) Levels, Balanced Score Card.

Text Books:

1. Management Science, Aryasri, Tata McGraw Hill, 2009.
2. Management, James Arthur, Finch Stoner, R. Edward Freeman, and Daniel R. Gilbert, 6th Edition, Pearson Education/Prentice Hall.

References Books:

1. Principles of Marketing: A South Asian Perspective, Kotler Philip, Gary Armstrong, Prafulla Y. Agnihotri, and Eshan ul Haque , 13th Edition, Pearson Education/ Prentice Hall of India, 2010.
2. A Handbook of Human Resource Management Practice, Michael Armstrong, Kogan Page Publishers.
3. Quantitative Techniques in Management, N.D. Vohra, 4th edition, Tata McGraw Hill, 2010.
4. Operations Management: Theory and Practice, B. Mahadevan, Pearson Education, 2010.

Web Links:

1. www.managementstudyguide.com
2. www.citehr.com
3. www.nptel.ac.in/courses/122106032
4. www.btechguru.com/courses--nptel--basic-course

SOFTWARE PROJECT MANAGEMENT
(Professional Elective-IV)
(Common to CSE & IT)

VII Semester
Course Code: 171CS7E13

L T P C
3 1 0 3

Course Objectives:

- COB 1: To teach the basic concepts of software project management activities and project planning steps.
- COB 2: To create awareness on how to plan and manage projects at each stage of the software development life cycle (SDLC).
- COB 3: To provide knowledge on various Effort estimation techniques (COCOMO, SLOC) and tools.
- COB 4: To make the students learn about Risk Management Techniques, Project Monitoring & Control.
- COB 5: To discuss the Software Quality Planning and Metrics.

Course Outcomes:

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

- CO 1: Explain Software Project Management fundamentals and Planning activities.
- CO 2: Compare SDLC models in project framework.
- CO 3: Apply various Effort estimation techniques and tools in real time applications.
- CO 4: Discuss various Risk categories, Project Monitoring Control and Resource Allocation.
- CO 5: Demonstrate the concept Software Quality.

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

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT- I

Introduction: Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals.

Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure.

UNIT- II

Project Approach: Lifecycle models, Choosing Technology, Prototyping Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows.

UNIT- III

Effort estimation & activity Planning: Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis.

UNIT- IV

Risk Management: Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach.

Project Monitoring & Control, Resource Allocation: Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling.

UNIT -V

Software Quality: Planning Quality, Defining Quality - ISO 9126, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality.

Text Books:

1. Software Project Management, Bob Hughes & Mike Cotterell, 5th Edition, TATA Mcgraw-Hill, 2010.
2. Software Project Management, Walker Royce, 2nd Edition, Pearson Education, 2005.
3. Software Project Management in practice, Pankaj Jalote, Pearson Education, 2002.

Reference Books:

1. Software Project Management, Joel Henry, 1st Edition, Pearson Education.
2. Introduction to Software Project Management, Adolfo Villaflorita, 1st Edition, CRC Press, 2014.
3. Essentials of project management and systems engineering management, Howard Eiser, 3rd Edition, Wiley, 2008.
4. Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Harold Kerzner, Winley, 2013.
5. Software Project Management for Dummies, 1st Edition, 2006.

Web Links:

1. [https://onlinecourses.nptel.ac.in/noc18_mg08/preview.](https://onlinecourses.nptel.ac.in/noc18_mg08/preview)
2. <https://www.coursera.org/specializations/product-management>
3. [https://www.tutorialspoint.com/software_engineering/software_project_management.](https://www.tutorialspoint.com/software_engineering/software_project_management)
4. [https://www.scribd.com/doc/7102316/Software-Project-Management.](https://www.scribd.com/doc/7102316/Software-Project-Management)
5. <https://in.udacity.com/course/software-development-process--ud805>

BIG DATA ANALYTICS
(Professional Elective-IV)

VII Semester

Course Code: 171CS7E14

L T P C
3 1 0 3

Course Objectives:

- COB 1: To teach the data structures using java collection framework
- COB 2: To facilitate the students to learn the building blocks of Hadoop
- COB 3: To create awareness on Map Reduce approach to solve data analytics problems
- COB 4: To make the students learn PIG programming tool of Hadoop echo system.
- COB 5: To train the students install and learn Hive and Hive query language.

Course Outcomes:

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

- CO 1: Develop various data structures using java collection framework.
- CO 2: Demonstrate Building blocks of Hadoop.
- CO 3: Choose map reduce approach to solve big data Problems.
- CO 4: Make use of Pig Framework to work with big data.
- CO 5: Utilize Hive to Structure the 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	1	-	3	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	1	3	3	3	-	-	3	3	3
CO3 (K2)	2	1	-	-	2	2	-	-	3	3	2	3
CO4 (K3)	3	2	-	-	3	3	-	-	3	3	3	3
CO5 (K3)	3	2	1	1	3	3	-	-	3	3	3	3

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT- I

Data structures Implementation using Java: Introduction to collections: ArrayList, Linked List, Stack, Queue, Set, Map, Generic classes and methods.

UNIT -II

The Hadoop Distributed File System: The Design of HDFS, HDFS Concepts-Blocks, Name nodes and Data Nodes, Block Caching, HDFS Federation, HDFS high availability, The Command Line Interface-Basic File System Operations or commands.

UNIT - III

Map Reduce: A Weather Dataset –Data Format, Analyzing Data with Unix Tools, Analyzing the Data with Hadoop-Map Reduce, java Map Reduce (Mapper Code, Reducer Code, Driver Code), Combiner functions. Map Reduce Types, Input Format class Hierarchy, other map reduce examples (word count)

UNIT - IV

Pig- Hadoop Programming Made Easier: Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin Checking out the Pig Script Interfaces, Scripting with Pig Latin.

UNIT - V

Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works with examples, Querying and Analyzing Data.

Text Books:

6. Big Java, Cay Horstmann, 4th Edition, John Wiley & Sons, INC, 2008.
7. Hadoop: The Definitive Guide, Tom White, 4th Edition, O'reilly, 2012.
8. Hadoop for Dummies, Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, BruceBrown, RafaelCoss, John Wiley & Sons, 2014.

Reference Books:

1. Hadoop in Practice, Alex Holmes, 2nd Edition, MANNING Publ, 2014.
2. Hadoop Map Reduce Cookbook, SrinathPerera, ThilinaGunarathne, 2nd Edition, Packt Publishing, 2015
3. Learning Spark: Lightning Fast Big Data Analysis Paperback, Holden Karau
4. Hadoop in Action, Chuck Lam, 2nd Edition, MANNING Publ, 2011.

Web Links:

1. Hadoop: <http://hadoop.apache.org/>
2. Hive: <https://cwiki.apache.org/confluence/display/Hive/Home>
3. Piglatin: <http://pig.apache.org/docs/r0.7.0/tutorial.html>
4. <http://nptel.ac.in/courses/106106142/>
5. <https://hortonworks.com/tutorial/how-to-process-data-with-apache-hive/>

IMAGE PROCESSING
(Professional Elective – IV)
(Common to CSE & IT)

VII Semester
Course Code: 171CS7E15

L T P C
3 1 0 3

Course Objectives:

- COB 1: To make the students, learn the fundamental steps in digital image processing.
- COB 2: To discuss the properties of digital image.
- COB 3: To facilitate the students, study how morphology deals with the structures of objects in an image.
- COB 4: To impart the knowledge on image segmentation.
- COB 5: To provide an overview of different image compression methods.

Course Outcomes:

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

- CO 1: Discuss the steps and components of image processing system.
- CO 2: Demonstrate the fundamentals of digital images.
- CO 3: Illustrate the basic properties of digital images
- CO 4: Outline different colour image processing techniques.
- CO 5: Apply morphological image processing operations to process an image.
- CO 6: Interpret an image using different segmentation techniques.
- CO 7: Make use of different types of compression techniques in image data compression.

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 (K5)	3	3	3	3	3	-	-	-	3	3	-	-
CO2 (K2)	2	1	-	-	2	-	-	-	3	3	-	-
CO3 (K2)	2	1	-	-	2	-	-	-	3	3	-	-
CO4 (K2)	2	1	-	-	2	-	-	-	3	3	-	-
CO5 (K3)	3	2	1	1	3	-	-	-	3	3	-	-
CO6(K2)	2	1	-	-	2	-	-	-	3	3	-	-
CO7(K3)	3	2	1	1	3	-	-	-	3	3	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO4(K4)
CO1 (K5)	-	-	3	3
CO2 (K2)	-	-	2	-
CO3 (K2)	-	-	2	-
CO4 (K2)	-	2	-	1
CO5 (K3)	3	-	-	2
CO6 (K2)	-	2	-	-
CO7 (K3)	-	-	3	2

UNIT-I

Introduction: Digital Image Processing, Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system.

Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels

UNIT-II

Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy

Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection, Smoothing Spatial Filters, Sharpening Spatial Filters

UNIT-III

Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

UNIT-IV

Segmentation: Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Merging Region Splitting, Splitting and Merging, Watershed Segmentation.

UNIT-V

Image Data Compression: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

Text Books:

1. Image Processing, Analysis and Machine Vision, Milan Sonka, Vaclav Hlavoc, Roger Boyle, 3rd Edition, Cengage Learning.
2. Digital Image Processing, R C Gonzalez & RE Woods, 2nd Edition, Prentice Hall.

Reference Books:

1. Computer & Machine Vision, Theory, Algorithms, Practicles, E R Davies, 4th Edition, Elsevier.
2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier.
3. Image Processing: The Fundamentals, Maria Petrou, Costas Petrou, 2nd Edition, Wiley publications.

Web Links:

1. <http://nptel.ac.in/courses/117105079/>
2. <http://freevideolectures.com/Course/2316/Digital-Image-Processing-IIT-Kharagpur>
3. <https://www.cs.nmt.edu/~ip/lectures.html>
4. <https://www.robotix.in/tutorial/imageprocessing/basicIp/>
5. <http://nptel.ac.in/courses/117105135/>

CYBER LAWS
(Professional Elective-IV)
(Common to CSE & IT)

VII Semester
Course Code: 171CS7E16

L T P C
3 1 0 3

Course Objectives:

- COB 1: To provide basic understanding of IT act.
- COB 2: To discuss different kinds of cyber crimes and their treatment by IT act 2000.
- COB 3: To impart knowledge on criminal justice in India regarding cyber crimes.
- COB 4: To illustrate methods on how to counter cyber crimes.
- COB 5: To discuss how hackers steal information.
- COB 6: To explain how identity thefting happens.

Course Outcomes:

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

- CO 1: Identify the need for IT acts.
- CO 2: Summarize IT act 2000 and its relevance.
- CO 3: Discuss cyber crimes.
- CO 4: Apply existing tools to counter cyber crimes.
- CO 5: Demonstrate hacking and identity thefting happens.
- CO 6: Describe cyber crimes handled in India.

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 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO5 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO6 (K2)	2	2	1	1	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	-	-	-	-
CO2 (K3)	3	-	-	-
CO3 (K3)	3	3	3	-
CO4 (K3)	-	3	3	-
CO5 (K3)	-	3	-	-
CO6 (K2)	2	2	2	-

UNIT- I

The IT Act, 2000: A Critique: Crimes in this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce?, Forgetting the Line between Cognizable and Non-Cognizable Officers, Arrest for “About to Commit” an Offence Under the IT Act, A Tribute to Darco, Arrest, But No Punishment.

UNIT- II

Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act, 2000: Concept of Cyber Crime and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber fraud and Cyber Cheating, Virus on Internet Deformation, Harassment and E-mail Abuse

Cyber Pornography, Other IT Offences, Monetary Penalties, Adjudication and Appeals Under IT Act 2000, Network Service Providers, Jurisdiction and Cyber Crimes, Nature of Cyber Criminality Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications.

UNIT- III

Digital Signatures, Certifying Authorities and E-Governance: Digital Signatures, Digital Signature Certificate, Certifying Authorities and Liability in the Event of Digital Signature compromise, E-Governance in the India. A Warming to Babudom, Are Cyber Consumers Covered under the Consumer Protection, Goods and Services, Consumer Complaint Defect in Goods and Deficiency in Services Restrictive and Unfair Trade Practices

UNIT- IV

Traditional Computer Crime: Early Hacker and Theft of Components: Traditional problems, Recognizing and Defining Computer Crime, Phreakers: Yesterday’s Hackers, Hacking, Computers as Commodities, Theft of intellectual Property

Web Based Criminal Activity, Interference with Lawful Use of Computers, Malware, DoS (Denial of Service) and DDoS (Distributed Denial of Service) Attacks, Spam , Ransomware and Kidnapping of Information, Theft of Information, Data Manipulation, and Web Encroachment , Dissemination of Contraband or Offensive materials, Online Gambling Online Fraud, Securities Fraud and stock Manipulation, Ancillary crimes

UNIT- V

Identity Theft and Identity Fraud: Typologies of Internet Theft/Fraud, Prevalence and Victimology, Physical Methods of Identity Theft, Virtual and Internet Facilitated methods, Crimes facilitated by Identity theft/fraud, Organized Crime and Technology Protection of Cyber consumers in India Cyber-consumer act Consumer, Goods and service, consumer compliant, restricted and unfair trade practices

Text Books:

1. Cyber Law Simplified, Vivek Sood, 4th edition Tata McGraw Hill.
2. Computer Forensics and Cyber Crime, Marjie T. Britz, 3rd edition Pearson.

Reference Books:

1. Cyber Laws Texts and Cases, Ferrera, 3rd edition CENGAGE India.
2. Cyber Law by Pavan Duggal, 2nd edition Universal law publishing.

Web Links:

1. <https://www.coursera.org/learn/cyber-conflicts>
2. <https://www.cse.iitb.ac.in/~siva/talks/ips2012.pdf>
3. <http://www.cyberlawsindia.net/>
4. medind.nic.in/daa/t10/i1/daat10i1p137.pdf
5. <http://meity.gov.in/content/cyber-laws>

MIDDLEWARE TECHNOLOGIES
(Professional Elective-V)

VII Semester
Course Code: 171CS7E17

L T P C
3 1 0 3

Course Objectives:

- COB 1: To teach the basic concepts of Middleware Technologies.
- COB 2: To enable the students to learn about ASP .NET.
- COB 3: To teach the fundamentals of C#.
- COB 4: To impart the knowledge on Web Services Architectures.
- COB 5: To make use of java beans.

Course Outcomes:

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

- CO 1: Demonstrate the basic concepts of middleware elements.
- CO 2: Develop the middleware application using C#.NET.
- CO 3: Make use of ASP.NET to implement database access.
- CO 4: Compare different web services.
- CO 5: Summarize the concepts of EJB.

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	2	3	2	3	-	-	-
CO2 (K3)	3	2	-	-	3	3	3	3	3	-	-	-
CO3 (K3)	3	2	-	-	3	3	3	3	3	-	-	-
CO4 (K2)	2	1	-	-	2	2	3	2	3	-	-	-
CO5 (K2)	2	1	-	-	2	2	3	2	3	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	2	2	-	-
CO2 (K3)	3	3	-	-
CO3 (K3)	3	3	3	-
CO4 (K2)	-	-	2	-
CO5 (K2)	-	-	-	-

UNIT - I

Emergence of Middleware: Introduction, Objects, Web Services, Middleware Elements, Vendor, Architecture, interoperability, Middleware in distributed applications, Types of Middleware, RMI, JDBC, Client/Server CORBA Style.

UNIT- II

Fundamentals of C# & .NET platform: Comprehensive .NET Assemblies, OOPs with C#, Attributes, Reflection, Properties, Indexers ,Delegates ,Events, Collections, Generics, Anonymous Methods, Unsafe Codes and Multithreading.

UNIT - III

ASP.NET: Introduction, Lifecycle, Server Controls, Basic Controls, Directives, Validators, Database Access, ADO. Net, File Uploading, Data Sources, Data Binding, Custom Controls, Security, Data Caching, Multithreading, Deployment.

UNIT- IV

Web Services: Introduction, Architecture, Components, Security, XML Web Service Standards, Creating Web Services, Extending Web Services, Messaging Protocol, describing, discovering, securing.

UNIT V

EJB: Java Bean Component Model, EJB Architecture, Session Bean, Java Message Service, Message Driven Bean, Entity Bean.

Text Books:

1. Engineering Distributed Objects, Wolfgang EmmerichJohn, Wiley, 2000.
2. ASP.net web developer guide, Mesbah Ahmed, Chris Garrett, Jeremy Faircloth, Chris Payne, DotThatCom.com, Wei Meng Lee (Series Editor), Jonothan Ortiz (Technical Editor), Syngress Publications, 2001.

Reference Books:

1. C# and the .NET Platform, Andrew Troelsen, Apress Wiley-dreamtech, India Pvt.Ltd, 2011.
2. NET Web Services-Architecture and Implementation, Keith Ballinger, Pearson Education, 2002.

Web Links:

6. http://sunset.usc.edu/~neno/cs477_2003/april8.pdf
7. <http://middlewaretutorial.com/>
8. https://www.tutorialspoint.com/software_architecture_design/distributed_architecture.htm

**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(Professional Elective-V)**

VII Semester
Course Code: 171CS7E18

L T P C
3 1 0 3

Course Objectives:

- COB 1: To enable students to differentiate optimal reasoning vs human like reasoning.
- COB 2: To make the students aware of AI problem solving techniques.
- COB 3: To discuss with students about the propositional logic.
- COB 4: To facilitate the students to study various learning models.
- COB 5: To demonstrate the reduction techniques.

Course Outcomes:

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

- CO 1: Describe the fundamentals of Artificial Intelligence and its applications.
- CO 2: Analyze the time and space complexities of searching techniques.
- CO 3: Apply various logical systems to inference the different logical problems.
- CO 4: Identify the machine learning techniques.
- CO 5: Employ the reduction 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 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
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 (K3)	PSO 4 (K4)
CO1 (K2)	-	-	-	-
CO2 (K3)	3	-	3	-
CO3 (K3)	3	3	3	2
CO4 (K3)	-	3	3	2
CO5 (K3)	3	3	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**Introduction:**

Well-Posed Learning Problems, Designing a Learning System, Perspectives and Issues in Machine Learning.

Bayesian Learning:

Introduction, Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and Least-Squared Error Hypothesis, Maximum Likelihood Hypothesis for Predicting Probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naive Bayes Classifier, Bayesian Belief Networks.

UNIT-V**Model ensembles:**

Bagging and random forests, Boosting.

Dimensionality Reduction:

Principal Component Analysis (PCA), Implementation and demonstration.

Text Books:

1. Artificial Intelligence, Saroj Kaushik, Cengage Learning, 1st Edition, 2011.
2. Machine Learning, Tom M. Mitchell, MGH, 1st Edition, 1997.

Reference Books:

1. Artificial Intelligence, Rich, Kevin Knight, Shiy Shankar B Nair, TMH, 3rd Edition, 2009.
2. Artificial intelligence: A modern Approach, Stuart Russel, Peter Norvig, PEA, 2nd Edition, 2010.
3. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge, 1st Edition, 2012.

4. Machine Learning for absolute beginners, Oliver Theobald, Scatterplotpress, 2nd Edition, 2012.
5. Introduction to Machine Learning, Ethem Alpaydm, The MIT Press, 2nd Edition, 2010.
6. Machine Learning in Action, Peter Harrington, Cengage, 1st Edition, 2012.

Web Links:

5. https://onlinecourses.nptel.ac.in/noc17_cs30/
6. <https://in.udacity.com/course/intro-to-artificial-intelligence--cs271/>
7. https://onlinecourses.nptel.ac.in/noc17_cs17/
8. <https://www.coursera.org/learn/machine-learning/>
9. <https://in.udacity.com/course/intro-to-machine-learning--ud120/>

INFORMATION RETRIEVAL SYSTEMS
(Professional Elective-V)
(Common to CSE & IT)

VII Semester
Course Code: 171CS7E19

L T P C
3 1 0 3

Course Objectives:

- COB 1: To make the students learn the basic concepts of Information Retrieval (IR) process.
- COB 2: To impart the knowledge on different information retrieval system capabilities.
- COB 3: To discuss on different indexing data structures used in IR process.
- COB 4: To facilitate the students learn PAT trees for efficient Text Searching.
- COB 5: To make the students apply stemming algorithms to improve the performance of IR system.
- COB 6: To demonstrate Document and Term Clustering to assist the user in identifying relevant information.

Course Outcomes:

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

- CO 1: Apply Information Retrieval principles to locate relevant information in large collections of data.
- CO 2: Summarize the functions in Information system.
- CO 3: Make use of Inverted file data structure in IR process.
- CO 4: Analyze the different signature based text retrieval methods.
- CO 5: Describe various algorithms for text searching in PAT tree.
- CO 6: Utilize different stemming algorithms in Information Retrieval.
- CO 7: Discuss various techniques to create Thesaurus clusters.

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	-	-	-	-	-	-	-
CO2 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO3 (K3)	3	2	1	-	-	3	-	-	-	-	-	-
CO4 (K4)	3	3	2	2	-	-	-	-	-	-	-	-
CO5 (K2)	2	1	-	-	-	2	-	-	-	-	-	-
CO6 (K3)	3	2	1	1	-	3	-	-	-	-	-	-
CO7 (K2)	2	1	-	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	3	3	3	2
CO2 (K2)	2	2	-	-
CO3 (K3)	3	3	-	-
CO4 (K4)	3	3	-	3
CO5 (K2)	2	2	2	-
CO6 (K3)	3	3	3	2
CO7 (K2)	3	3	-	-

UNIT - I

Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

UNIT- II

Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities.

Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array.

UNIT- III

Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

UNIT- IV

PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

Stemming Algorithms: Introduction, Types of Stemming Algorithms.

UNIT - V

Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters.

Text Books:

1. Information Retrieval Data Structures and Algorithms, William B.Frakes, Ricardo Baeza –Yates, 4th Edition, Pearson, 2008.
2. Information Retrieval Systems: Theory and Implementation, Gerald J. Kowalski, Mark T. Maybury, 2nd Edition, Springer, 2013.

Reference Books:

1. Modern Information Retrieval, Yates, Pearson.
2. Information Storage & Retrieval, Robert Korfhage, John Wiley & Sons.
3. Information retrieval Algorithms and Heuristics, 2nd Edition, Springer.

Web Links:

1. <https://swayam.gov.in/course/4185-information-storage-and-retrieval>
2. <http://nlp.stanford.edu/IR-book/information-retrieval-book.html>
3. <http://www.cse.iitb.ac.in/~soumen/mining-the-web/>
4. <http://www.cs.bilkent.edu.tr/~canf/CS533/>
5. <http://www.inf.unibz.it/~ricci/ISR/>

**MOBILE COMPUTING
(Professional Elective – V)**

VII Semester
Course Code: 171CS7E20

L T P C
3 1 0 3

Course Objectives:

- COB 1: To make the students learn basic concepts and principles in Wireless Network.
- COB 2: To demonstrate the GSM and GPRS architecture in Mobile Network environment.
- COB 3: To describe the various Medium Access Control techniques in Wireless Network.
- COB 4: To explain the various roles of Mobile IP in Wireless Network.
- COB 5: To describe the Routing, Data Transmission protocols and data dissemination services.
- COB 6: To illustrate the Application Layer Protocols.

Course Outcomes:

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

- CO 1: Describe the basic concepts and principles in mobile computing.
- CO 2: Identify the various subsystems in GSM and GPRS architecture.
- CO 3: Illustrate the concept of Medium Access Control Mechanisms.
- CO 4: Apply Mobile IP in Wireless environment to handle packet delivery during mobility.
- CO 5: Compare Traditional TCP and Modified TCP
- CO 6: Discuss various database issues and data delivery mechanisms in mobile environment.
- CO 7: Summarize various Data Synchronization Protocols.
- CO 8: Analyze the various Routing Techniques in MANET.
- CO 9: Describe the Protocols and Platforms for Mobile 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	-	-	2	-	-	-	-	-	-	-
CO2 (K2)	-	-	-	-	-	-	3	-	-	-	-	-
CO3 (K2)	2	-	-	-	2	2	3	2	-	-	-	-
CO4 (K3)	3	2	1	1	3	3	3	-	3	3	-	-
CO5 (K2)	-	-	-	-	-	2	-	-	-	-	-	-
CO6 (K2)	2	1	-	-	2	-	3	-	3	3	-	-
CO7 (K2)	2	1	-	-	2	2	-	-	-	3	-	-
CO8 (K4)	3	3	2	2	3	3	3	3	-	3	-	-
CO9 (K2)	2	1	-	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	-	-	2	-
CO2 (K2)	2	2	2	-
CO3 (K2)	2	2	2	1
CO4 (K3)	3	3	3	-
CO5 (K2)	-	-	2	-
CO6 (K2)	2	2	2	1
CO7 (K2)	-	-	2	-
CO8 (K4)	3	3	3	3
CO9 (K2)	2	2	2	-

UNIT - I

Mobile Communications: Mobile Communication, Mobile Computing:- Novel Applications, Limitations of Mobile Computing, Mobile Computing Architecture, Mobile Devices, Handheld Devices, Limitations of Mobile Devices.

GSM–Services, System Architecture, Radio Interfaces of GSM, Protocols of GSM, Localization, Call Handling, Handover, Security, New Data Services, General Packet Radio Service.

UNIT – II

Medium Access Control (MAC): Motivation for a specialized MAC: Hidden and exposed terminals, near and far terminals, SDMA, FDMA, TDMA and CDMA.

Mobile Network Layer: Mobile IP: Goals, assumptions and requirements, Entities and terminology, IP Packet Delivery Agent discovery, Registration, Tunnelling and encapsulation, Optimizations, Reverse tunnelling, Dynamic Host Configuration Protocol.

UNIT – III

Mobile Transport Layer: Traditional TCP, Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation.

UNIT - IV

Data Dissemination: Communication Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing techniques.

Data Synchronization: – Synchronization, Synchronization Software, Synchronization Protocols.

UNIT - V

Mobile Ad hoc Networks: Introduction to Mobile Ad-hoc Network, MANET: Properties, Applications, Routing and Routing Algorithms (Algorithms such as DSR, AODV, DSDV, etc.), Mobile Agent, Service Discovery.

Protocols & Platforms for Mobile Computing: WAP, Bluetooth-enabled Devices Network, XML, J2ME, JavaCard, PalmOS, Windows CE, Symbian OS, Android.

Text Books:

1. Mobile Communications, Jochen H. Schiller, 2nd Edition, Pearson, 2009.
2. Mobile Computing, Raj Kamal, 2nd Edition, Oxford University Press, 2007.

Reference Books:

1. Mobile Computing, Technology Applications and Service Creation, Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, 2nd Edition, Mc Graw Hill.
2. Handbook of Wireless Networks and Mobile Computing, Ivan Stojmenovic, Wiley. 2002.

Web Links:

1. <https://www.coursera.org/browse/computer-science>
2. <https://www.tutorialspoint.com/gsm>
3. https://sgar91.files.wordpress.com/2011/10/mobile_communications_schiller_2e.pdf
4. <https://www.sciencedirect.com/science/article/pii/S1877050915019882>
5. http://www.dauniv.ac.in/downloads/Mobilecomputing/MobileCompChap06L01UD_P&TCP.pdf

UML AND DESIGN PATTERNS LAB

VII Semester
Course Code: 171CS7L12

L T P C
0 0 3 2

Course Objectives:

- COB 1: To introduce the concept of Object-oriented design.
- COB 2: To make the students learn the problems of complex systems, evolution of object-oriented model, classes, object-oriented methodology and its notations.
- COB 3: To impart the knowledge on designing Use-Case and Interactive diagrams that capture requirements for a software system.
- COB 4: To nurture the students with design model of a software system using activity and state chart diagrams.
- COB 5: To provide knowledge on how to design a system with applications, case studies and CASE tools.

Course Outcomes:

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

- CO 1: Show the importance of system analysis and design in solving complex problems.
- CO 2: Compare object-oriented approach with traditional approach in system analysis and design.
- CO 3: Analyze the importance of modeling and design of various applications.
- CO 4: Construct various UML models using appropriate notations.
- CO 5: Compare and Contrast various object relationships.
- CO 6: Show the role and function of each UML model in developing object-oriented software.
- CO 7: Apply the Rational Software Suit for the construction of UML 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	-	-	2	2	-	-	-	-	-	-
CO2 (K2)	2	1	-	-	2	2	-	-	-	-	-	-
CO3 (K4)	3	3	2	-	3	3	-	-	-	-	-	-
CO4 (K3)	3	2	1	-	3	3	-	-	-	-	-	-
CO5 (K2)	2	1	-	-	2	2	-	-	-	-	-	-
CO6 (K2)	2	1	-	-	2	2	-	-	-	-	-	-
CO7 (K3)	3	2	1	-	3	3	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	-	2	-	-
CO2 (K2)	-	-	-	-
CO3 (K4)	3	3	3	3
CO4 (K3)	3	3	3	-
CO5 (K2)	-	-	-	-
CO6 (K2)	-	-	-	-
CO7 (K3)	3	3	-	-

List of Case Studies:

Choose any two case studies and Implement, the experiments,

- 1) ATM Application.
- 2) Library Management System.
- 3) Online Book Shop.
- 4) Customer Support System.
- 5) Point of Sale.

List of Experiments:

- 1) Familiarization with Rational Rose
- 2)
 - 2.1) Identify and analyze events
 - 2.2) Identify Use cases
- 3)
 - 3.1) Develop event table
 - 3.2) Identify & analyze domain classes
- 4)
 - 4.1) Represent use cases and a domain class diagram using Rational Rose
 - 4.2) Develop CRUD matrix to represent relationships between use cases and problem domain classes
- 5)
 - 5.1) Develop Use case diagrams
 - 5.2) Develop Use case descriptions & scenarios
- 6)
 - 6.1) Develop system sequence diagrams and generate Collaboration diagrams
 - 6.2) Develop high-level sequence diagrams and generate Collaboration diagrams
 - 6.3) Develop Detailed Sequence Diagrams / Communication diagrams and generate Collaboration diagrams ,showing interactions among all the three-layer objects
- 7)
 - 7.1) Develop Use case Packages.
 - 7.2) Develop sample diagrams for other UML diagrams - state chart diagrams, and activity diagrams

7.3) Develop component diagrams and deployment diagrams

Design Pattern Experiments:

- 8) Using UML, design Abstract factory and Builder patterns.
- 9) Using UML, design Facade pattern.
- 10) Using UML, design Bridge and Proxy patterns.
- 11) Using UML, design Decorator and Command patterns.
- 12)**
 - 12.1) Using UML, design Iterator pattern.
 - 12.2) User gives a print command from a word document. Design to represent this chain of responsibility design pattern.

List of Augmented Experiments:

(Any 2 of the following experiments can be performed)

Design all UML models for the following Case studies.

- 13) Leave Management System(LMS)
- 14) Online Drug Store
- 15) Online Movie ticket Booking System.
- 16) Develop CRUD Matrix to represent relationship between Use Cases and domain classes.

Reference Books:

1. Object-oriented analysis and design using UML, Mahesh P. Matha, PHI.
2. Head first object-oriented analysis and design, Brett D. McLaughlin, Gary Pollice, Dave West, O'Reilly.
3. Object-oriented analysis and design with the Unified process, John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning
4. The Unified modeling language Reference manual, James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley.
5. Object Oriented Analysis & Design, Atul Kahate, The McGraw-Hills Companies

Web Links:

1. <https://www.geeksforgeeks.org/unified-modeling-language-uml>
2. <https://www.quora.com/in/What-are-the-best-websites-to-study-UML-for-beginners>
3. <https://www.coursera.org/learn/object-oriented-design/lecture/6GJtg/1-1-3-object-oriented-modeling>
4. <https://www.tutorialspoint.com/uml/index.htm>
5. <https://repository.genmymodel.com/okasha/udacity>

BIG DATA ANALYTICS LAB
(Common to CSE & IT)

VII Semester
Course Code: 171CS7L13

L T P C
0 0 3 2

Course Objectives:

- COB 1: To impart knowledge on linear and non linear data structures.
- COB 2: To enable the students installing hadoop in various modes.
- COB 3: To train the students adding, retrieving and deleting files in hadoop file system.
- COB 4: To help the students write map reduce approach for solving big data problems.
- COB 5: To impart knowledge on Pig Latin
- COB 6: To illustrate the students handle big data using Hive

Course Outcomes:

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

- CO 1: Develop linear and nonlinear data structures using Java Collection framework
- CO 2: Build the Hadoop Cluster using various installation modes.
- CO 3: Apply hadoop commands to interact with HDFS.
- CO 4: Solve Big Data Problems using Map Reduce approach
- CO 5: Analyse the big data using Pig Latin
- CO 6: Build queries using Hive Query Language

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	-	1	-	3	-	-	-	-	-	-	3
CO4 (K3)	3	2	1	1	3	3	3	-	3	3	3	3
CO5 (K4)	3	3	2	2	3	3	3	-	3	3	3	3
CO6 (K3)	3	2	1	1	3	3	3	-	3	3	3	3

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO1(K3)	PSO2(K3)	PSO3(K3)	PSO4(K4)
CO1 (K3)	3	3	-	-
CO2 (K3)	3	-	-	-
CO3 (K3)	3	3	-	2
CO4 (K3)	3	-	3	2
CO5 (K4)	3	-	3	3
CO6 (K3)	3	3	-	2

List of Experiments:**1) Linear Data Structures**

- 1.1) Implement the following Data structures using Java
a) Linked Lists b) Stacks c) Queues

2) Non-Linear Data Structures

- 2.1) Implement the following Data structures using Java
a) Set b) Map

3) Hadoop Standalone mode Installation

- 3.1) Perform setting up and Installing Hadoop in the Standalone mode.

4) Hadoop Pseudo distributed mode Installation

- 4.1) Perform setting up and Installing Hadoop in the Pseudo distributed mode.

5) Fully Distributed Mode

- 5.1) Installing Hadoop in the Fully distributed mode.

6) Hadoop File System Operations

- 6.1) Implement the following file management tasks in Hadoop:
i. Adding files and directories
ii. Retrieving files
iii. Deleting files

7) MapReduce-WordCount

- 7.1) Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

8) MapReduce Weather DataSet

- 8.1) Write a Map Reduce Application to find the maximum temperature in the weather dataset.

9) PigLatin Script

- 9.1) Install Pig Latin Software
9.2) Develop Pig Latin scripts to load the data and sort your data.

10) PigLatin Script

- 10.1) Develop Pig Latin scripts to group, join, project, and filter the data.

11) Hive Queries

- 11.1) Install Hive Framework
11.2) Implement Hive to create, alter, and drop databases, tables

12) Hive Queries

- 12.1) Implement hive queries and joins to perform display and retrieve the data

List of Augmented Experiments:
(Any 2 of the following experiments can be performed)

- 13) Create an application using Sets for the following case.
The application reads all words from a dictionary file that contains correctly spelled words and places them in a set. It then reads all words from a document and place in set. Finally, it prints all words from that set that are not in the dictionary set. These are the potential misspellings. (As you can see from the output, we used an American dictionary, and words with British spelling, such as clamour, are flagged as potential errors.).
- 14) Perform YouTube Data Analysis and find out what are the top 10 rated videos on YouTube, who uploaded the most number of videos.
- 15) Analyze Patient data set and perform queries using Hive
- 16) Analyze Banking data set and perform queries using PigLatin

Reference Books:

6. Big Java, Cay Horstmann, 4th Edition, John Wiley & Sons, INC ,2008
7. Hadoop: The Definitive Guide, Tom White, 3rd Edition, O'reilly, 2012-01-27.
8. Hadoop in Action, Chuck Lam, 2nd Edition, MANNING Publ,2011
9. Hadoop for Dummies, Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss, John Wiley & Sons ,2014
10. Hadoop in Practice, Alex Holmes, 2nd Edition MANNING Publ.

Web Links:

1. Hadoop: <http://hadoop.apache.org/>
2. <https://cwiki.apache.org/confluence/display/Hive/Home>
3. <http://pig.apache.org/docs/r0.7.0/tutorial.html>
4. <http://nptel.ac.in/courses/106106142/>
5. <https://hortonworks.com/tutorial/how-to-process-data-with-apache-hive/>

INDUSTRY ORIENTED (INTERNSHIP) MINOR PROJECT

VII Semester	L	T	P	C
Course Code: 171CS7P01	0	0	0	1

Guidelines:

1. The thrust of minor project is to develop ethnographical skills, comprising a group of 3-4 students intended to develop/design a software product.
2. The software product may be an App/Service/Embedded application covering the various domains in software industry.
3. It should adhere to Software Paradigms, Algorithms, Databases and Testing principles.
4. The team should make a detailed literature survey about the selected problem/software methodology/approaches or environment (GUI, WUI) and identify a suitable title of the problem specifying the desired goals.
5. The peers/team should submit an abstract/synopsis within two weeks after commencement of semester.
6. The team should develop specification and design methodologies, required tools and languages or API for successful development/deployment of product/project exerting professional, innovative and creativity.
7. The student should scrupulously study, design, develop, test and deliver the product within the industry specified time.
8. The student can choose any of current technologies catering broadly Machine Learning, Deep Learning, AI and Robotics, IoT, Cloud Computing, Data mining, Big data and analytics, Cryptography techniques.

Internship Objectives:

- COB 1: To inculcate student with professional skills expected in industry.
- COB 2: To equip the student with the knowledge in suitable domain.
- COB 3: To expose students with leadership skills, team work and professional code of conduct.
- COB 4: To mould a student focusing on work ethics and dedication towards society and in working environment.
- COB 5: To make a student apply technical expertise in automating real world problems.

Internship Outcomes:

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

- CO 1: Relate the domain knowledge to solve a real world problem.
- CO 2: Apply tools/techniques/programming languages used in software industry.
- CO 3: Make use of real time tools, software practices and upcoming technologies with a broader pursuit of knowledge.
- CO 4: Compare and contrast the gap between industry and academic institution level.
- CO 5: Adapt the technical expertise and skills in the working environment towards the academic progression.
- CO 6: Adapt to work as a team, gaining leadership and adhering professional ethics in presenting the results in written and oral formats.

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)	2	1	-	-	2	2	3	-	-	-	-	-
CO 2(K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO 3(K3)	3	2	1	1	3	3	3	-	-	-	-	3
CO 4(K4)	-	-	-	-	-	-	3	3	-	-	3	-
CO 5(K6)	-	-	-	3	-	3	-	-	-	-	-	-
CO 6(K6)	-	-	-	-	-	-	-	3	3	-	3	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 3 (K4)
CO 1(K2)	2	2	2	1
CO 2(K3)	2	2	2	1
CO 3(K3)	2	2	2	1
CO 4(K4)	-	-	-	-
CO 5(K6)	-	-	3	-
CO 6(K6)	-	-	-	-

AGILE METHODOLOGIES
(Professional Elective VI)
(Common to CSE & IT)

VIII Semester
Course Code: 171CS8E21

L T P C
3 1 0 3

Course Objectives:

- COB 1: To discuss about origins and motivations of the Agile Manifesto.
- COB 2: To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
- COB 3: To interpret the various Agile models with software developments
- COB 4: To Provide practical knowledge of how to develop Sprint and extract the User Stories
- COB 5: To discuss the importance of Product Backlog and Estimations in the Scrum project
- COB 6: To Provide practical knowledge of how to manage a project using Scrum framework.

Course Outcomes:

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

- CO 1: Compare the Agile Model with Traditional Models
- CO 2: Summarize the Agile Manifesto.
- CO 3: Demonstrate the various Agile Software Development Process Models.
- CO 4: Model the Sprint framework in Agile environment.
- CO 5: Create User Stories for software requirements in Agile Software Development.
- CO 6: Identify the role of Product Backlog and Estimations for each Sprint.
- CO 7: Organize the plans for each Sprint in the Scrum Framework.

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 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO3 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO4 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO5 (K6)	3	3	3	3	3	-	-	-	-	-	-	-
CO6 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO7 (K3)	3	2	1	1	3	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K2)	-	-	-	-
CO2 (K2)	-	-	-	-
CO3 (K2)	2	-	-	-
CO4 (K3)	3	-	3	-
CO5 (K6)	3	-	3	-
CO6 (K3)	3	-	3	-
CO7 (K3)	3	-	-	-

UNIT-I

Agile Methodology: Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model – Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams – Agility in Design, Testing – Agile Documentations.

Project Part 1:

Team Formation and Product Inception

UNIT-II

Agile Software Development Ecosystems: SCRUM, Dynamic System Development Method, Crystal, Feature Driven Development- Lean Development – Extreme Programming- Adaptive Software Development.

Project Part 2:

Survey on Agile Software development Methodologies and present a report of 10-15 pages

UNIT-III

Backdrop-The Science of Scrum: The Skelton and Heart of Scrum, Scrum Roles, Scrum Flow, Scrum Artifacts

New Management Responsibilities: The Scrum Master at MetaEco, The Product Owner at MegaEnergy, The team at Service1st.

The Scrum Master: The Untrained Scrum Master at Trey Research, The Untrained Scrum Master at LitWare

Project Part 3:

Write the User Stories for your own project

UNIT-IV

The Product Owner: Customer and team Collaboration, Getting Service 1st Management Back In Action, Fixing the problem of Xflow at Megafund, Company Goals at Techcore, Company Goals at Mega Bank Fund Transfer System

Planning A Scrum Project: Managing Cash at Mega Bank, Certified Scrum Masters Take on Return On Investment

Project Part 4:

Create a Product Backlog for the same project and Estimate in # Sprints (small in size).

UNIT-V

The Team: Team Formation at Service1ST, Giving the team a Chance at Web New Site.

Scaling the Project with Scrum: Scaling at Mega Fund, Scrum Scaling, Scaling at Medcinsoft.

Rules: Sprint Planning Meeting, Daily Scrum Meeting, Sprint, Sprint Review Meeting, Sprint Retrospective meeting.

Text Books:

1. Agile Project Management With Scrum, Ken Schwaber, Microsoft Press
2. Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Hazza and Dubinsky, Springer
3. Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, David J. Anderson and Eli Schragenheim, Prentice Hall

Reference Books:

1. Agile Software Development- Evaluating the methods for your organizations, Alan S.Koch, Artech House.
2. Agile Software Development, Cockburn, Highsmith, Alistair Cockburn Series.
3. Agile Estimating and Planning, Mike Cohn, Prentice Hall
4. Agile Software Development Ecosystems–: Jim Highsmith, Addison Wisley.
5. Essential Scrum- A Practical Guide to the Most Popular Agile Process, Kenneth S.Rubin, Addison Wisley.

Web Links:

1. <https://www.edx.org/course/agile-software-development>
2. <https://www.class-central.com/course/coursera-agile-software-development-9513>
3. <https://www.cprime.com/resources/what-is-agile-what-is-scrum/>
4. <https://www.atlassian.com/agile/kanban>
5. https://file.scirp.org/pdf/JCC_2017033115471602.pdf

CYBER SECURITY
(Professional Elective VI)
(Common to CSE & IT)

VIII Semester
Course Code: 171CS8E22

L T P C
3 1 0 3

Course Objectives:

- COB 1: To Demonstrate cybercrime fundamentals.
- COB 2: To Inspect cyber offence planning.
- COB 3: To Discuss with student about cybercrime on mobile and wireless devices.
- COB 4: To Inspect cybercrime methods and tools.
- COB 5: To Know Importance of cyber security and cyber laws.

Course Outcomes:

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

- CO 1: Illustrate cybercrime fundamentals.
- CO 2: Analyze cyber offence planning.
- CO 3: Interpret cybercrime on mobile and wireless devices.
- CO 4: Distinguish type of tools and methods used in cyber crimes.
- CO 5: Explain the importance of cyber security.

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)
CO 1(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 2(K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO 3(K5)	3	3	3	3	3	-	-	-	-	-	-	-
CO 4(K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO 5(K2)	2	1	-	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO 1(K2)	2	-	-	-
CO 2(K4)	3	3	-	-
CO 3(K5)	3	3	3	-
CO 4(K4)	-	-	3	-
CO 5(K2)	-	-	2	-

UNIT-I

Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

UNIT-II

Cyber offenses: How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT-III

Cybercrime Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT-IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT-V

Cybercrimes and Cyber security: Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program, Continuing Strategies.

Text Books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, SunitBelapure, 1st edition, Wiley.
2. Principles of Information Security, Micheal E.Whitman and Herbert J.Mattord, 4th edition, Cengage Learning.

Reference Books:

1. Information Security, Mark Rhodes, Ousley, 2nd edition, MGH.

Web Links:

1. <https://www.edx.org/micromasters/ritx-cybersecurity>.
2. <https://www.coursera.org/specializations/cyber-security>.
3. <https://www.nptel.ac.in/courses/106105031/>.
4. <http://bedford-computing.co.uk/learning/wp-content/uploads/2016/08/Principles-of-Information-Security-4th-ed.-Michael-E.-Whitman.pdf>
5. <https://www.wileyindia.com/cyber-security-understanding-cyber-crimes-computer-forensics-and-legal-perspectives.html>

DISTRIBUTED DATABASES
(Professional Elective VI)
(Common to CSE & IT)

VIII Semester
Course Code: 171CS8E23

L T P C
3 1 0 3

Course Objectives:

- COB 1: To impart the concepts of Distributed and Centralized Databases.
- COB 2: To enable with the principles of Query transformation and Optimization techniques.
- COB 3: To nurture with precepts of transaction management in distributed database.
- COB 4: To discuss the concurrency control concepts in distributed systems.
- COB 5: To familiarize the basics concepts of reliability and inconsistency problems of distributed database systems.

Course Outcomes:

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

- CO 1: Outline the features and principles Develop system architecture based on distributed databases.
- CO 2: Solve transforming a global query into local query using optimizing techniques.
- CO 3: Summarize the distributed transaction management principles.
- CO 4: Explain various distributed concurrency control techniques.

- CO 5: Evaluate the Non-blocking Commitment Protocols.

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	1	-	-	-	2	-	-	-	-	-	-
CO2(K3)	3	2	1	1	3	3	-	-	-	-	-	-
CO3(K2)	2	-	-	-	-	2	3	-	-	-	-	-
CO4(K2)	2	1	-	-	2	2	3	-	-	-	-	-
CO5(K5)	3	3	3	3	-	3	3	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1(K2)	2	2	2	-
CO2(K3)	3	3	3	2
CO3(K2)	2	2	2	1
CO4(K2)	-	-	-	-
CO5(K5)	3	3	3	-

UNIT- I

Introduction: Features of Distributed versus Centralized Databases, Principles of Distributed Databases, Reference Architecture for Distributed Databases, Types of data fragmentation

UNIT-II

Translation of Global Queries to Fragment Queries: Equivalence Transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation

Query Optimization: Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries.

UNIT-III

The Management of Distributed Transactions: A frame work for transaction management, supporting atomicity of transactions, Concurrency Control for Distributed Transactions.

UNIT-IV

Concurrency Control: Distributed Deadlocks, Concurrency Control based on Timestamps, optimistic methods for Distributed Concurrency Control.

UNIT-V

Reliability: Basic Concepts, Non-blocking Commitment Protocols, Reliability and concurrency Control, Detection and Resolution of Inconsistency.

Text Books:

1. Distributed Database Principles & Systems, Stefano Ceri, Giuseppe Pelagatti, 1st Edition, MGH, 1984.

Reference Books:

1. Principles of distributed database, M. Tamer Ozsu, Patrick Valdariez, 3rd Edition, Springer, 2011.
2. Chanda Ray Distributed Database Systems, Pearson Publications.
3. Andrew S Tanenbaum and Maarten Van Steen Distributed Systems Principles and Paradigms, 2nd edition, PHI, 2006.
4. Distributed Systems Concepts and Design, Jean Dollimore, Tim Kindberg and George Coulouris, Addison Wesley, 4th Edition, 1996.

Web Links:

1. <https://nptel.ac.in/syllabus/106106093>.
2. https://www.tutorialspoint.com/distributed_dbms.
3. <https://www.geeksforgeeks.org/distributed-database-system>.

DISTRIBUTED SYSTEMS
(Professional Elective VI)

VIII Semester
Course Code: 171CS8E24

L	T	P	C
3	1	0	3

Course Objectives:

- COB 1: To demonstrate the fundamentals of distributed systems.
- COB 2: To make the students learn different System Models.
- COB 3: To impart the knowledge on IPC mechanisms in distributed systems.
- COB 4: To facilitate the students understand Remote Procedure Calls.
- COB 5: To enable the students know the importance of Operating System in Distributed Systems.
- COB 6: To provide knowledge on Transactions and Replications.

Course Outcomes:

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

- CO 1: Demonstrate the basic concepts of distributed systems.
- CO 2: Analyze the Various System Models in distributed systems.
- CO 3: Illustrate the Inter process Communication used in TCP and UDP.
- CO 4: Compare RMI with RPC in the implementation of Remote Invocations.
- CO 5: Summarize Operating System support.
- CO 6: Discuss the Distributed File Systems.
- CO 7: Organize the processes to coordinate their actions and agree on shared values in distributed systems.
- CO 8: Relate the Transactions and Replications with real time examples.

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	-	-	-	-	-	-	-	-	-
CO2 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO3 (K2)	2	1	-	-	3	-	-	-	-	-	-	-
CO4 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO5 (K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO6 (K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO7 (K3)	3	2	1	1	3	3	-	-	-	-	-	-
CO8 (K2)	2	1	-	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1 (K3)	-	-	3	-
CO2 (K4)	3	3	3	3
CO3 (K2)	2	-	2	1
CO4 (K2)	2	2	3	-
CO5 (K2)	-	2	2	-
CO6 (K2)	2	2	2	-
CO7 (K3)	3	3	2	2
CO8 (K2)	2	2	-	1

UNIT-I

Characterization of Distributed Systems: Introduction, Examples of distributed systems, Resource sharing and the Web, Challenges.

System Models: Introduction, Architectural models, Fundamental models.

UNIT-II

Interprocess Communication: Introduction, The API for the Internet protocols, External data representation and marshalling, Client-server communication, Group communication.

UNIT-III

Distributed Objects and Remote Invocation: Introduction, Communication between distributed objects, Remote procedure call, Events and notifications, Case Study: JAVA RMI

UNIT-IV

Operating System Support: Introduction, The Operating system layer, Protection, Processes and threads.

Distributed File Systems: Introduction, File service architecture, Peer-to-Peer Systems- Introduction, Napster and its legacy, Peer-to-Peer Middleware, Routing overlays.

UNIT-V

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

Transactions & Replications:

Introduction, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery, Replication-Introduction, System Model and Group Communication, Fault-tolerant services.

Text Books:

1. Distributed Systems- Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, 4th Edition, Pearson Publication.
2. Distributed Computing, Principles, Algorithms and Systems, Ajay D Kshemkalyani, Mukesh Sighal, Cambridge, University Press, 2011.

Reference Books:

1. Distributed Computing – Principles and Applications, M.L. Liu, Addison-Wesley, Pearson Education, 2004.
2. Distributed Systems- Principles and Paradigms, Tanenbaum A.S., Van Steen M., Pearson Education, 2007.
3. Distributed Computing: Fundamentals, Simulations and Advanced Topics, Hagit Attiya and Jennifer Welch, Wiley, 2004.
4. Distributed Algorithms, Nancy A Lynch, Morgan Kaufman publishers, USA, 2003.

Web Links:

1. nptel.ac.in/courses/106106168/
2. <http://db.uwaterloo.ca/~tozsu/courses/cs454>
3. <http://cse.iitkgp.ac.in/~agupta/distsys/index.html>
4. <http://www.cis.upenn.edu/~lee/03cse380/lectures/ln19-ds-v3.4pp.pdf>
5. <http://www.cloudbus.org/652/LectureSlides.html>

MICROPROCESSOR AND MULTI CORE SYSTEMS
(Open Elective)
(Common to CSE & IT)

VIII Semester

Course Code: 171CS8O01

L T P C
3 1 0 3

Course Objectives:

- COB 1: To study the instruction set and assembler directives of 8086 microprocessor.
- COB 2: To learn the programming concepts of 8086 microprocessor.
- COB 3: To enable the students to introduce various advanced processor architectures such as 80X86 processor and Pentium processor.
- COB 4: To understand the multi core architectures and challenges in parallel and multi-threaded programming.

Course Outcomes:

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

- CO 1: Analyze the generalized concepts of basic microprocessors.
- CO 2: Develop the basic concepts of programming 8086 microprocessor.
- CO 3: Construct the different styles of programming 8086 microprocessor.
- CO 4: Classify the advanced microprocessors based on their features and architecture.
- CO 5: Apply the knowledge of multi core architectures in parallel programming environment.

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)
CO 1(K4)	3	3	2	-	3	-	-	-	-	-	-	-
CO 2(K3)	3	2	1	-	3	-	-	-	-	-	-	-
CO 3(K3)	3	2	1	-	3	-	-	-	-	-	-	-
CO 4(K4)	3	3	2	-	3	-	-	-	-	-	-	-
CO 5(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 (K3)	PSO4(K4)
CO 1(K4)	-	-	-	-
CO 2(K3)	-	-	-	-
CO 3(K3)	-	-	-	-
CO 4(K4)	-	-	-	-
CO 5(K3)	3	3	3	-

UNIT-I

Overview of microcomputer structure and operation, execution of a three instruction program, microprocessor evolution and types.

8086 ARCHITECTURE: Main features, pin diagram/description, 8086 microprocessor family, memory segmentation, 8086 internal architecture, 8086 system timing, minimum mode and maximum mode configuration, interrupts and interrupt responses.

UNIT-II

8086 INSTRUCTION SET AND ASSEMBLER DIRECTIVES: Instruction descriptions, 8086 string instructions assembler directives , DB, DD, DQ, DT, DW, end-program, endp, ends, equ ,even-align on even memory address, extrn, global, public / extrn, group, include, label, length- not implemented IBM MASM, name – offset, ORG, proc, ptr, segment, short, type

UNIT-III

8086 PROGRAMMING: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools. Simple sequence programs, jumps, flags and conditional jumps, if-then, if-then-else and multiple if-then-else programs, while-do programs, repeat-until programs, instruction timing and delay loops, procedures and macros.

UNIT-IV

ADVANCED MICROPROCESSORS: Introduction, special purpose registers, memory organization, protected mode, virtual mode, memory paging mechanism, Architecture of Intel 80286 CPU, Intel 80386, and 32-bit CPU- 80486-Microprocessor (No instruction set), Introduction to Pentium Processor architecture.

UNIT-V

MULTI CORE ARCHITECTURES: Dual Core and Core Duo –Basic characteristics, Architecture and comparison with other CPU's. Single Core to Multi-Core Architectures – SIMD and MIMD Systems – Interconnection Networks – Symmetric and Distributed Shared Memory Architectures – Cache Coherence – Performance Issues – Parallel Program Design and Challenges.

Text Books:

1. Advanced Micro Processors and Interfacing, Ray and Burchandi, Tata McGraw Hill.
2. Microprocessors and Interfacing, Douglas V Hall, 2nd Edition, Mc Graw Hill.
3. An Introduction To Parallel Programming, Peter S. Pacheco Morgan-affman/Elsevier, 2011.

Reference Books:

1. The X86 Microprocessors, architecture, Programming and Interfacing (8086 to Pentium), Lyla B Das, PEA.
2. Microcomputer Systems: The 8086.8088 Family, Architecture, Programming and Design, Yu-Cheng Liu, Glenn A Gibson, 2nd Edition.
3. Microprocessors, The 8086/8088, 80186/80286, 80386/80486 and the Pentium Family, Nilesh B Bahadure, PHI.
4. Multi-Core Programming, Shameem Akhter And Jason Roberts, Intel Press, 2006.

Web Links:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/microcontrollers/micro/ui/Course_home4_29.htm
2. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/pdf/Teacher_Slides/mod1/M1L3.pdf
3. https://onlinecourses.nptel.ac.in/noc18_ec03/preview
4. <https://www.udemy.com/certificate-program-in-introduction-to-microprocessors/>

EMBEDDED SYSTEMS
(Open Elective)
(Common to CSE & IT)

VIII Semester
Course Code: 171CS8O02

L T P C
3 1 0 3

Course Objectives:

- COB 1: To prepare the students learn the basic concepts of an embedded system.
- COB 2: To make the students interact various micro controllers and their design aspects.
- COB 3: To enable the students learn the RTOS based embedded Systems.
- COB 4: To enable the students study the RTOS services for an embedded Systems.
- COB 5: To motivate the students work with IDEs for developing an embedded systems.

Course Outcomes:

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

- CO 1: Illustrate the basic concepts of an embedded systems with hardware components.
- CO 2: Categorize the microcontrollers required to design an embedded systems.
- CO 3: Identify the different RTOSs for various embedded and real time applications.
- CO 4: Examine the different issues RTOS objects in embedded systems.
- CO 5: Assess the embedded systems by various implementation and development tools.

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)
CO 1(K2)	2	1	-	-	2	2	3	-	-	-	2	-
CO 2(K4)	-	3	2	-	3	-	-	-	-	-	-	-
CO 3(K3)	-	2	1	1	3	-	-	-	-	-	-	-
CO 4(K4)	-	3	2	2	3	-	-	-	-	-	-	-
CO 5(K5)	-	-	-	3	-	-	-	-	-	3	-	3

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO 1(K2)	2	2	2	1
CO 2(K4)	-	3	3	3
CO 3(K3)	3	-	-	-
CO 4(K4)	3	3	-	3
CO 5(K5)	-	-	3	-

UNIT-I

Introduction to Embedded systems: What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

UNIT-II

8 Bit Microcontrollers Architecture: Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples, Introduction to ARM family of processor.

UNIT-III

Real Time Operating System: RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling, Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets

UNIT- IV

Objects of RTOS: Task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem, The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events.

UNIT-V

Embedded system Development Environment: Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and firm ware

Text books:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.
2. Embedded Software Primer, David Simon, Pearson.

Reference books:

1. The 8051 Microcontroller & Embedded Systems using Assembly and C, Ayala &Gadre, CENGAGE.
2. Embedded Systems-Architectures, Programming and Design-by Raj Kamal, Tata McGraw Hill Publications.
3. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson.

Web Links:

1. <https://www.udemy.com/certificate-program-in-introduction-to-microprocessors/>
<https://books.google.co.in/books?isbn=1425145078>
2. <https://www.coursera.org/learn/embedded-operating-system>
3. <https://www.udemy.com/topic/embedded-systems/>
4. <https://www.online.colostate.edu/certificates/embedded-systems-certificate/>

SOFT COMPUTING (Open Elective)

VIII Semester

Course Code: 171CS8O03

L	T	P	C
3	1	0	3

Course Objectives:

- COB 1: To introduce the Basic concepts of Neural Networks (NN).
- COB 2: To enable the students know the applications of Neural Networks.
- COB 3: To discuss the Fuzzy Logic and its applications.
- COB 4: To facilitate the students aware of various optimization and familiarizing genetic algorithms.
- COB 5: To demonstrate the Hybrid Systems.

Course Outcomes:

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

- CO 1: Identify the fundamentals and types of neural networks.
- CO 2: Apply knowledge in developing the different algorithms for neural networks.
- CO 3: Analyze Fuzzy set and Fuzzy logic principles.
- CO 4: Compare genetic algorithms and their applications
- CO 5: Identify the efficiency of a hybrid 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 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO2 (K3)	3	2	1	1	3	-	-	-	-	-	-	-
CO3 (K4)	3	3	2	2	3	-	-	-	-	-	-	-
CO4 (K4)	3	3	2	2	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 (K3)	PSO 4 (K4)
CO1 (K3)	3	-	3	-
CO2 (K3)	3	3	3	-
CO3 (K4)	3	3	-	3
CO4 (K4)	-	2	-	-
CO5 (K3)	3	-	3	-

UNIT-I

Introduction To Artificial Intelligence Systems: Neural Networks, Fuzzy Logic, Genetic Algorithms.

Fundamentals Of Neural Networks: Basic Concepts of Neural Networks ,Human Brain, Model of an Artificial Neuron, Neural Network Architectures ,Characteristics of Neural Networks ,Learning Methods, Taxonomy of Neural Network Architectures ,History of Neural Network Research, Early Neural Network Architectures, Some Application Domains.

UNIT-II

Backpropagation Networks: Architecture of a Back propagation Network ,Back propagation Learning, Illustration, Applications, Effect of Tuning Parameters of the Back propagation Neural Network, Selection of Various Parameters in BPN, Variations of Standard Back propagation Algorithm, Research Directions.

UNIT-III

Fuzzy Set Theory: Fuzzy versus Crisp, Crisp sets, Fuzzy Sets, Crisp Relations, and Fuzzy Relations.

Fuzzy Systems: Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule based System, Defuzzification Methods, and Applications.

UNIT-IV

Fundamentals Of Genetic Algorithms: Genetic Algorithms: History, Basic Concepts, Creation of Off springs, Working Principle, Encoding, Fitness Function, Reproduction.

Genetic Modeling: Inheritance Operators, Cross Over, Inversion and Deletion, Mutation Operator, Bit-wise Operators, Bit-wise Operators Used in GA, Generational Cycle, Convergence of Genetic Algorithm, Applications, Multi-level Optimization, Real Life Problem, Differences and Similarities between GA and other Traditional Methods, Advances in GA.

UNIT-V

Integration of Neural Networks, Fuzzy Logic, And Genetic Algorithms: Hybrid Systems, Neural Networks, Fuzzy Logic and Genetic Algorithms Hybrids.

Genetic Algorithm Based Backpropagation Networks: GA Based Weight Determination, Applications.

Text Books:

1. Neural Networks, Fuzzy Logic, Genetic Algorithms: Synthesis and Applications, S. Rajasekaran and G.A.V. Pai, 1st Edition, PHI, 2011.
2. Neural networks a comprehensive foundations, Simon Haykin, 2nd Edition, 2004.

Reference Books:

1. Artificial Intelligence, Rich, Kevin Knight, Shiv Shankar B Nair, 3rd Edition, TMH, 2009.
2. Artificial Intelligence: A modern Approach, Stuart Russell, Peter Norvig, 2nd Edition, PEA, 2010.
3. Machine Learning, Tom M. Mitchell, 1st Edition, MGH, 1997.
4. Principles of Soft Computing by S. N. Sivanandam, S. N. Deepa, 1st Edition, Wiley-India, 2008.
5. Soft Computing: Integrating Evolutionary, Neural and Fuzzy Systems, Andrea Tettamanzi, Marco Tomassini, 1st Edition, Springer, 2001.

Web Links:

1. https://www.tutorialspoint.com/artificial_intelligence/
2. https://www.tutorialspoint.com/fuzzy_logic/fuzziness_in_neural_networks.htm
3. https://onlinecourses.nptel.ac.in/noc18_cs13/
4. <https://www.slideshare.net/ankush281290/introduction-to-soft-computing/>
5. <https://in.udacity.com/course/intro-to-machine-learning--ud120/>

ROBOTICS
(Open Elective)
(Common to EEE, ECE, CSE, IT & Min. E)

VIII Semester
Course Code: 171EE8O05

L T P C
 3 1 0 3

Course Objectives:

- COB 1: To give the students aware of applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics.
- COB 2: The students will be exposed to the concepts of robot Kinematics, Dynamics, Trajectory Planning.
- COB 3: Mathematical approach to explain how the robotic arm motion can be described.
- COB 4: To make the students to understand the functioning of sensors and actuators.

Course Outcomes:

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

- CO 1: Demonstrate the basic concepts, parts of robots and types of robots.
- CO 2: Identify various robot configuration and components.
- CO 3: Select appropriate actuators and sensors for a robot based on specific application.
- CO 4: Analyze the simple serial kinematic chains.
- CO 5: Analyze the trajectory planning for a manipulator by avoiding obstacles.

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	-	-	-	-	-	-	-	3	3	2	3
CO2(K3)	3	2	-	-	-	-	3	-	3	-	3	-
CO3 (K3)	3	-	1	1	3	-	-	-	-	-	-	-
CO4(K4)	3	3	-	2	-	-	-	-	-	-	-	-
CO5 (K4)	3	3	2	2	3	-	-	-	-	-	3	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT -I

Introduction: Automation-CAD/CAM-Robotics –An over view of Robotics – present and future applications – classification by coordinate system and control system.

Applications of Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

UNIT-II

Components of the Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, Robot programming methods.

Robot Actuators and Feed Back Components: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.

Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

UNIT-III

Motion Analysis: Homogeneous transformations as applicable to rotation and translation –problems.

Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT-IV

Transformations: Differential transformation and manipulators, Jacobians – problems

Dynamics: Lagrange – Euler formulations – Problems.

UNIT-V

Trajectory Planning: General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion.

Text Books:

1. Industrial Robotics, Groover M P, Pearson Edu.
2. Robotics and Control, Mittal R K & Nagrath I J, TMH.

Reference Books:

1. Robotics, Fu K S, McGraw Hill.
2. Robotic Engineering, Richard D.Klafter, Prentice Hall.
3. Robot Analysis and Control, H. Asada and J.J.E. Slotine, BSP Books Pvt.Ltd.
4. Introduction to Robotics, John J Craig, Pearson Edu.

Web Links:

1. <https://www.scribd.com/doc/39035404/Robot-Actuators-and-Feedback-Components-Main7>
2. <http://medesign.seas.upenn.edu/uploads/Courses/robotics05dh.pdf>
3. <http://robotics.itee.uq.edu.au/~metr4202/2013/lectures.pdf>
4. <https://www.slideshare.net/anirudhreddy123/robots-in-manufacturing>

OPERATIONS RESEARCH
(Open Elective)
(Common to CSE, IT & Ag. E)

VIII Semester
Course Code: 171CS8O04

L T P C
 3 1 0 3

Course Objectives:

- COB 1: To formulate a mathematical model of a real-world problem involving decision making.
- COB 2: To find an optimal solution of a model using various techniques i.e., Linear programming problem, Transportation model, Assignment model and Sequencing algorithm.
- COB 3: To find optimal parameters by using replacement model, inventory model, queuing theory, dynamic programming, game theory and simulation technique.

Course Outcomes:

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

- CO1 : Apply mathematical modelling to formulate real-world problems involving decision making.
- CO2 : Solve Linear programming problem, transportation and assignment problems.
- CO3 : Solve sequencing problem, replacement problem and inventory problem.
- CO4 : Apply game theory problems, queuing theory in decision making
- CO5 : Apply dynamic programming & simulation techniques in real-world problems.

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	-	-	-	-	-	-	-	-	-	-
CO2 (K5)	3	3	3	3	3	3	-	-	-	-	-	-
CO3 (K5)	3	3	3	3	3	3	-	-	-	-	-	-
CO4 (K3)	3	2	-	-	-	3	-	-	-	-	-	-
CO5 (K3)	3	2	-	-	-	3	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PO	PSO1 (K3)	PSO2 (K3)	PSO3 (K3)	PSO4 (K4)
CO1 (K3)	3	-	-	-
CO2 (K5)	3	-	-	-
CO3 (K5)	3	-	-	-
CO4 (K3)	3	-	-	-
CO5 (K3)	3	-	-	-

UNIT-I

Introduction: Definition and Scope of Operations Research, Phases of Operations Research - Mathematical formulation of the problem, graphical solution.

Linear Programming Problem: Standard Form of LPP, Basic Feasible Solutions, Unrestricted Variables, Simplex Algorithm , Artificial Variables, Big M Method, Two Phase Simplex Method, Degeneracy, Alternative Optimal, Unbounded Solutions, Infeasible Solutions, Primal And Dual Problems And Their Relations, Dual Simplex Method.

UNIT-II

Transportation Problem: Introduction to the problem, LP formulation of a transportation problem. Basic feasible solution by north-west corner method, Vogel's approximation method, least cost method. Finding optimal solution by MODI method, degeneracy, unbalanced transportation matrix and Maximization in transportation model.

Assignment Problem: Hungarian method, optimal solution, unbalanced assignment matrix. Flight scheduling problems, Traveling salesman problem.

Replacement: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.

UNIT-III

Job Sequencing: Sequencing Problems, Johnson's method for N-Jobs 2-Machine Problem, N-Jobs K-Machines Problem, Two-Jobs M- Machines Problem.

Inventory Control: Inventory-Factors Effecting Inventory-EOQ, ABC & VED analysis, Inventory Problems with and without Shortages, Price Breakups, Multi Item Deterministic Problems. Probabilistic Inventory Problems.

UNIT-IV

Queuing Theory: Queuing systems and their characteristics. M/M/1: FCFS / / M/M/2: FCFS/, M/M/1: FCFS / N queuing models.

Theory of games: Introduction, Rectangular two person zero person games, solution of rectangular games in terms of mixed strategies , solution of 2x2 games without saddle points, concept of dominance to reduce the given matrix , graphical method for 2xn and nx2 games.

UNIT-V

Dynamic Programming: Introduction – Bellman's principle of optimality – applications of DP- Capital budgeting problem – Shortest path problem.

Simulation: Definition and applications- Monte Carlo simulation- Random numbers and random number generation- Application problems in queuing and inventory.

Text Books:

1. Operations Research By S.D Sharma Kedarnath Ramnath& Co.
2. Operations Research, Kanti Swaroop, P.K. Gupta, Man Mohan, Sulthan Chand & Sons

Reference Books:

1. Operations Research P.K.Gupta and D.S.Hira, S.Chand & Co., 7th Edition.
2. Operations Research Panneer Selvam, Prentice Hall Of India.
3. Operations Research, Richard Bronson, Schaum Series
4. Operations Research – An Introduction, Handy A Taha – Pearson Education

Web Links:

1. <http://www2.informs.org/Resources/>
2. <http://www.mit.edu/~orc/>
3. <http://www.ieor.columbia.edu/>
4. <http://www.universalteacherpublications.com/univ/ebooks/or/Ch1/origin.htm>
5. <http://www.wolfram.com/solutions/OperationsResearch/>

OPTICAL COMMUNICATIONS
(Open Elective)
(Common to CSE & IT)

VIII Semester
Course Code: 171CS8O05

L T P C
3 1 0 3

Course Objectives:

- COB 1: To make students understand functionality of major elements of optical transmission system.
- COB 2: To help students understand properties of optical fiber that affects the performance of a communication link.
- COB 3: To describe fiber optic joints.
- COB 4: To analyze operation of LEDs, LASER diodes, and PIN photo detectors.
- COB 5: To design optical communication system and analyze power budgeting, rise time budgeting.
- COB 6: To illustrate the multiplexing technique and implementation suitable for optical communication.

Course Outcomes:

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

- CO 1: Discover various properties of ray theory transmission and mode theory.
- CO 2: Analyze various attenuation mechanisms that affect the optical transmission link.
- CO 3: Apply different types of fiber joints for single and multimode fibers.
- CO 4: Utilize optical sources and detectors based on their properties (emission wavelength, spectral widths, quantum efficiency, response time etc).
- CO 5: Interpret source to fiber power launching, link power and rise time budgeting, WDM 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)	3	3	-	2	-	-	-	-	-	-	-	-
CO2(K4)	3	3	-	2	-	-	-	-	-	-	-	-
CO3(K3)	3	2	-	1	-	-	3	-	-	-	-	-
CO4(K3)	3	2	-	1	-	-	3	-	-	-	-	-
CO5(K5)	3	3	-	3	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO1(K4)	3	-	-	-
CO2(K4)	3	-	-	-
CO3(K3)	3	-	-	-
CO4(K3)	3	-	-	-
CO5(K5)	-	-	-	-

UNIT-I

Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers, Related problems.

UNIT-II

Fiber materials:- Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers-Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacity determination, Related problems.

UNIT-III

Optical fiber Connectors-Connector types, Fiber Splicing- Splicing techniques, Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT-IV

Optical sources- LEDs, Structures, Materials, Injection Laser Diodes- Modes, Threshold conditions, Optical detectors- Physical principles of PIN and APD, Comparison of Photo detectors, Related problems.

UNIT-V

Source to fiber power launching - Output patterns, Optical system design - Point-to-point links- Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM.

Text books:

1. Optical Fiber Communications – Gerd Keiser, 3rd Edition, Mc Graw-Hill International Edition, 2000.
2. Optical Fiber Communications – John M. Senior, 2nd Edition, PHI, 2002.

Reference books:

1. Fiber Optic Communications – D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fiber Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal, John Wiley, 3rd Edition, 2004.
4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

Web Links:

1. <http://nptel.ac.in/courses/117104127/2>
2. <http://www.navodayaengg.in/study-material/ece/semester-vii/optical-fiber-communication/>
3. <https://www.smaritzworld.com/notes/optical-communication-oc-notes-pdf/>
4. <http://studentsfocus.com/ec6702-ocn-notes-optical-communication-networks-engineering-lecture-handwritten-notes-ece-7th-sem-anna-university/>

INTERNET OF THINGS
(Open Elective)
(Common to EEE, ECE, CSE & IT)

VIII Semester

Course Code: 171EE8O07

L T P C
3 1 0 3

Course Objectives:

- COB 1: To introduce the concepts of Internet of Things.
- COB 2: To impart the knowledge on IoT application areas.
- COB 3: To introduce the IoT business process models, design technology for Connected Devices.
- COB 4: To enable the students learn the effective usage of device connectivity and web connectivity models.
- COB 5: To illustrate the data Collection, Storage and analyzing methods in Cloud.

Course Outcomes:

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

- CO 1: Demonstrate the need of IoT in the computing world.
- CO 2: Identify the Business Process models of IoT.
- CO 3: Develop the communication protocols and communication technologies.
- CO 4: Analyze the data storage and acquisition mechanisms for real time applications.
- CO 5: Describe the involvement of cloud service model platforms in IoT.
- CO 6: Design an IoT application for complex problems.

Mapping of Course Outcomes with Programme 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	-	-	-	3	-	-
CO2 (K2)	-	-	-	-	-	2	-	-	3	3	-	-
CO3 (K3)	3	-	1	-	-	3	-	3	-	3	-	-
CO4 (K4)	3	-	-	-	3	-	-	-	-	-	-	-
CO5 (K2)	-	-	-	-	-	-	-	-	-	3	2	3
CO6 (K6)	3	3	-	-	-	3	-	-	-	3	3	3

Mapping of Course Outcomes with Programme Outcomes:

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 4 (K4)
CO 1 (K2)	2	2	-	1
CO 2 (K2)	2	2	2	-
CO 3 (K3)	-	-	-	2
CO 4 (K4)	3	3	-	3
CO 5 (K2)	2	2	-	1
CO 6 (K6)	-	-	-	3

UNIT-I

Internet of Things : An Overview, Internet of Things, IoT Conceptual Framework, IoT Architectural View, Technology Behind IoT, Sources of IoT, M2M Communication, Examples of IoT.

UNIT-II

Business Models and Processes Using IoT: Introduction, Business Models and Business Model Innovation Value Creation of Internet of Things, Business Model Scenarios for Internet of Things.

Design Principles for Connected Devices: Introduction, IoT/M2M Systems Layers and Designs Standardization, Communication Technologies, Data Enrichment, Data Consolidation and Device Management at Gateway, Ease of Designing and Affordability.

UNIT-III

Design Principles for Web Connectivity: Introduction, Web Communication Protocols for Connected Devices, Message Communication Protocols for Connected Devices, Web Connectivity for Connected Devices.

UNIT-IV

Internet Connectivity Principles: Introduction, Internet Connectivity, Internet based Communication, IP Addressing in IoT, Media Access Control, Application Layer Protocols.

Data Acquiring, Organizing, Processing and Analytics: Introduction, Data Acquiring, Storage, Organizing, Analytics, Knowledge Acquiring, Managing and Storing Processes.

UNIT-V

Data Collection, Storage and Computing Using a Cloud Platform: Introduction, Cloud Computing Paradigm, Cloud Service Model.

Sensors: Introduction, Sensor Technology, Participatory Sensing, Industrial IoT and Automotive IoT, Sensor Data Communication Protocols.

Text Books:

1. Internet of Things: Architecture and Design Principles, RajKamal, 1st Edition, MGH, 2016.
2. Internet of Things: A Hands-on Approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2017.

Reference Books:

1. Internet of Things: Principles and Paradigms, RajKamal Buyya, Amir Vahid Jastjerdi, MK publications, 2016.
2. Designing the Internet of Things, Adrian McEwen, Hakim Casimally, Wiley and Sons publications, 2014.

Web Links:

1. 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>
5. <https://www.coursera.org/learn/iot>

DISASTER MANAGEMENT
(Open Elective)
(Common to ECE, CSE, IT & PT)

Open Elective
Course Code: 171EC8O02

L T P C
3 1 0 3

Course Objectives:

- COB 1: To introduce the basic concept of disaster and its occurrence.
- COB 2: To impart knowledge on Vulnerability profile of India.
- COB 3: To familiarize the students with various disaster mitigation strategies.
- COB 4: To equip the students with various remedial measures against disaster.
- COB 5: To illustrate Rehabilitation programmes.

Course Outcomes:

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

- CO 1: Explain the basics of disaster management and their mitigation measures.
- CO 2: Interpret the disaster vulnerability conditions of India.
- CO 3: Choose the means of preparedness measures against disaster.
- CO 4: Illustrate the impact of hazards on structures.
- CO 5: Outline the various rehabilitation programmes to be adopted.

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	-	-	-	-	-	-	-	3	-	-	3
CO2 (K2)	-	1	-	-	-	-	3	-	3	-	-	-
CO3 (K3)	3	2	-	-	3	3	3	-	3	3	-	3
CO4 (K2)	-	1	-	-	-	-	-	-	3	-	-	-
CO5 (K2)	2	-	-	-	-	-	3	-	3	-	-	3

Mapping of Course Outcomes with Program Specific Outcomes:

CO / PSO	PSO 1(K3)	PSO 2(K3)	PSO 3(K3)	PSO 4(K4)
CO1 (K2)	-	-	-	1
CO2 (K2)	-	-	-	-
CO3 (K3)	-	-	-	-
CO4 (K2)	-	-	-	1
CO5 (K2)	-	-	-	-

UNIT-I

Introduction: Concept of Disaster Management. Types of Disasters. Disaster mitigating agencies and their organizational structure at different levels.

UNIT-II

Vulnerability profile of India and Preparedness: Overview of Disaster Situations in India Vulnerability profile of India and Vulnerability mapping including disaster – prone areas, communities, places. Disaster preparedness – ways and means; skills and strategies; rescue, relief reconstruction. Case Studies: Lessons and Experiences from Various Important Disasters in India

UNIT-III

Floods and Drought: Flood damage, assessing flood risk, flood hazard assessment, flood impact assessment, flood risk reduction options. Drought and development, relief management and prevention, drought mitigation and management- integrating technology and people.

UNIT-IV

Landslides and Earthquakes: Land slide hazards, zonation, mapping and geo-environmental problems associated with the occurrence of landslides. The use of electrical resistivity method in the study of landslide. Causes and effects of earth quakes. Secondary effects. Criteria for earthquake resistant design.

UNIT-V

Cyclone and Fire Disaster: Cyclone occurrence and hazards. Cyclone resistant house for coastal areas. Disaster resistant construction role of insurance sector. Types of fire. Fire safety and fire fighting method, fire detectors, fire extinguishers.

Rehabilitation: Rehabilitation programmes, Management of Relief Camp, information systems & decision making tools.

Text Books:

1. Disaster Management, RB Singh (Ed), Rawat Publications, 2000.
2. Disaster Management Future Challenges and Opportunities, Jagbir Singh, I.K International publishing house

Reference Books:

1. Natural Hazards in the Urban habitat by Iyengar, CBRI, Tata McGraw Hill
2. Natural Disaster management, Jon Ingleton (Ed), Tuler Rose, 1999
3. Anthropology of Disaster management, Sachindra Narayan, Gyan Publishing house, 2000.

Web Links:

1. <https://swayam.gov.in/courses/4983-disaster-management>
2. <https://www.futurelearn.com/courses/disaster-management/2>
3. <https://nidm.gov.in/online.asp>
4. <https://www.ifrc.org/en/get-involved/learning-education-training/certified-professional-development-courses/online-certificate-programme-in-disaster-management/>

RENEWABLE ENERGY SOURCES (Open Elective)

VIII Semester
Course Code: 171CS8O06

L	T	P	C
3	1	0	3

Course Objectives:

- COB 1 : To help the students acquire knowledge on the solar radiation data, extraterrestrial radiation, radiation on earth's surface.
- COB 2 : To enable the students study the basic concepts of solar photo voltaic systems.
- COB 3 : To train the students to use the maximum power point techniques in solar PV and wind energy.
- COB 4 : To enable the students design the wind energy conversion systems.
- COB 5 : To help the students to acquire the basic principle and working of tidal, biomass, fuel cell and geothermal systems.

Course Outcomes:

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

- CO 1: Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface.
- CO 2: Examine the solar photo voltaic systems.
- CO 3: Develop maximum power point techniques in solar PV and wind energy systems.
- CO 4: Illustrate the wind energy conversion systems, wind generators and power generation.
- CO 5: Explain basic principle and working of tidal, biomass, fuel cell and geothermal 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(K4)	3	3	2	2	-	-	-	-	-	-	-	-
CO 2(K4)	3	3	2	-	3	-	-	-	-	-	-	-
CO 3(K3)	3	-	1	1	-	-	-	-	-	-	-	-
CO 4(K2)	2	1	-	-	2	-	-	-	-	-	-	-
CO 5(K2)	2	1	-	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

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

UNIT-I

Fundamentals of Energy Systems and Solar energy: Energy conservation principle – Energy scenario (world and India) – various forms of renewable energy –Solar radiation: Outside earth's atmosphere–Earth surface–Analysis of solar radiation data– Geometry– Radiation on tilted surfaces – Numerical problems. Liquid flat plate collectors, Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

UNIT-II

Solar Photovoltaic Systems: Solar photovoltaic cell, module, array–construction– Efficiency of solar cells–Developing technologies– Cell I-V characteristics– Equivalent circuit of solar cell– Series resistance – Shunt resistance –Applications and systems–Balance of system components- System design: storage sizing – PV system sizing –Maximum power point techniques: Perturb and observe (P&O)technique– Hill climbing technique.

UNIT-III

Wind Energy: Sources of wind energy–Wind patterns–Types of turbines–Horizontal axis and vertical axis machines–Kinetic energy of wind–Betz coefficient–Tip–speed ratio–Efficiency – Power output of wind turbine – Selection of generator (synchronous, induction) –Maximum power point tracking– wind farms – Power generation for utility grids.

UNIT-IV

Hydro, Biomass and Tidal power systems:

Hydro Power System: Basic working principle – Classification of hydro systems: Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems.

Biomass Energy: Fuel classification–Pyrolysis–Direct combustion of heat–Different digesters and sizing.

Tidal power: Basics–Kinetic energy equation–Turbines for tidal power–Numerical problems

UNIT-V

Fuel cells, geothermal systems and Wave Power:

Fuel cell: Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics.

Geothermal: Classification–Dry rock and hot aquifer– Energy analysis– Geothermal based electric power generation.

Wave Power: Basics – Kinetic energy equation – Wave power devices – Linear generators.

Text Books:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, 3rd Edition, TMH, New Delhi.
2. Non conventional energy source—B.H.khan, 2nd edition, TMH.
3. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis, 2nd edition.

Reference Books:

1. Introduction to renewable Energy, Vaughn nelson, Kenneth starcher, 2nd Edition, CRC press.
2. Renewable Energy, Godfrey Boyle, 2nd Edition, Oxford.

Web Links:

1. <https://www.edx.org/learn/renewable-energy>
2. <https://www.coursera.org/learn/renewable-energy>
3. <https://alison.com/course/renewable-energy-sources>
4. <http://www.iff-training.com/event/mechanics-of-renewable-energy-training-course/booking>

NANO TECHNOLOGY AND ITS APPLICATIONS
(Open Elective)
(Common to CSE & IT)

VIII Semester
Course Code: 171CS8O07

L T P C
3 1 0 3

Course Objectives:

- COB 1 : To illustrate the concept of fundamentals of Nanotechnology
- COB 2 : To discuss various fundamentals of different classes of nano materials
- COB 3 : To understand the basic knowledge on various synthesis and characterization techniques involved in Nanotechnology
- COB 4 : To discuss various synthesis and characterization techniques involved in Nanotechnology
- COB 5 : To familiarize with nanotechnology potentialities

Course Outcomes:

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

- CO 1 : Explain the structure and properties of Nano materials.
- CO 2 : Summarize the importance of development and fabrication of different types of Nano materials.
- CO 3 : Illustrate various methods of synthesizing different Nano materials.
- CO 4 : Analyze the Nano structure of materials using various characterization techniques.
- CO 5 : Make use of different Advanced Nano materials for Engineering and Technological applications.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO1 (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	-	-	-	-	-	-	-	-	-	-
CO2(K2)	2	1	-	-	-	-	-	-	-	-	-	-
CO3(K2)	-	1	-	-	-	-	-	-	-	3	-	-
CO4(K4)	3	3	-	2	-	-	-	-	-	-	-	-
CO5(K3)	3	2	-	-	-	3	-	3	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1(K3)	PSO 2(K3)	PSO 3(K3)	PSO 4(K4)
CO1(K2)	-	-	-	-
CO2(K2)	-	-	-	-
CO3(K2)	-	-	-	-
CO4(K4)	-	3	-	-
CO5(K3)	-	-	-	-

UNIT- I

Introduction: Introduction – Scientific revolutions –Time and length scale in structures – Definition of a nano system –Dimensionality and size dependent phenomena – Surface to volume ratio -Fraction of surface atoms – Surface energy and surface stress- surface defects-Properties at nano scale (optical, mechanical, electronic and magnetic).

UNIT-II

Classification: Classification based on dimensionality-Quantum Dots, Wells and Wires- Carbon- based nano materials (bucky balls, nano tubes, graphene)– Metal based nano materials (nano gold, nano silver and metal oxides) –Nano composites- Nano polymers – Nano glasses –Nano ceramics -Biological nano materials.

UNIT- III

Synthesis: Chemical Methods: Metal Nano crystals by Reduction – Solvo thermal Synthesis- Photochemical Synthesis – Sono chemical Routes- Chemical Vapor Deposition (CVD) – Metal Oxide - Chemical Vapor Deposition (MOCVD).Physical Methods: Ball Milling – Electro deposition - Spray Pyrolysis - Flame Pyrolysis - DC/RF Magnetron Sputtering - Molecular Beam Epitaxy (MBE). Nanofabrication: Photolithography and its limitation.

UNIT-IV

Characterization of Nano structures: Electron-beam lithography (EBL) - Nano imprint – Soft lithography patterning. Characterization: Field Emission Scanning Electron Microscopy (FESEM) – Environmental Scanning Electron Microscopy (ESEM) – High Resolution Transmission Electron Microscope (HRTEM) –Scanning Tunneling Microscope (STM)- Rutherford backscattering spectroscopy (RBS).

UNIT-V

Applications: Solar energy conversion and catalysis - Molecular electronics and printed electronics –Nano electronics -Polymers with a special architecture - Liquid crystalline systems - Linear and non-linear optical and electro-optical properties, Applications in displays and other devices –Nano materials for data storage - Photonics, Plasmonics- Chemical and biosensors –Nano medicine and Nano biotechnology – Nano toxicology challenges.

Text Books:

1. Nano science and Nanotechnology, Pradeep T., Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Nano structured Materials and Nanotechnology, Hari Singh Nalwa, Academic Press, 2002.

Reference Books:

1. Nano Technology Importance and Applications, M.H.Fulekar., I.K. International publishing house, 2010.
2. Nano science: Nanotechnologies and Nanophysics, Dupas C., Houdy P., Lahmani M., Springer - Verlag Berlin Heidelberg, 2007.
3. Organic and Inorganic Nanostructures, Nabok A., Artech House, 2005.
4. Introduction to Nanotechnology, Charles P Poole and Frank J Owens., Wiley publishers, 2003.

Web Links:

1. <https://nptel.ac.in/courses/103103033/module9/lecture1.pdf>
2. <https://nptel.ac.in/courses/118104008/6>
3. www.nanotech-now.com › Directory
4. [https://www.nano.gov/you/nanotechnology-benefits](http://www.nano.gov/you/nanotechnology-benefits)

MAJOR PROJECT

VIII Semester
Course Code: 171CS8P02

L	T	P	C
0	0	0	14

Guidelines for Major Project:

The prime objective of this project work is to imbibe students with technical, analytical and innovative ideas. It's to ensemble the students with theoretical and practical learning pertaining to software applications development, design practices and guidelines/paradigms. A peer of 3-4 students formed as group/team and work under the supervision/mentoring of a departmental faculty. Associating the students to solve from real world problems to various R&D problems identified within the department or sister departments. The team is formed towards fostering the communication and leadership skills among peers, so that they can survive and exercise during their career, abreast. The project work normally includes:

1. Literature survey on existing problem/ topic from viable sources.
2. Eliciting the problem solving approach/methodologies and making the feasibility study.
3. The team should perform an extensive software requirements analysis and ethnographical study.
4. Preparing an abstract/synopsis on the opted topic and present before Departmental Review Committee (DRC).
5. Preparing a roadmap to design, analyze, implement, evaluate/test considering functional, non-functional aspects and finally, deploy the application/product/software service.
6. Detailed Analysis/Design/Modeling/Simulation and experimentation as needed.
7. Final development of product/process conducting testing and specifying the results, conclusions and future directions.
8. Preparing a Dissertation in the standard format for being evaluated by the Department Review Committee (DRC).
9. Final Project presentation / execution before Departmental Review Committee (DRC).

Major Project Objectives:

- COB 1: To provide students an opportunity to design/develop a prototype in pursuit of technical skills related to computer science domain.
- COB 2: To make students identify their domain of competence to choose an appropriate project topic to demonstrate engineering skills acquired.
- COB 3: To apply technical expertise to develop / automate real world issues.
- COB 4: To collaborate with other departments to apply inter disciplinary knowledge for project completion.
- COB 5: To work as a team under the guidance of a supervisor in developing a project.

Major Project Outcomes:

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

- CO 1: Perceive, leadership and management skills required for project development and product delivery.
- CO 2: Build a model/idea/method/algorithm for societal problems.
- CO 3: Develop inventive or innovative thought making process using software engineering principles.
- CO 4: Apply relevant tools for collecting /processing/Analyze the required information for a project completion.
- CO 5: Adapt to work as a team and adhering professional ethics in presenting the results in written and oral formats.

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)	-	-	-	-	-	-	-	-	-	-	2	-
CO 2(K2)	-	1	-	-	-	-	3	-	-	-	2	-
CO 3(K3)	3	2	-	-	3	-	-	-	-	-	-	-
CO 4(K4)	3	3	-	2	-	3	-	-	-	-	-	-
CO 5(K6)	-	-	-	-	-	-	-	-	3	3	3	3

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1 (K3)	PSO 2 (K3)	PSO 3 (K3)	PSO 3 (K4)
CO 1(K2)	2	2	2	1
CO 2(K3)	2	2	2	1
CO 3(K3)	2	2	2	1
CO 4(K4)	-	-	-	-
CO 5(K6)	-	-	3	-
