ACADEMIC REGULATIONS,

COURSE STRUCTURE

and

DETAILED SYLLABUS

CHOICE BASED CREDIT SYSTEM

R21

B.Tech – Computer Science & Engg.,

B.Tech - Regular Four Year Degree Program
(For batches admitted from the academic year 2021 - 2022)

Holy Mary Institute of Technology & Science
Bogaram (V), Keesara (M), Medchal (Dist) - 501 301

FOREWORD

The autonomy is conferred on Holy Mary Institute of Technology & Science by UGC, based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own **curriculum, examination system and monitoring mechanism**, independent of the affiliating University but under its observance.

Holy Mary Institute of Technology & Science is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a two decades in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the college in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought, at appropriate time with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL

ACADEMIC REGULATIONS

B. Tech. - Regular Four Year Degree Programme
(For batches admitted from the academic year 2021-22)
&
B. Tech. - Lateral Entry Scheme
(For batches admitted from the academic year 2022-23)

For pursuing four year Under Graduate Degree Programme of study in Engineering & Technology (UGP in E&T) offered by Holy Mary Institute of Technology & Science under Autonomous status is herein referred to as HITS (Autonomous):

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2021-22 onwards. Any reference to "Institute" or "College" in these rules and regulations shall stand for Holy Mary Institute of Technology & Science (Autonomous).

All the rules and regulations, specified hereafter shall be read as a whole for the purpose of interpretation as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, Holy Mary Institute of Technology & Science shall be the chairman Academic Council.

1. ADMISSION

1.1. **Admission into first year of four year B. Tech. degree programmes of study in Engineering**

1.1.1. **Eligibility:**

A candidate seeking admission into the first year of four year B. Tech. degree Programmes should have:

(i) Passed either Intermediate Public Examination (I.P.E) conducted by the Board of Intermediate Education, Telangana, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Telangana or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Telangana or equivalent Diploma recognized by Board of Technical Education for admission as per guidelines defined by the Regulatory bodies of Telangana State Council for Higher Education (TSCHE) and AICTE.

(ii) Secured a rank in the EAMCET examination conducted by TSCHE for allotment of a seat by the Convener, EAMCET, for admission.

1.1.2. **Admission Procedure:**

Admissions are made into the first year of four year B. Tech. Degree Programmes as per the stipulations of the TSCHE.

(a) Category 'A' seats are filled by the Convener, TSEAMCET.

(b) Category 'B' seats are filled by the Management.

1.2 Admission into the second year of four year B. Tech. degree Program in Engineering

1.2.1 **Eligibility**:

A candidate seeking admission under lateral entry into the II year I Semester B. Tech. degree Programmes should have passed the qualifying exam (B.Sc. Mathematics or Diploma in concerned course) and based on the rank secured by the candidate at Engineering Common Entrance Test ECET (FDH) in accordance with the instructions received from the Convener, ECET and Government of Telangana.

1.2.2 **Admission Procedure**:

Admissions are made into the II year of four year B. Tech. degree Programmes through Convener, ECET (FDH) against the sanctioned strength in each Programmes of study as lateral entry students.

2. PROGRAMMES OFFERED

Holy Mary Institute of Technology & Science, an autonomous college affiliated to JNTUH, offers the following B.Tech Programmes of study leading to the award of B. Tech degree under the autonomous scheme.

1) B.Tech. - Civil Engineering
2) B.Tech. - Computer Science and Engineering
3) B.Tech. – Computer Science and Engineering (Artificial Intelligence & Machine Learning)
4) B.Tech – Computer Science and Engineering (Data Science)
5) B.Tech – Computer Science and Engineering (IoT)
6) B.Tech – Computer Engineering (Software Engineering)
7) B.Tech. - Electronics and Communication Engineering
8) B.Tech - Electrical & Electronics Engineering
9) B.Tech. - Mechanical Engineering

The medium of instructions for the entire under graduate programme in Engineering & Technology will be English only.

3. DURATION OF THE PROGRAMMES

3.1 Normal Duration

3.1.1 B. Tech. degree programme extends over a period of four academic years leading to the Degree of Bachelor of Technology (B.Tech.) of the Jawaharlal Nehru Technological University Hyderabad.

3.1.2 For students admitted under lateral entry scheme, B. Tech. degree programme extends over a period of three academic years leading to the Degree of Bachelor of Technology (B. Tech.) of the Jawaharlal Nehru Technological University Hyderabad.

3.2 Maximum Duration

3.2.1 The maximum period within which a student must complete a full-time academic programme is 8 years for B. Tech. If a student fails to complete the academic programme within the maximum duration as specified above, he shall forfeit the seat in B.Tech and his admission shall stand cancelled.

3.2.2 For students admitted under lateral entry scheme in B. Tech. degree programme, the maximum period within which a student must complete a full-time academic programme is 6 years. If a student fails to complete the academic programme within the maximum duration as specified above, he shall forfeit the seat in B.Tech and his admission shall stand cancelled.

3.2.3 The period is reckoned from the academic year in which the student is admitted first time into the degree Programme.

4. AWARD OF B.Tech DEGREE

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

4.1 The candidate shall pursue a course of study as specified in section 3.1 and 3.2.

4.2 The candidate shall register for 160 credits and secure 160 credits (Excluding Mandatory Courses).

5. PROGRAMME STRUCTURE

5.1 UGC/AICTE specified Definitions/ Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations/ Norms, which are listed below.

Semester Scheme:

Each UGP is of 4 Academic Years (8 Semesters), each year divided into two Semesters of 22 weeks (≥90 working days), each Semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as denoted by UGC, and Curriculum/Course Structure as suggested by AICTE are followed.

5.1.1 The B.Tech. Programme of Holy Mary Institute of Technology & Science is Semester pattern, with 8 Semesters constituting 4 Academic Years, each Academic Year having TWO Semesters (First/Odd and Second/Even Semesters). Each Semester shall be of 16-18 Weeks duration with a minimum of 90 Instructional Days per Semester.

5.1.2 Credit Courses:

a) All Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Subject/ Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods : Credits) Structure, based on the following general pattern .

- One Credit - for One hour / Week / Semester for Theory / Lecture(L) / Tutorial)T) Courses; and
- One Credit - for Two hours/Week/Semester for Laboratory/Practical (P) Courses, Mini Project...
- Mandatory Courses Credits shall not be counted for credit requirements for award of degree. However all the mandatory courses have to be passed by the student.

5.1.3 **Course Classification:**

All Courses offered for the UGP are broadly classified as:

- **Basic Science Courses (BSC):** Includes Mathematics, Physics, Chemistry, Biology etc.
- **Engineering Science Courses (ESC):** Courses include Materials, Workshop, Basics of Electrical/Electronics/ Mechanical/Computer Science & Engineering, Engineering Graphics, Instrumentation, Engineering Mechanics, Instrumentation etc.
- **Humanities and Social Science including Management Courses (HSMC):** Courses include English, Communication skills, Management etc.
- **Professional Core Courses (PCC):** Relevant to the chosen specialization/branch.
- **Professional Elective Courses (PEC):** Relevant to the chosen specialization/ branch offered as electives.
- **Open Elective Courses (OEC):** Other technical and/or emerging subject areas offered in the College by the Departments of Engineering, Science and Humanities.
- **Mandatory Course:** Course work on peripheral subjects in a programme, wherein familiarity considered mandatory. To be included as non-Credit, Mandatory Courses, with only a pass in each required to qualify for the award of degree from the concerned institution.
- **Project Work:** and/or internship in industry or elsewhere, seminar.
- **MOOCS –** Massive Open Online Courses in a variety of disciplines available at both introductory and advanced levels, accessible from e-resources in India and abroad.

5.1.4 **Course Nomenclature:**

The Curriculum Nomenclature or Course-Structure Grouping for the each of the UGP E&T (B.Tech Degree Programme), is as listed below.

S. No	Broad Course Classification	Course Group/ Category	Course Description	Credits
1)	BSC,ESC & HSMC	BSC – Basic Sciences Courses	Includes - Mathematics, Physics and Chemistry Subjects	25
2)		ESC - Engineering Sciences Courses	Includes fundamental engineering subjects.	24

3)		HSMC – Humanities and Social Sciences including Management	Includes subjects related to Humanities, Social Sciences and Management.	12
4)	PCC	PCC – Professional Core Courses	Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.	57
5)	PEC	PEC– Professional Elective Courses	Includes Elective subjects related to the Parent Discipline / Department / Branch of Engg.	18
6)	OEC	OEC – Open Elective Courses	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/ Department / Branch of Engg.	09
7)	PWC	Project Work	Major Project.	15
8)		Industrial Training/ Mini- Project	Industrial Training/ Internship/ Mini-Project.	
9)		Seminar	Seminar / Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.	
10)	MC	Mandatory Courses	Mandatory Courses (non-credit)	--
Total Credits for UGP (B. Tech.)Programme				**160**

- Minor variations as per AICTE / UGC guidelines

6. COURSE REGISTRATION

6.1 A 'Faculty Advisor or Counsellor' shall be assigned to each student, who advises him/her about the UGP, its Course Structure and Curriculum, Choice/Option for Subjects/Courses, based on his/her competence, progress, pre-requisites and interest.

6.2 Academic Section of the College invites 'Registration Forms' from students prior (before the beginning of the Semester), ensuring 'DATE and TIME Stamping'. The Registration Requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.

6.3 A Student can apply for Registration, which includes approval from his faculty advisor, and then should be submitted to the College Academic Section through the Head of Department (a copy of the same being retained with Head of Department, Faculty Advisor and the Student).

6.4 A student may be permitted to register for his/her course of CHOICE with a Total of prescribed credits per Semester (permitted deviation being±12%), based on his PROGRESS and SGPA/CGPA, and completion of the 'PRE-REQUISITES' as indicated for various courses in the Department Course Structure and Syllabus contents.

6.5 Choice for 'additional Courses' must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Counsellor.

6.6 If the Student submits ambiguous choices or multiple options or erroneous (incorrect) entries during Registration for the Course(s) under a given/specified Course Group/ Category as listed in the Course Structure, only the first mentioned Course in that Category will be taken into consideration.

6.7 Dropping of Courses or changing of options may be permitted, ONLY AFTER obtaining prior approval from the Faculty Advisor, 'within 15 Days of Time' from the commencement of that Semester. Course Options exercised through Registration are final and CANNOT be changed, and CANNOT be inter-changed; further, alternate choices will also not be considered. However, if the Course that has already been listed for Registration (by the Head of Department) in a Semester could not be offered due to any unforeseen or unexpected reasons, then the Student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing Subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by Head of the Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

7. COURSES TO BE OFFERED

7.1 A typical section (or class) strength for each semester shall be 60.

7.2 Courses may be offered to the Students, only if minimum of 20 students ($1/3^{rd}$ of the section strength) opt for it.

7.3 More than ONE TEACHER may offer the SAME SUBJECT (Lab/Practical's may be included with the corresponding Theory Subject in the same Semester) in any Semester. However, selection choice for students will be based on - 'CGPA Basis Criterion' (i.e., the first focus shall be on early Registration in that Semester, and the second focus, if needed, will be on CGPA of the student).

7.4 If more entries for Registration of a Subject come into picture, then the concerned Head of the Department shall take necessary decision, whether to offer such a Subject/Course for TWO (or multiple) SECTIONS or NOT.

7.5 OPEN ELECTIVES will be offered by a department to the students of other departments.

8. B.Tech (Honours) DEGREE

A new academic programme B.Tech (Hons.) is introduced in order to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area.

8.1 B.Tech students in regular stream can opt for B.Tech (Hons.), provided they have a CGPA of 8.0 and above up to the end of IV-Semester without any history of arrears and attempting of betterment.

8.2 For B. Tech (Honors), a student needs to earn additional 20 credits (over and above the required 160 credits for B. Tech degree). Student to opt for the courses from NPTEL/SWAYAM/Coursera/other MOOC platform as recommended by concern BOS relevant to her/his discipline through MOOCs as recommended by the BOS.

8.3 If the credits of NPTEL/ SWAYAM/ Coursera /other MOOC platform courses do not match with the existing subject the BOS will take appropriate decision.

8.4 After registering for the B.Tech (Honours) programme, if a student fails in any course he/she will not be eligible for B.Tech (Honours).

8.5 Students who have obtained "C grade" or "reappear" or "Repeat Course" / "Re Admitted" or "Detained" category in any course, including the MOOCs courses, are not eligible for B.Tech (Hons.) degree. Up to 8 semesters without any history of arrears and attempting of betterment is not eligible to get B.Tech (Hons.).

8.6 Those who opted for B. Tech (Honours) but unable to earn the required additional credits in 8 semesters or whose final CGPA is less than 8 shall automatically fall back to the B.Tech programme. However, additional course credits and the grades thus far earned by them will be shown in the grade card but not included for the CGPA.

8.7 The students have to pay the requisite fee for the additional courses.

Table: Assigned Credits

Hour/Week	Online Course Duration	Assigned Credits
2 hours / week	04 Weeks	01 Credit
3 hours / week	08 Weeks	03 Credits
3 hours / week	12 Weeks	04 Credits

9. B.Tech (Minor) DEGREE

This concept is introduced in the curriculum of all conventional B. Tech. programmes offering a major degree. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying any five theory subjects from the programme core & professional elective courses of the minor discipline or equivalent MOOC courses available under SWAYAM platform. The list of courses to be studied either in MOOCs or conventional type will be decided by the department at the time of registration for Minor degree.

a. B.Tech students in regular stream can opt for B.Tech (Minor.), provided they have a CGPA of 8.0 and above up to the end of IV-Semester without any history of arrears and attempting of betterment.
b. Students aspiring for a Minor must register from **V**-Semester onwards and must opt for a Minor in a discipline other than the discipline he/she is registered in. However, Minor discipline registrations are not allowed before V-Semester and after VI-Semester.
c. Students will not be allowed to register and pursue more than extra two subjects in any semester.
d. Completion of a Minor discipline programme requires no addition of time to the regular Four year Bachelors' programme. i.e. Minor discipline programme should be completed by the end of final year B. Tech. program along with the major discipline.
e. A student registered for Minor in a discipline shall pass in all subjects that constitute the requirement for the Minor degree programme. No class/division (i.e., second class, first class and distinction, etc.) shall be awarded for Minor degree programme.

10. ATTENDANCE REQUIREMENTS

a. A student will be eligible to appear for the End Semester Examinations, if he acquires a minimum of 75% of attendance in aggregate of all the Subjects/Courses (excluding Mandatory or Non-Credit Courses) for that Semester.
b. Condoning of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each Semester may be granted by the College Academic Committee on genuine and valid grounds, based on the student's representation with supporting evidence by following the govt. rules in vogue.
c. A stipulated fee shall be payable towards condoning of shortage of attendance.
d. Shortage of Attendance below 65% in aggregate shall in No case be condoned.
e. A student shall not be promoted to the next Semester unless he/she satisfies the attendance requirements of the current Semester. The student may seek readmission for the Semester when offered next. He / She shall not be allowed to register for the subjects of the Semester while he/she is in detention. A student detained due to shortage of attendance, will have to repeat that Semester when offered next. The academic regulations under which the student has been readmitted shall be applicable.
f. Students whose attendance is less than 75% are not entitled to get the scholarship / fee reimbursement in any case as per the TS Govt. Rules in force.

11. ACADEMIC REQUIREMENTS FOR PROMOTION/COMPLETION OF REGULAR B.TECH PROGRAMME COURSE STUDY.

11.1 A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to each Course, if he secures not less than 35% marks in the End Semester Examination, and a minimum of 40% of marks in the sum Total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of Letter Grades, this implies securing P Grade or above in that Course.

11.2 A Student will not be promoted from I Year to II Year, unless he/she fulfils the Attendance and Academic Requirements and secure a Total 40% of Credits up to I Year II Semester from all the relevant regular and supplementary examinations.

11.3 A Student will not be promoted from II Year to III Year, unless he/she fulfils the Attendance and Academic Requirements and secure a Total 50% of Credits up to II Year II Semester from all the relevant regular and supplementary examinations.

11.4 A Student will not be promoted from III Year to IV Year, unless he/she fulfils the attendance and Academic Requirements and secure a Total 60% of Credits up to III Year II Semester, from all the regular and supplementary examinations.

11.5 After securing the necessary 160 Credits as specified for the successful completion of the entire UGP, resulting in 160 Credits for UGP performance evaluation, i.e., the performance of the Student in these 160 Credits shall alone be taken into account for the calculation of the final CGPA.

If a Student registers for some more 'extra courses' (in the parent Department or other Departments/Branches of Engg.) other than those listed courses Totalling to 160 Credits as specified in the Course Structure of his/her Department, the performances in those 'extra courses' (although evaluated and graded using the same procedure as that of the required 160 Credits) will not be taken into account while calculating the SGPA and CGPA. For such 'extra courses' registered, % marks and Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in items 8 and 9.1-9.5.

11.6 Students who fail to earn minimum of 160 Credits as per the Course Structure, and as indicated above, within 8 Academic Years from the Date of Commencement of their I Year shall forfeit their seats in B.Tech Programme and their admissions shall stand cancelled.

When a Student is detained due to shortage of attendance/lack of credits in any Semester, he may be re-admitted into that Semester, as and when offered. However the regulations at the time of admissions hold good.

12. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

12.1 The performance of a student in each Semester shall be evaluated Course-wise (irrespective of Credits assigned) with a maximum of 100 marks for Theory. The B.Tech Project Work (Major Project) will be evaluated for 100 marks in Phase-I and 100 Marks in Phase-II.

12.2 For all Theory Courses as mentioned above, the distribution shall be 30 marks for CIE, and 70 marks for the SEE.

12.3

a) For Theory Subjects (inclusive of Minor Courses), during the semester, there shall be two Continues Internal Evaluations (CIE) examinations for 3**0 marks** each. Each CIE examination consists of one subjective paper for **25 marks**, and assignment for **5 marks** for each subject. Question paper contains Two Parts (Part-A &Part-B) the distribution of marks for PART-A and PART-B will be 10 marks & 15 marks respectively for UG programme. Average of two CIE examinations will be taken as part of external assessment.

Pattern of the question paper is as follows:

PART–A

Consists of **one compulsory question** with five sub questions each carrying two mark. For the I-Mid examinations the sub question would be from first 2 ½ units and for the II-Mid examination the sub question would be from the remaining 2 ½ units.

PART-B

Consists of five questions (out of which students have to answer three questions) carrying five marks each. Each question there will be an "either" "or" choice (that means there will be two questions from each unit and the student should answer any one question). The questions can consist of sub questions also.

b) The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus.

c) First Assignment should be submitted before the commencement of the first mid-term examinations, and the Second Assignment should be submitted before the commencement of the second mid-term examinations. The assignments shall be specified/given by the concerned subject teacher.

d) If any candidate is absent for the CIE examinations or those who want to improve their internal marks in any subject can opt for improvement exam as and when offered. The improvement exam is a 45 minutes duration and consisting of 30 objective questions from the entire syllabus of the subject. Best marks are considered as final marks from the average of two mid examinations or improvement examination marks. The improvement can be taken after the payment of prescribed fee. There is no Internal Improvement for the courses Machine Drawing, Production Drawing, Engineering Drawing, Engineering Graphics and practical, mandatory courses.

12.4 For Practical Courses, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 30 internal marks, and 70 marks are assigned for Lab/Practical End Semester Examination (SEE). Out of the 30 marks for internals, day-to-day work in the laboratory shall be evaluated for 20 marks; and for the remaining 10 marks - two internal practical tests (each of 10 marks) shall be conducted by the concerned laboratory teacher and the average of the two tests is taken into account. The SEE for Practical's shall be conducted at the end of the Semester by Two Examiners appointed by the Chief Controller of Examinations in consultation with the Head of the Department.

12.5 For the Subjects having Design and/or Drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing, Production Drawing Practice, and Estimation), the distribution shall be 30 marks for CIE (10 marks for day-to-day work and 20 marks for internal tests) and 70 marks for SEE. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal tests.

12.6 Open Elective Course**:** Students can choose one open elective course (OE-I) during III-B.Tech I-semester, one (OE-II) during III-B.Tech II-semester, one (OE-III) in IV-B.Tech I-semester, and one (OE-IV) in IV-B.Tech II-semester from the list of open elective courses given. However, students cannot opt for an open elective courses offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any Semester.

12.7 There shall be an Industrial Oriented Mini Project/Summer Internship, in collaboration with an industry of their specialization. Students will register for this immediately after II year II semester examinations and pursue it during summer vacation. Industrial Oriented Mini Project/Summer Internship shall be submitted in a report form and presented before the committee in III year I semester. It shall be evaluated for 100 external marks. The committee consists of an external examiner, Head of the Department, Supervisor of the Industrial Orientated Mini Project/Summer Internship and a senior faculty member of the department. There shall be no internal marks for Industrial Orientated Mini Project/Summer Internship.

12.8 There shall be a Comprehensive Viva (Independent Study) in III-B.Tech II-Semester and will be conducted SEE through a test or a committee consisting of One External Examiner, Head of the Department and two senior faculty members of the Department. The independent study is intended to

assess the student's understanding of the subjects he/she studied during the B.Tech course of study and evaluated for 100 marks. There shall be no CIE for Comprehensive Viva.

12.9.

a) UG project work shall be carried out in two stages: Project Stage – I during IV Year I Semester, Project Stage – II during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.

b) For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work and project supervisor shall evaluate for 100 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks in the total of the CIE.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

c) For Project Stage – II, the external examiner shall evaluate the project work for 70 marks and the project supervisor shall evaluate it for 30 marks. The topics for industrial oriented mini project and Project Stage – I shall be different from one another. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

For conducting viva-voce of project stage – II, Chief Controller of Examinations selects an external examiner from the list of experts in the relevant branch submitted by the department HODs of the College.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

12.10. **Semester End Examination:**

a) Question paper contains 2 Parts (Part-A and Part-B) having the questions distributed equally among all units.

b) The distribution of marks for i) PART-A for 20 marks ii) PART-B for 50 marks. Pattern of the question paper is as follows:

PART–A

Consists of one question which is compulsory. The question consists of ten sub-questions one from each unit and carry 2 marks each.

PART-B

Consists of 5 questions carrying 10 marks each. Each of these questions is from one unit and may contain sub questions. Each question there will be an "either" "or" choice (that means there will be two questions from each unit and the student should answer any one question).

12.11. For Mandatory Non-Credit Courses offered in a Semester, after securing ≥ 65% attendance and has secured not less than 35% marks in the SEE, and a minimum of 40% of marks in the sum Total of the CIE and SEE taken together in such a course, then the student is **PASS** and will be qualified for the award of the degree. No marks or Letter Grade shall be allotted for this courses/activities. However, for non credit courses '**Satisfactory'** or "**Unsatisfactory'** shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

12.12. SWAYAM: College intends to encourage the students to do a minimum of one MOOC in discipline and open elective during third year. The respective departments shall give a list of

standard MOOCs providers including SWAYAM whose credentials are endorsed by the BoS. In general, MOOCs providers provide the result in percentage. In such case, specified by the college shall follow the grade table mentioned in 14.2. The Credits for MOOC(s) shall be transferred same as given for the respective discipline or open electives. In case a student fails to complete the MOOCs he/she shall re-register for the same with any of the providers from the list provided by the department. The equivalence of the courses shall be established by the department committee. Still if a student fails to clear the course/s, or in case a provider fails to offer a MOOC in any semester, then in all such cases the college shall conduct the end semester examinations for the same as per the college end semester examination pattern. The syllabi for the supplementary examinations shall be same as that of MOOCs. There shall be no internal assessment however the marks obtained out of 70 shall be scaled up to 100 marks and the respective letter grade shall be allotted. The details of MOOC(s) shall be displayed in Memorandum of Grades of a student, provided he/she submits the proof of completion of it or them to the examination branch through the Coordinator/Mentor, before the end semester examination of the particular semester.

13. AWARD OF DEGREE

After a student has satisfied the requirement prescribed for the completion of the Programme and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes Shown in Table.

Table: **Declaration of Class based on CGPA (Cumulative Grade Point Average)**

Class Awarded	Grade to be Secured
First Class with Distinction	CGPA ≥ 8.00
First Class	≥ 6.50 to < 8.00 CGPA
Second Class	≥ 5.50 to < 6.50 CGPA
Pass Class	≥ 5.00 to < 5.50 CGPA
FAIL	CGPA < 5

14. LETTER GRADE AND GRADE POINT

14.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practical's, or Seminar, or Project, or Internship*/Mini-Project, Minor Course etc., based on the %marks obtained in CIE+SEE (Continuous Internal Evaluation + Semester End Examination, both taken together), and a corresponding Letter Grade shall be given.

14.2 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed...

% of Marks Secured (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
90% and above (≥ 90% , ≤ 100%)	O (Outstanding)	10
Below 90% but not less than 80% (≥ 80% , < 90%)	A^+ (Excellent)	9
Below 80% but not less than 70% (≥ 70% , < 80%)	A (Very Good)	8
Below 70% but not less than 60% (≥ 60% , < 70%)	B^+ (Good)	7
Below 60% but not less than 50% (≥ 50% , < 60%)	B (above Average)	6
Below 50% but not less than 40% (≥ 40% , < 50%)	C (Average)	5
Below 40% (< 40%)	F (FAIL)	0
Absent	AB	0

14.3 A student obtaining F Grade in any Subject shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the End Semester Examination (SEE), as and when offered. In such cases, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

14.4 A Letter Grade does not imply any specific % of Marks.

14.5 In general, a student shall not be permitted to repeat any Subject/Course (s) only for the sake of 'Grade Improvement' or 'SGPA/CGPA Improvement'. However, he has to repeat all the Subjects/Courses pertaining to that Semester, when he is detained.

14.6 A student earns Grade Point (GP) in each Subject/Course, on the basis of the Letter Grade obtained by him in that Subject/Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Subject/Course.

Credit Points (CP) = Grade Point (GP) x Credits …. For a Course

14.7 The Student passes the Subject/Course only when he gets GP ≥ 4 (P Grade or above).

14.8 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP) secured from ALL Subjects/Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

SGPA = $\{\sum_{i=1}^{N} C_i G_i\} / \{\sum_{i=1}^{N} C_i\}$ …. For each Semester,

where 'i' is the Subject indicator index (takes into account all Subjects in a Semester), 'N' is the no. of Subjects 'REGISTERED' for the Semester (as specifically required and listed under the Course Structure of the parent Department), C_i is the no. of Credits allotted to that ix Subject, and G_i represents the Grade Points (GP) corresponding to the Letter Grade awarded for that i Subject.

Illustration of Computation of SGPA Computation

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course1	3	A	8	3 x 8 = 24
Course2	4	B+	7	4 x 7 = 28
Course3	3	B	6	3 x 6 = 18
Course4	3	O	10	3 x10= 30
Course5	3	C	5	3 x 5 = 15
Course6	4	B	6	4 x 6 = 24

Thus, **SGPA =139/20 =6.95**

14.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered Courses in ALL Semesters, and the Total Number of Credits registered in ALL the Semesters. CGPA is rounded off to TWO Decimal Places. CGPA is thus computed from the I Year Second Semester onwards, at the end of each Semester, as per the formula

CGPA = $\{\sum_{j=1}^{M} C_j G_j\} / \{\sum_{j=1}^{M} C_j\}$ … for all S Semesters registered

(i.e., up to and inclusive of S Semesters, S ≥ 2),

where 'M' is the TOTAL no. of Subjects (as specifically required and listed under the Course Structure of the parent Department) the Student has 'REGISTERED' from the 1st Semester onwards up to and inclusive of the Semester S (obviously M > N), 'j' is the Subject indicator index (takes into account all Subjects from 1 to S Semesters), C_j is the no. of Credits allotted to the jth Subject, and G_j represents the Grade Points (GP) corresponding to the Letter Grade awarded for that jth Subject. After registration and completion of I Year I Semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.

For CGPA Computation

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
Credits : 19.5 SGPA : 6.9	Credits : 20.5 SGPA : 7.8	Credits : 18.0 SGPA : 5.6	Credits : 19.0 SGPA : 6.0	Credits : 21.5 SGPA : 6.3	Credits : 21.5 SGPA : 8.0	Credits : 23 SGPA : 8.0	Credits : 17 SGPA : 8.0

Thus, CGPA = $\frac{19.5x6.9+20.5x7.8+18.0x5.6+19.0x6.0+21.5x6.3+21.5x8.0+23x8.0+17x8.0}{160}$ = 7.10

14.10 For Merit Ranking or Comparison Purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.

14.11 For Calculations listed in Item 12.6–12.10, performance in failed Subjects/Courses (securing F Grade) will also be taken into account, and the Credits of such Subjects/Courses will also be included in the multiplications and summations. However, Mandatory Courses will not be taken into consideration.

14.12 Conversion formula for the conversion of GPA into indicative percentage is

% of marks scored = (final CGPA -0.50) x 10

15. DECLARATION OF RESULTS

Computation of SGPA and CGPA are done using the procedure listed in 12.6– 12.10.

No SGPA/CGPA is declared, if a candidate is failed in any one of the courses of a given Semester.

16. WITH HOLDING OF RESULTS

If the student has not paid fees to College at any stage, or has pending dues against his name due to any reason what so ever, or if any case of indiscipline is pending against him, the result of such student may be withheld, and he will not be allowed to go into the next higher Semester. The Award or issue of the Degree may also be withheld in such cases.

17. REVALUATION

Students shall be permitted for revaluation after the declaration of end Semester examination results within due dates by paying prescribed fee. After revaluation if there is any betterment in the grade, then improved grade will be considered. Otherwise old grade shall be retained.

18. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations for the odd Semester shall be conducted with the regular examinations of even Semester and vice versa, for those who appeared and failed or absent in regular examinations. Such candidates writing supplementary examinations may have to write sometimes one or two examinations per day.

ADVANCED SUPPLEMENTARY EXAMINATION

Advanced supplementary examinations will be conducted for IV year II Semester after announcement of regular results.

19. TRANSCRIPTS

After successful completion of prerequisite credits for the award of degree a Transcript containing performance of all academic years will be issued as a final record. Duplicate PC, CMM & Transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

20. RULES OF DISCIPLINE

20.1 Any attempt by any student to influence the teachers, Examiners, faculty and staff of controller of Examination for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.

20.2 When the student absents himself, he is treated as to have appeared and obtained zero marks in that course(s) and grading is done accordingly.

20.3 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, he is awarded zero marks in that subject(s).

20.4 When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Examiner is final.

21. MALPRACTICE PREVENTION COMMITTEE

A malpractice prevention committee shall be constituted to examine and punish the students who involve in malpractice / indiscipline in examinations. The committee shall consist of:

a) Controller of examinations - Chairman
b) Addl. Controller of examinations.- Member Convenor
c) Subject expert - member
d) Head of the department of which the student belongs to. - Member
e) The invigilator concerned – member

The committee shall conduct the meeting after taking explanation of the student and punishment will be awarded by following the malpractice rules meticulously.

Any action on the part of candidate at the examination like trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents relating to the examinations, in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and will be recommended for appropriate punishment after thorough enquiry.

22. TRANSITORY REGULATIONS

Student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the Degree Programme, may be considered eligible for readmission to the same Subjects/Courses (or equivalent Subjects/Courses, as the case may be), and same Professional Electives/Open Electives (or from set/category of Electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the Date of Commencement of his I Year I Semester).

23. AMENDMENTS TO REGULATIONS

The Academic Council of Holy Mary Institute of Technology & Science reserves the right to revise, amend, or change the regulations, scheme of examinations, and / or syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

There shall be no Branch transfers after the completion of Admission Process. Transfer of student is permitted subjected to the rules and regulations of TSCHE (TE Department) and JNTUH in vogue. The College shall have its own Annual Graduation Day for the award of Degrees issued by the College/ University.

Institute will award Medals to the outstanding students who complete the entire course in the first attempt within the stipulated time.

i) Where the words “he”, “him”, “his”, occur in the write-up of regulations, they include “she”, “her”.
ii) Where the words “Subject” or “Subjects”, occur in these regulations, they also imply “Course” or “Courses”.
iii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.
iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.

Academic Regulations for B. Tech. (Lateral Entry Scheme) (Effective for the students getting admitted into II year from the Academic Year 2022-2023 on wards)

1. The Students have to acquire 120 credits from II to IV year of B.Tech Programme (Regular) for the award of the degree.
2. Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.
3. The same attendance regulations are to be adopted as that of B. Tech. (Regular)

Promotion Rule:

A Student will not be promoted from III Year to IV Year, unless he/she fulfils the Attendance and Academic Requirements and (i) secures a Total of 60% Credits up to III
Year II Semester, from all the regular and supplementary examinations.

Award of Class:

After the student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of B. Tech. Degree, he/she shall be placed in one of the following four classes: The marks obtained for 120 credits will be considered for the calculation of CGPA and award of class shall be shown separately.

Table: **Declaration of Class based on CGPA (Cumulative Grade Point Average)**

Class Awarded	Grade to be Secured
First Class with Distinction	CGPA ≥ 8.00
First Class	≥ 6.50 to < 8.00 CGPA
Second Class	≥ 5.50 to < 6.50 CGPA
Pass Class	≥ 5.00 to < 5.50 CGPA
FAIL	CGPA < 5

All other regulations as applicable for B. Tech. Four-year degree programme (Regular) will hold good for B.Tech (Lateral Entry Scheme).

MALPRACTICES RULES - DISCIPLINARY ACTION FOR /IMPROPER CONDUCT IN EXAMINATIONS

S. No	Nature of Malpractices / Improper Conduct	Punishment
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the Principal.
3	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6	Refuses to obey the orders of the Addl. Controller of examinations / 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 addl. Controller of examinations 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 addl. Controller of examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred for two consecutive Semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that Semester/year examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the principal for further action to award suitable punishment.	

COURSE STRUCTURE

Dept. of Computer Science & Engineering

I B.Tech.- I-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1MA101BS	Linear Algebra and Calculus	BSC	3	1	-	4	30	70	100
A1AP104BS	Applied Physics	BSC	3	1	-	4	30	70	100
A1EE107ES	Basic Electrical and Electronics Engineering	ESC	3	1	-	4	30	70	100
A1ME108ES	Engineering Graphics	ESC	1	-	4	3	30	70	100
A1AP112BS	Applied Physics Lab	BSC	-	-	3	1.5	30	70	100
A1EE115ES	Basic Electrical and Electronics Engineering Lab	ESC	-	-	2	1	30	70	100
A1ME116ES	Workshop Manufacturing Practices	ESC	-	-	4	2	30	70	100
A1CS117ES	Social Innovation	ESC	-	-	3	1.5	30	70	100
Total			**10**	**3**	**16**	**21**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
A1CS101MC	Technical Seminar - I	MC	-	-	2	-	100	-	100

I B.Tech.- II-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1MA201BS	Ordinary Differential Equations and Advanced Calculus	BSC	3	1	-	4	30	70	100
A1CH202BS	Engineering Chemistry	BSC	3	1	-	4	30	70	100
A1CS206ES	Programming for Problem Solving	ESC	3	-	-	3	30	70	100
A1EN205HS	English for Effective Communication	HSMC	2	-	-	2	30	70	100
A1CS214ES	Programming for Problem Solving Lab	ESC	-	-	4	2	30	70	100
A1CH210BS	Engineering Chemistry Lab	BSC	-	-	3	1.5	30	70	100
A1EN213HS	English Language and Communication Skills Lab	HSMC	-	-	3	1.5	30	70	100
A1CS218PW	Engineering Exploration	PWC	-	-	2	1	30	70	100
Total			**11**	**2**	**12**	**19**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
A1CS202MC	Technical Seminar-II	MC	-	-	2	-	100	-	**100**

II B.Tech.- I-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1MA301BS	Computer Oriented Statistical Methods	BSC	3	1	-	4	30	70	100
A1CS302PC	Data Structures	PCC	3	-	-	3	30	70	100
A1CS303PC	Discrete Mathematical Structures	PCC	3	-	-	3	30	70	100
A1CS304PC	Object Oriented Programming through Java	PCC	3	-	-	3	30	70	100
A1CS305PC	Data Structures Lab	PCC	-	-	3	1.5	30	70	100
A1CS306PC	Java Programming Lab	PCC	-	-	3	1.5	30	70	100
A1CS307PC	IT Workshop Lab	PCC	-	-	3	1.5	30	70	100
Total			**12**	**1**	**9**	**17.5**	**210**	**490**	**700**
Mandatory Course (Non-Credit)									
A1CS303MC	Environmental Studies	MC	2	-	-	-	100	-	100
A1CS304MC	Human Values and Professional Ethics	MC	3	-	-	-	100	-	100

II B.Tech.- II -Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1CS401ES	Digital Logic and Design	ESC	3	-	-	3	30	70	100
A1CS402PC	Computer Organization and Architecture	PCC	3	-	-	3	30	70	100
A1CS403PC	Database Management Systems	PCC	3	-	-	3	30	70	100
A1CS404PC	Operating System	PCC	3	-	-	3	30	70	100
A1CS405HS	Business Economics and Financial Analysis	HSMC	3	-	-	3	30	70	100
A1CS406PC	Python Programming Lab	PCC	1	-	3	2.5	30	70	100
A1CS407PC	Database Management Systems Lab	PCC	-	-	2	1	30	70	100
A1CS408PC	Operating Systems Lab	PCC	-	-	2	1	30	70	100
Total			**16**	**-**	**7**	**19.5**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
A1CS405MC	Gender Sensitization	MC	-	-	2	-	100	-	100

III B.Tech.- I Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1CS501PC	Web Technologies	PCC	3	-	-	3	30	70	100
A1CS502PC	Computer Networks	PCC	3	-	-	3	30	70	100
A1CS503PC	Design and Analysis of Algorithms	PCC	3	-	-	3	30	70	100
A1CS504PC	Software Engineering	PCC	3	-	-	3	30	70	100
	Professional Elective-I	PEC	3	-	-	3	30	70	100
A1CS505PC	Web Technologies Lab	PCC	-	-	3	1.5	30	70	100
A1CS506PC	Computer Networks Lab	PCC	-	-	3	1.5	30	70	100
A1EN507HS	Advanced English Communication Skills Lab	HSMC	-	-	2	1	30	70	100
A1CS508PW	Internship/Mini Project	PWC	-	-	-	2	-	100	100
	MOOCs (For B.Tech. Hons. Degree)*								
Total			**15**	**-**	**8**	**21**	**340**	**560**	**900**
Mandatory Course (Non-Credit)									
A1CS506MC	Constitution of India	MC	2	-	-	-	100	-	100

III B.Tech.- II Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1CS601PC	Automata and Complier Design	PCC	3	-	-	3	30	70	100
A1CS602PC	Machine Learning	PCC	3	-	-	3	30	70	100
A1CS603PC	DevOps	PCC	3	-	-	3	30	70	100
	Professional Elective-II	PEC	3	-	-	3	30	70	100
	Professional Elective-III	PEC	3	-	-	3	30	70	100
	Open Elective-I	OEC	3	-	-	3	30	70	100
A1CS604PC	DevOps Lab	PCC	-	-	3	1.5	30	70	100
A1CS605PC	Machine Learning Lab	PCC	-	-	3	1.5	30	70	100
A1CS607PW	Comprehensive Viva	PWC	-	-	-	1	-	100	100
	MOOCs (For B.Tech. Hons. Degree)*								
Total			**18**	**-**	**6**	**22**	**240**	**660**	**900**
Mandatory Course (Non-Credit)									
A1CS607MC	Essence of Indian Traditional Knowledge	MC	2	-	-	-	100	-	100

IV B.Tech.- I Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1CS701PC	Big Data Analytics	PCC	3	1	-	4	30	70	100
A1CS702PC	Cryptography and Network Security	PCC	3	-	-	3	30	70	100
A1CS703PC	Data Mining	PCC	3	-	-	3	30	70	100
	Professional Elective-IV	PEC	3	-	-	3	30	70	100
	Open Elective-II	OEC	3	-	-	3	30	70	100
A1CS704PC	Big Data Analytics Lab	PCC	-	-	3	1.5	30	70	100
A1CS705PC	Data Mining Lab	PCC	-	-	3	1.5	30	70	100
A1CS706PW	Project Phase - 1	PWC	-	-	8	4	100	-	100
	MOOCs (For B.Tech. Hons. Degree)*								
Total			**15**	**1**	**14**	**23**	**310**	**490**	**800**

IV B.Tech. - II Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1CS801HS	Organizational Behavior	HSMC	3	-	-	3	30	70	100
	Professional Elective-V	PEC	3	-	-	3	30	70	100
	Open Elective-III	OEC	3	-	-	3	30	70	100
A1CS802PW	Project Phase - 2	PWC	-	-	16	8	30	70	100
	MOOCs (For B.Tech. Hons. Degree)*								
Total			**9**	**-**	**16**	**17**	**120**	**280**	**400**

Total Credits = 160

PROFESSIONAL ELECTIVES			
PE-I		**PE-II**	
A1CS501PE	Artificial Intelligence	A1CS604PE	Computer Vision
A1CS502PE	Principles of Programming Languages	A1CS605PE	Robotic Process Automation
A1CS503PE	Distributed Databases	A1CS606PE	Distributed Systems
PE-III		**PE-IV**	
A1CS607PE	Mobile Application Development	A1CS710PE	Natural Language Processing
A1CS608PE	Scripting Languages	A1CS711PE	Internet of Things
A1CS609PE	Software Testing Methodologies	A1CS712PE	Cloud Computing
PE-V			
A1CS813PE	Predictive Analytics		
A1CS814PE	Block chain Technology		
A1CS815PE	Cyber Security		

OPEN ELECTIVES			
OE-I		**OE-II**	
A1CS601OE	Operating Systems	A1CS703OE	PHP Programming
A1CS602OE	Database Management Systems	A1CS704OE	Cyber Security
OE-III			
A1CS805OE	Linux Programming		
A1CS806OE	R Programming		

OPEN ELECTIVES				
S. No.	**Name of the Department Offering Open Electives**	**Open Elective – I (Semester – VI)**	**Open Elective – II (Semester – VII)**	**Open Elective – III (Semester – VIII)**
1	Civil Engg.	**A1CE601OE**	**A1CE703OE**	**A1CE805OE**
		Engineering Materials For Sustainability	Environmental Engineering	Green Building Technologies
		A1CE602OE	**A1CE704OE**	**A1CE806OE**
		Disaster Preparedness & Planning Management	Construction Engineering And Management	Air Pollution and Control
2	Computer Science and Engg.	**A1CS601OE**	**A1CS703OE**	**A1CS805OE**
		Java Programming	Operating Systems	Linux Programming
		A1CS602OE	**A1CS704OE**	**A1CS806OE**
		Database Management Systems	Cyber Security	R Programming
3	Electrical and Electronics Engg.	**A1EE601OE**	**A1EE703OE**	**A1EE805OE**
		Energy Storage Systems	Electrical Safety Practices for Industry	Modern Trends in Electrical Energy
		A1EE602OE	**A1EE704OE**	**A1EE806OE**
		Renewable Energy Sources	Basics of Power Plant Engineering	Energy from Waste

4	Electronics and Communication Engg.	**A1EC601OE**	**A1EC703OE**	**A1EC805OE**
		Principles of Communications	Fiber Optic Communications	Embedded Networking
		A1EC602OE	**A1EC704OE**	**A1EC806OE**
		Electronic Measuring Instruments	Mobile Communication and Networks	Satellite Communication
5	Mechanical Engg.	**A1ME601OE**	**A1ME703OE**	**A1ME805OE**
		Mechatronics	Composite Materials	Total Quality Management
		A1ME602OE	**A1ME704OE**	**A1ME806OE**
		Additive Manufacturing	Industrial Robotics	Renewable Energy Sources
6	CSE(Artificial Intelligence and Machine Learning)	**AIAM601OE**	**A1AM703OE**	**A1AM805OE**
		ComputationalComplexity	Introduction To Machine Learning	Cognitive Computing
		AIAM602OE	**A1AM704OE**	**A1AM806OE**
		Computer Networks	Green Computing	Software Process and Project Management
7	CSE(Data Science)	**A1DS601OE**	**A1DS703OE**	**A1DS805OE**
		Data Warehousing and Data Mining	Python Programming	Deep Learning
		A1DS602OE	**A1DS704OE**	**A1DS806OE**
		Artificial Intelligence	Text Analytics and Natural Language Processing	Reinforcement Learning
8	CSE(IoT)	**A1IO601OE**	**A1IO703OE**	**A1IO805OE**
		Sensor and Devices	**IoT for Architects**	**IoT System Design**
		A1IO602OE	**A1IO704OE**	**A1IO806OE**
		IoT Sensor and Technologies	**Python for IoT**	**Internet of Medical Things**
9	CSE(Software Engineering) Civil Engg.	**A1SE601OE**	**A1SE703OE**	**A1SE805OE**
		Introduction to C++	**JAVA Programming**	**Scripting Language**
		A1SE602OE	**A1SE704OE**	**A1SE806OE**
		Principles of Software Engineering	**Software Testing Methodology**	**Software Quality Management**

***Open Elective –** Students should take Open Electives from List of Open Electives Offered by Other Departments / Branches Only

Ex: - A Student of Computer Science and Engineering can take Open Electives from all other departments/branches except Open Electives offered by Computer Science and Engineering Dept.

DETAILED SYLLABUS

I-YEAR (I-SEMESTER)

LINEAR ALGEBRA AND CALCULUS

I B. TECH- I SEMESTER **L T P C**
Course Code: A1MA101BS **3 1 - 4**

COURSE OBJECTIVES

To learn

1. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
3. Concept of Sequence and nature of the series.
4. Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
5. Partial differentiation and finding maxima and minima of function of two and three variables.

COURSE OUTCOMES

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

1. Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
2. Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
3. Analyse the nature of sequence and series.
4. Solve the applications on the mean value theorems and evaluate the improper integrals using Beta and Gamma functions
5. Find the extreme values of functions of two variables with/ without constraints.

UNIT – I: MATRICES

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method

UNIT – II: EIGEN VALUES AND EIGEN VECTORS

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation

UNIT-III FIRST ORDER ORDINARY DIFFERENTIAL EQUATION

Exact,linear and Bernoulli's equations: Orthogonal Trajectories (in Cartesian and polar coordinates) Newton's law of cooling, Law of natural growth and decay, Equations not of first degree: Equations solvable for p, Equations solvable for y, Equations solvable for x and Clairaut's type.

UNIT – IV: CALCULUS

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. Curvature- Radius of Curvature (Cartesian and Parametric co-ordinates) – Center of Curvature –Evolutes – Envelopes of one parameter family of curves. Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002

REFERENCE BOOKS:

1. G.B.Thomas, calculus and analytical geometry, 9th Edition, Pearson Reprint 2006.
2. N.P Bali and Manish Goyal, A Text of Engineering Mathematics, Laxmi publications, 2008.
3. E.L.Ince, Ordinary differential Equations, Dover publications, 1958.

REFERENCE BOOKS:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.

APPLIED PHYSICS

I B. TECH- I SEMESTER **L T P C**
Course Code: A1AP104BS **3 1 - 4**

COURSE OBJECTIVES:

1. To impart the knowledge of quantum mechanics to explore the behavior of subatomic particles.
2. To extend the competency and understanding of the concepts of Semiconductor physics.
3. To acquire the knowledge of Optoelectronics and able to apply it to various systems like communications, solar cell, photo cells and so on.
4. To differentiate the properties of laser with the ordinary light and describe the principle and propagation of light through optical fibers.
5. To understand the concepts of electromagnetism and study the properties of magnetic materials and its various applications.

COURSE OUTCOMES: Upon graduation, the students will be able to:

1. Explain the concepts of the quantum mechanics and point out the shortcomings of classical mechanics.
2. Acquire the knowledge of Semiconductor physics and apply it to day to day issues.
3. Compare the working of several day-to-day optoelectronic devices.
4. Study and characterize the properties of Lasers and optical fibers and prepare new models for various engineering applications.
5. Evaluate the different parameters of magnetic materials and their applications, and analyze the fundamentals of Electromagnetic theory.

UNIT-I: QUANTUM MECHANICS

Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect (qualitative treatment), de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, G.P. Thompson Experiment, Heisenberg's Uncertainty principle and its applications ,Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

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UNIT-II: BAND THEORY AND SEMICONDUCTOR PHYSICS

Bloch theorem, Band theory of solids, Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Energy level diagram of p-n junction diode,ZenerdiodeandtheirV-ICharacteristics,BipolarJunctionTransistor(BJT):Construction,Principleofoperation.

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UNIT-III: OPTOELECTRONICS

Radiative and non-radiative recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit, Semiconductor photo detectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT-IV: LASERS AND FIBRE OPTICS

Lasers: Introduction to interaction of radiation with matter, Coherence, Characteristics of LASER, Principle and working of Laser, Einstein coefficients, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO_2) laser, He-Ne laser, Nd-Yag laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

UNIT-V: ELECTROMAGNETISM AND MAGNETIC PROPERTIES OF MATERIALS

Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Polarization, Permittivity and Dielectric constant, Internal fields in a solid, Clausius-Mossotti equation(qualitative treatment), Ferroelectrics and Piezoelectrics. Magnetisation, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials.

TEXT BOOKS:

1.EngineeringPhysics,B.K.Pandey,S.Chaturvedi- CengageLearing.
2.HallidayandResnick,Physics-Wiley.
3.AtextbookofEngineeringPhysics,Dr.M.N.Avadhanulu,Dr.P.G.Kshirsagar -S.Chand
4. Solid state physics by Dr. M.Arumugam

REFERENCE BOOKS:

1. RichardRobinett,Quantum Mechanics
2. J. Singh,SemiconductorOptoelectronics:PhysicsandTechnology,McGraw-Hillinc.(1995).
3. Solid state physics by A. J. Dekker.
4. https://nptel.ac.in/courses/113/106/113106065/

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

I B. TECH- I SEMESTER **L T P C**
Course Code: A1EE107ES **3 1 - 4**

COURSE OBJECTIVES

The course should enable the students to learn:

1. Develop fundamentals, including Ohm's law, Kirchhoff's laws and be able to solve for currents, voltages and power in electrical circuits.
2. Develop EMF equation and analyze the operation of DC Machines.
3. Analyze the working principle of Transformer.
4. Discuss the operation of AC Machines.
5. Analyze the operation of PN junction diode and rectifiers.
6. Discuss the operation and characteristics of Transistors.

COURSE OUTCOMES:

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

1. Analyze and solve for current values in resistive circuits with independent sources.
2. Analyze the working of DC machines and solve the numerical problems.
3. Analyze the working of AC electrical machines and solve the numerical problems.
4. Analyze the V-I characteristics of PN – junction diode and describe the operation of rectifiers.
5. Analyze the different configurations of Transistors and obtain its characteristics.

UNIT I ELECTRICAL CIRCUITS

Basic definitions-Ohm's Law, types of elements, types of sources, Kirchhoff's Laws – simple problems. Series & parallel resistive networks with DC excitation star to delta and delta to star transformations. **Norton's, Thevenin's theorems.**

UNIT II DC MACHINES

Principle of Operation of DC Motor, types of DC motor, Torque equation & Losses and problems. DC Generator construction and working Principle, EMF Equation types of generators and problems.

UNIT III AC MACHINES

Working principle and Construction of transformer, Emf Equation & problems, Principle operation of 3- phase induction motor, slip and torque Equation, Torque –slip Characteristics & problems, principle Operation of 3-phase Alternator, Emf Equation of Alternator & problems.

UNIT IV DIODE AND ITS CHARACTERISTICS

PN JUNCTION DIODE: Operation of PN junction Diode: forward bias and reverse bias, Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics. Rectifiers, Half wave, Full wave and bridge Rectifiers –capacitor filters, inductor filters.

UNIT V TRANSISTORS

Bipolar Junction Transistor - NPN & PNP Transistor, CB, CE, CC Configurations and Characteristics – Transistor Amplifier.

TEXT BOOKS:

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshaiah TMH.
2. Electronic Devices and circuits by J.Millman, C.C.Halkias and SatyabrataJit2ed.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th Edition.

REFERENCE BOOKS:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering",Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press (2005).
3. Mehta V K, "Principles of Electronics", S.Chand& Company Ltd, (1994).
4. MahmoodNahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, (2002).

ENGINEERING GRAPHICS

I B. TECH- I SEMESTER **L T P C**
Course Code: A1ME108ES **1 - 4 3**

COURSE OBJECTIVES:

To learn:

1. To provide basic concepts in engineering drawing.
2. To impart knowledge about standard principles of orthographic projection of objects.
3. To draw sectional views and pictorial views of solids.

COURSE OUTCOMES:

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

1. Preparing working drawings to communicate the ideas and information.
2. Read, understand and interpret engineering drawings.

UNIT – I INTRODUCTION

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales –Plain & Diagonal.

UNIT – II PROJECTIONS

Projections of Points, Lines and Planes: Principles of Orthographic Projections –Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. —Auxiliary Planes.

UNIT – III PROJECTION OF SOLIDS

Projection of Solids and Sectioned Solids:Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere.

UNIT – IV DEVELOPMENT OF LATERAL SURFACES

Development of Lateral Surfaces: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone.

UNIT – V ISOMETRIC PROJECTIONS

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions.

Introduction to CAD: For Internal Evaluation Weightage only):

Introduction to CAD Software Package Commands. - Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package.

TEXT BOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar.
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford.

REFERENCE BOOKS:

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill.
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers.

APPLIED PHYSICS LAB

I B. TECH- I SEMESTER **L T P C**
Course Code: A1AP112BS **- - 3 1.5**

COURSE OBJECTIVES:

1. To discuss the energy gap (Eg) of a semiconductor diode and the fill factor of solar cell using the V-I characteristics.
2. To explain the electrical resonance by using the LCR circuit and calculate the time constant by using RC circuit.
3. To develop skills to impart practical knowledge in real time solution of various optoelectronic devices like LED and LASER.
4. To understand the bending losses and numerical aperture of an optical fiber cable.
5. To impart the practical knowledge on the concept of photo electric effect and Hall Effect and compare the results with theoretical calculations.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. Analyze various properties of the semi-conductor devices and determine the energy gap of semiconductors.
2. Discuss the working of various electronic components like inductor, capacitor, resister and built the circuits by selecting the appropriate components.
3. Explain the working and characteristics of the various optoelectronic devices and develop the skills of practical knowledge in real time solution.
4. Compare the bending losses of optical fibers at various working areas and recall the applications of optical fibers.
5. Understand the properties of magnetic materials and determine the related parameters of magnetic fields.

LIST OF EXPERIMENTS:

1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.

2. Solar Cell: To study the V-I Characteristics of solar cell.

3. R-C Circuit: To determine the time constant of R-C circuit.

4. LCR Circuit: To determine the Quality factor of LCR Circuit.

5. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.

6. LASER: To study the characteristics of LASER sources.

7. Optical fiber: To determine the bending losses of Optical fibers.

8. Photoelectric effect: To determine work function of a given material.

9. Stewart – Gee's experiment: Determination of magnetic field along the axis of a current carrying coil.

10. Hall effect: To determine Hall co-efficient of a given semiconductor.

Note: Any 8 experiments are to be performed.

REFERENCE BOOKS:

1. Engineering Physics Lab Manual by Dr.Y. Aparna&Dr.K.Venkateswarao (V.G.S.Book links).
2. Physics practical manual, Lorven Publications.

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

I B. TECH- I SEMESTER **L T P C**
Course Code: A1EE115ES **- - 2 1**

COURSE OBJECTIVES

The course should enable the students to learn:

1. Develop fundamentals, including Ohm's law, Kirchhoff's laws and be able to solve for currents, voltages and power in electrical circuits.
2. Develop EMF equation and analyze the operation of DC Machines.
3. Analyze the working principle of Transformer.
4. Discuss the operation of AC Machines.
5. Analyze the operation of PN junction diode and rectifiers.
6. Discuss the operation and characteristics of Transistors.

COURSE OUTCOMES:

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

1. Analyze and solve for current values in resistive circuits with independent sources.
2. Analyze the working of DC machines and solve the numerical problems.
3. Analyze the working of AC electrical machines and solve the numerical problems.
4. Analyze the V-I characteristics of PN – junction diode and describe the operation of rectifiers.
5. Analyze the different configurations of Transistors and obtain its characteristics.

LIST OF EXPERIMENTS

PART-A (Electrical Engineering):

WEEK – 1 Verification of **Norton's, Thevenin's theorems**

WEEK -2 Verification of KVL and KCL

WEEK – 3 Brake test on DC shunt motor.

WEEK – 4 Swinburne's test on D.C. Shunt machine (predetermination of efficiency of a given D.C. shunt machine working as motor and generator).

WEEK – 5 O.C and S.C test on single phase transformer (predetermination of Efficiency and regulation at given power factor.

WEEK – 6 Brake test on 3- phase induction motor (determination of performance Characteristics).

WEEK – 7 No-Load Characteristics of a Three-phase Alternator.

PART-B (Electronics Engineering):

WEEK – 8 Study and operation of

(i)Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.

WEEK – 9 PN Junction diode characteristics

WEEK – 10 Zener diode characteristics and Zener as voltage Regulator

WEEK – 11 Input & Output characteristics of Transistor in CB / CE configuration

WEEK – 12 Full Wave Rectifier with & without filters

WEEK – 13 Input and Output characteristics of FET in CS configuration.

TEXT BOOKS:

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshaiah TMH.
2. Electronic Devices and circuits by J.Millman, C.C.Halkias and SatyabrataJit 2ed.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.

REFERENCE BOOKS:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering",Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press (2005).
3. Mehta V K, "Principles of Electronics", S.Chand& Company Ltd, (1994).
4. MahmoodNahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, (2002).

WORKSHOP MANUFACTURING PRACTICE

I B. TECH- I SEMESTER **L T P C**
Course Code: A1ME116ES **- - 4 2**

COURSE OBJECTIVES:

The course should enable the students to:

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

COURSE OUTCOMES:

By the end of the course students will be able:

1. Study and practice on machine tools and their operations
2. Practiceonmanufacturingofcomponentsusingworkshoptradesincludingpluming, fitting, carpentry, foundry, house wiring and welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.

LIST OF EXPERIMENTS:

I. TRADES FOREXERCISES:

At least two exercises from each trade:

Experiment-1 Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
Experiment-2 Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
Experiment-3 Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
Experiment-4 Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
Experiment-5 Welding Practice – (Arc Welding & Gas Welding)
Experiment-6 House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
Experiment-7 Black Smithy – (Round to Square, Fan Hook and S-Hook)

II.TRADES FOR DEMONSTRATION &EXPOSURE:

Experiment-1 Plumbing, Machine Shop, Metal Cutting
Experiment-2 Power tools in construction and Wood Working

REFERENCE BOOKS:

1. Workshop Practice /B. L. Juneja /Cengage
2. Workshop Manual / K. Venugopal /Anuradha.
3. Work shop Manual - P. Kannaiah/ K. L. Narayana/SciTech
4. Workshop Manual / Venkat Reddy/BSP

SOCIAL INNOVATION

I B. TECH- I SEMESTER **L T P C**
Course Code: A1CS117ES **- - 3 1.5**

COURSE DESCRIPTION:

Course Overview

Social Innovation is an open-ended course to develop social connectedness in engineering students through social awareness and social consciousness. This can be done through live field exposure along with faculty led conceptual presentations, real case reviews, self-study assignments, literature and field survey. Through this course, the students are expected to use their engineering knowledge to provide innovative solutions to existing social problems. This course also develops critical thinking ability among the students to develop sustainable solutions.

COURSE OUTCOMES

After the completion of the course, the student will be able to:

1. Develop awareness on social issues faced by local regions.
2. Identify the mind set of human Race and interpret the societal issues as simple, complicated, and complex problems.
3. Identify the need statement along with its main causes and effects.
4. Develop an innovative and sustainable solution for social issues by thinking critically and creatively

UNIT – I INTRODUCTION TO SOCIAL INNOVATION

Introduction to Social Innovation: Core definitions, core elements and common features of social innovation, a typology of social innovation, awakening social consciousness.

UNIT – II CREATE MINDSETS AND WICKED PROBLEMS

Create Mindsets and Wicked Problems: Seven mindsets – Empathy, Optimism, Iteration, Creative confidence, making it, embracing ambiguity, learning from failures. Distinguish between simple, complicated, and complex problems; describe the characteristics of wicked problems, breakdown a given problem by unpacking its complexity.

UNIT – III CRITICAL AND CREATIVE THINKING FOR SOCIAL INNOVATION

Critical and Creative Thinking for Social Innovation: Definition, engineering thinking and learning, distinguish between creativity and innovation. Models of Creative thinking. [Appreciative Inquiry (AI), Asset Based Community Development (ABCD) and Concept of Bricolage.]

UNIT – IV PROCESS OF SOCIAL INNOVATION

Process of Social Innovation: Community study, develop questionnaire, identifying the causes of a particular problem. Identify needs, record your learning's, Generate ideas, select promising ideas, prototyping, and testing.

UNIT – V SOCIAL INNOVATION ACROSS FOUR SECTORS AND STAGES OF INNOVATION

Social Innovation across Four Sectors: The non-profit sector, public sector, the private sector, the informal sector, links between and cross sectors.

Stages of Innovation: Social organizations and enterprises, social movements, social software and open source methods, common patterns of success and failure.

TEXT BOOKS:

1. Robin Murray, Julie Caulier-Grice, Geoff Mulgan, "The open book of social innovation: Ways to Design, Develop and Grow Social Innovation", The Young Foundation, 2010.
2. Julie Caulier-Grice, Anna Davies, Robert Patrick & Will Norman, The Young Foundation (2012) Social Innovation Overview: A deliverable of the project: "The theoretical, empirical and policy foundations for building social innovation in Europe" (TEPSIE), European Commission – 7th Framework Programme, Brussels: European Commission, DG Research.

REFERENCE BOOKS:

1. Geoff Mulgan, "Social Innovation: What it is, Why it matters and How it can be accelerated", The Young Foundation, 2007.
2. Asset Based Community Development (ABCD) Model – http://www.nurturedevelopment.org/assetbased-community-develop
3. Diana Whitney & Amanda Trosten-Bloom, "The Power of Appreciative inquiry – A Practical Guide to Positive Change", 2nd Edition, Berrett-Koehler Publishers, Inc, 2010.

I-YEAR (II-SEMESTER)

ORDINARY DIFFERENTIAL EQUATIONS AND ADVANCED CALCULUS

I B. TECH- II SEMESTER **L T P C**
Course code: A1MA201BS **3 1 - 4**

COURSE OBJECTIVES:

The students would be able to learn

1. Different methods of solving the differential equations of higher order.
2. Concept, properties of Laplace transforms and Solving ordinary differential equations using Laplace transforms techniques.
3. Evaluation of multiple integrals and their applications.
4. The physical quantities involved in engineering field related to vector valued functions.
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

COURSE OUTCOMES:

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

1. Solve higher differential equation and apply the concept of differential equation to real world problems.
2. Use the Laplace Transform techniques for solving ODE's.
3. Evaluate the multiple integrals and apply the concept to find areas, volumes.
4. Evaluate the line, surface and volume integrals and converting them from one to another.
5. Apply Green, Gauss, and Stokes theorem to the integrals.

UNIT –I ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sin ax, cos ax, polynomials in x, $e^{ax}(x)$ and $x\ V(x)$; method of Variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation .Application to Electrical circuits.

UNIT –II LAPLACE TRANSFORMS

Laplace Transform of standard functions; first shifting theorem, Second shifting theorem: Laplace transforms of functions when they are multiplied and divided by t. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Specific functions(Unit step function ,Unit impulsive function); Laplace transform of Periodic functions.

Inverse Laplace transform by different methods, Convolution theorem (without Proof), Solving ODEs by Laplace Transform method.

UNIT –III MULTIVARIABLE CALCULUS (INTEGRATION)

Evaluation of Double Integrals (Cartesian and polar coordinates); Change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and Volumes (by double integrals and triple integrals).

UNIT –IV VECTOR DIFFERENTIATION

Vector point functions and Scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V VECTOR INTEGRATION

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes theorems (statement &their verification).

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint,

REFERENCE BOOKS:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
3. Advance engineering mathematics by RK Jain & S.R.K.Iyengar 3rd edition Narosa publishing house Delhi

ENGINEERING CHEMISTRY

I B. TECH- II SEMESTER **L T P C**
Course Code: A1CH202BS **3 1 - 4**

COURSE OBJECTIVES:

1. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand & remember the technology based on them.
2. Able to understand the concepts of hardness & analyse hardness of water.
3. To acquire the knowledge of electrochemistry & corrosion
4. To acquire the skills pertaining to spectroscopy and able to evaluate the structure of organic compounds.
5. To impart the knowledge of stereochemistry and synthesis of Aspirin & Paracetamol

COURSE OUTCOMES:

1. Able to evaluate the MOELD of N2, O_2 & F_2.
2. Able to analyse hardness of water.
3. Able to apply electrochemistry concepts to **solve** the problem of corrosion.
4. Able to evaluate the structure of Organic compounds by using spectroscopy.
5. Able to synthesize Organic medicines like Paracetamol & Aspirin & **predict** the structure based on stereochemistry.

UNIT - I: MOLECULAR STRUCTURE AND THEORIES OF BONDING

Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N2, O2 and F2 molecules. π molecular orbitals of butadiene and benzene. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion dorbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

UNIT - II: WATER AND ITS TREATMENT

Introduction – Hardness of water – Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

UNIT - III: ELECTROCHEMISTRY AND CORROSION

Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Determination of pH of a solution by using quinhydrone and glass electrode. Measurement of emf of a cell(solution). Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).Fuel cells-Hydrogen-Oxygen fuel cell, Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – methods of application. Electroless plating of Nickel.

UNIT - IV: STEREOCHEMISTRY, REACTION MECHANISM AND SYNTHESIS OF DRUG MOLECULES

Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation analysis of n- butane. Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBR to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Rearrangement reactions: Pincol pinacolone rearrangement .Oxidation reactions: Oxidation of alcohols using KMnO4 and chromic acid. Reduction reactions: reduction of carbonyl compounds using LiAlH4 & NaBH4. Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT - V: INTRODUCTION OF SPECTROSCOPY, SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

Principles of spectroscopy, selection rules and applications of electronic spectroscopy. Vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

TEXT BOOKS:

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition.
5. University Chemistry, by B.M. Mahan, Pearson IV Edition.
6. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan

REFERENCE BOOKS:

1. Organic chemistry by Morryson and Boyd

PROGRAMMING FOR PROBLEM SOLVING

I B. TECH- II SEMESTER **L T P C**
Course Code: A1CS206ES **3 - - 3**

COURSE OBJECTIVES

1. To impart knowledge about problem solving and algorithmic thinking.
2. To familiarize with the syntax and semantics of C programming language.
3. To learn the usage of structured programming approach in solving problems.
4. To use arrays, pointers, strings and structures in solving problems.
5. To understand how to solve problems related to matrices, Searching and sorting.

COURSE OUTCOMES

1. At the end of the course, student will be able to:
2. Apply algorithmic thinking to understand, define and solve problems
3. Develop computer programs using programing constructs and control structures
4. Decompose a problem into functions to develop modular reusable code.
5. Use arrays, pointers, strings and structures to formulate algorithms and programs.
6. Use files to perform read and write operations.

UNIT – I: INTRODUCTION - PROBLEM SOLVING AND ALGORITHMIC THINKING

Introduction to Computer System, Types of memories, Application and System Software, Problem Solving and Algorithmic Thinking Overview – Problem Definition, logical reasoning, Algorithm definition, practical examples, properties, representation, flowchart, algorithms vs programs.

Algorithmic Thinking – Constituents of algorithms - Sequence, Selection and Repetition, input- output; Computation – expressions, logic; Problem Understanding and Analysis – problem definition,

variables, name binding, data organization: lists, arrays etc. algorithms to programs.

UNIT – II: OPERATORS, EXPRESSIONS AND CONTROL STRUCTURES

Introduction to C language: Structure of C programs, C tokens, data types, data inputs, output statements, Operators, precedence and associativity, evaluation of expressions, type conversions in expressions.

Control structures: Decision statements; if and switch statement; Loop control statements: while, for and do while loops, jump statements, break, continue, goto statements.

UNIT - III: ARRAYS AND FUNCTIONS

Arrays: Concepts, one dimensional array, declaration and initialization of one-dimensional arrays, two dimensional arrays, initialization and accessing, multi-dimensional arrays, Basic Searching Algorithms: Linear and Binary search

Functions: User defined and built-in Functions, storage classes, Parameter passing in functions, call by value, call by reference, passing arrays to functions, Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Towers of Hanoi etc.

UNIT - IV: STRINGS AND POINTERS

Strings: Arrays of characters, variable length character strings, inputting character strings, character library functions, string handling functions.

Pointers: Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, functions returning pointers, Dynamic memory allocation.

UNIT – V: STRUCTURES AND FILE HANDLING

Structures and unions: Structure definition, initialization, accessing structures, nested structures, arrays of structures, structures and functions, self-referential structures, unions, typedef, enumerations.

File handling: command line arguments, File modes, basic file operations read, write and append, example programs.

TEXT BOOKS:

1. Riley DD, Hunt K.A. Computational Thinking for the Modern Problem Solver. CRC press, 2014 Mar 27.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Byron Gottfried, “Programming with C”, Schaum's Outlines Series, McGraw Hill Education, 3rdedition, 2017.

REFERENCE BOOKS:

1. W. Kernighan Brian, Dennis M. Ritchie, “The C Programming Language”, PHI Learning, 2nd Edition, 1988.
2. Yashavant Kanetkar, “Exploring C”, BPB Publishers, 2nd Edition, 2003.
3. Schildt Herbert, “C: The Complete Reference”, Tata McGraw Hill Education, 4th Edition, 2014.
4. R. S. Bichkar, “Programming with C”, Universities Press, 2nd Edition, 2012.
5. Dey Pradeep, Manas Ghosh, “Computer Fundamentals and Programming in C”, Oxford University Press, 2nd Edition, 2006.
6. Stephen G. Kochan, “Programming in C”, Addison-Wesley Professional, 4th Edition, 2014.

WEB REFERENCES:

1. https://en.wikipedia.org/wiki/Computational_thinking
2. https://nptel.ac.in/courses/106/104/106104128/
3. https://en.cppreference.com/w/c/language
4. https://www.learn-c.org/

E-TEXT BOOKS:

1. https://slidelegend.com/queue/computational-thinking-for-the-modern-problem-solver_59d6f01e1723ddb0c7a0df47.html
2. http://flowgorithm.altervista.org/#elf_l1_Lw
3. http://www.freebookcentre.net/Language/Free-C-Programming-Books-Download.htm

MOOC COURSE:

1. https://www.coursera.org/learn/computational-thinking-problem-solving
2. https://onlinecourses.nptel.ac.in/noc18_cs33/preview
3. https://www.alison.com/courses/Introduction-to-Programming-in-c
4. http://www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s096-effective- programming-in-c-and-c-january-iap-2014/index.htm

ENGLISH FOR EFFECTIVE COMMUNICATION

I B. TECH- II SEMESTER	L	T	P	C
Course Code: A1EN205HS	2	-	-	2

INTRODUCTION:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students. In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.

COURSE OBJECTIVES:

1. Improve language proficiency with emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Apply the theoretical and practical components of English syllabus to study academic subjects more effectively and critically.
3. Analyze a variety of texts and interpret them to demonstrate in writing or speech.
4. Write clearly and creatively, and adjust writing style appropriately to the content, the context, and nature of the subject.
5. Develop language components to communicate effectively in formal and informal situations.

COURSE OUTCOMES:

Students should be able to:

1. Use English Language effectively in spoken and written forms.
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
5. Generate dialogues for various situations.

UNIT –I: 'THE RAMAN EFFECT' FROM THE PRESCRIBED TEXTBOOK 'ENGLISH FOR ENGINEERS' PUBLISHED BY CAMBRIDGE UNIVERSITY PRESS.

Vocabulary: The Concept of Word Formation --The Use of Prefixes and Suffixes. Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions. Reading: Reading and Its Importance- Techniques for Effective Reading. Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph – Creating Coherence- Organizing Principles of Paragraphs in documents.

UNIT –II: 'ANCIENT ARCHITECTURE IN INDIA' FROM THE PRESCRIBED TEXTBOOK 'ENGLISH FOR ENGINEERS' PUBLISHED BY CAMBRIDGE UNIVERSITY PRESS.

Vocabulary: Synonyms and Antonyms. Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement. Reading: Improving Comprehension Skills – Techniques for Good Comprehension Writing: Format of a Formal Letter-Writing Formal Letters, E.g. Letter of Complaint, Letter of Requisition, and Job Application with Resume.

UNIT –III: 'ENERGY: ALTERNATIVE SOURCES' FROM THE PRESCRIBED TEXT BOOK 'ENGLISH FOR ENGINEERS AND TECHNOLOGISTS' TEXT BOOK- ORIENT BLACK SWAN.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives- Words from Foreign Languages and their Use in English Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses. Reading: Sub-skills of Reading-Skimming and Scanning Writing: Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT –IV: 'WHAT SHOULD YOU BE EATING' FROM THE PRESCRIBED TEXTBOOK 'ENGLISH FOR ENGINEERS' PUBLISHED BY CAMBRIDGE UNIVERSITY PRESS.

Vocabulary: Standard Abbreviations in English Grammar: Redundancies and Clichés in Oral and Written Communication. Reading: Comprehension- Intensive Reading and Extensive Reading Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT –V: 'GOOD MANNERS' BY J C HILLS FROM FLUENCY IN ENGLISH – A COURSE BOOK FOR ENGINEERING STUDENTS

Vocabulary: Technical Vocabulary and their usage Grammar: Common Errors in English Reading: Reading Comprehension- Exercises for Practice. Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports -Writing a Report.

TEXT BOOKS:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers Cambridge University Press
2. Department of Humanities and Sciences, (2016) – Anna University - English for Engineers and Technologists – Orient BlackSwan
3. J.C.Hill, (2016) Fluency in English- A Course book for Engineering students- Orient BlackSwan

REFERENCE BOOKS:

1. Swan, M. (2016). Practical English Usage Oxford University Press
2. Kumar, S and Lata, P.(2018). Communication Skills Oxford University Press
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well Harper Resource Book
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press

Exercises in Spoken English. Parts I –III CIEFL, Hyderabad. Oxford University Press

PROGRAMMING FOR PROBLEM SOLVING LAB

I B. TECH- II SEMESTER **L T P C**
Course Code: A1CS214ES **- - 4 2**

COURSE OBJECTIVES

1. To be familiarize with flowgorithm to solve simple problems
2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings pointers and structures.

COURSE OUTCOMES

1. At the end of the course, student will be able to
2. Solve simple mathematical problems using Flowgorithm.
3. Correct syntax errors as reported by the compilers and logical errors encountered at run time
4. Develop programs by using decision making and looping constructs.
5. Implement real time applications using the concept of array, pointers, functions and structures.
6. Solve real world problems using matrices, searching and sorting

WEEK – 1:

a) Installation and working of Flowgorithm Software.
b) Write and implement basic arithmetic operations using Flowgorithm – sum, average, product, difference, quotient and remainder of given numbers etc.

WEEK – 2:

a) Draw a flowchart to calculate area of Shapes (Square, Rectangle, Circle and Triangle).
b) Draw a flowchart to find the sum of individual digits of a 3 digit number.
c) Draw a flowchart to convert days into years, weeks and days.
d) Draw a flowchart to read input name, marks of 5 subjects of a student and display the name of the student, the total marks scored, percentage scored.

WEEK – 3:

a) Draw a flowchart to find roots of a quadratic equation.
b) Draw a flowchart to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd
c) Draw a flowchart to check whether the triangle is equilateral, isosceles or scalene triangle

WEEK – 4:

a) Write a C program to swap values of two variables with and without using third variable.
b) Write a C program to enter temperature in Celsius and convert it into Fahrenheit.
c) Write a C program to calculate Simple and Compound Interest.
d) Write a C program to calculate s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).

WEEK – 5:

a) Write a C program to find largest and smallest of given numbers.
b) Write a C program which takes two integer operands and one operator form the user(+,-,*,/,% use switch)
c) Write a program to compute grade of students using if else adder. The grades are assigned as followed:

marks<50 F
50≤marks< 60 C

60≤marks<70	B
70≤marks	B+
80≤marks<90	A
90≤mars≤ 100	A+

WEEK – 6:

a) Write a C program to find Sum of individual digits of given integer
b) Write a C program to generate first n terms of Fibonacci series
c) Write a C program to generate prime numbers between 1 and n
d) Write a C Program to find the Sum of Series SUM=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!
e) Write a C program to generate Pascal's triangle.
f) Write a C program to generate pyramid of numbers.

```
1
1       3       1
1       3       5       3       1
```

WEEK – 7:

a) Write a C Program to implement following searching methods
   I. Binary Search
   II. Linear Search

b) Write a C program to find largest and smallest number in a list of integers

c) Write a C program
   I. To add two matrices
   II. To multiply two matrices

d) Write a C program to find Transpose of a given matrix

WEEK – 8:

a) Write a C program to find the factorial of a given integer using functions
b) Write a C program to find GCD of given integers using functions
c) Write a C Program to find the power of a given number using functions

WEEK – 9:

a) Write a C Program to find binary equivalent of a given decimal number using recursive functions.
b) Write a C Program to print Fibonacci sequence using recursive functions.
c) Write a C Program to find LCM of 3 given numbers using recursive functions

WEEK – 10:

a) Write a C program using functions to
b) Insert a sub string into a given main string from a given position
c) Delete n characters from a given position in a string
d) Write a C program to determine if given string is palindrome or not

WEEK – 11:

a) Write a C program to print 2-D array using pointers
b) Write a C program to allocate memory dynamically using memory allocation functions (malloc, calloc, realloc, free)

WEEK – 12:

I. Write a C Program using functions to
   a) Reading a complex number
   b) Writing a complex number

c) Add two complex numbers
d) Multiply two complex numbers
e) Note: represent complex number using structure

II. Write a C program to read employee details employee number, employee name, basic salary, hra and da of n employees using structures and print employee number, employee name and gross salary of n employees.

TEXT BOOKS:

1. Riley DD, Hunt K.A. Computational Thinking for the Modern Problem Solver. CRC press, 2014 Mar 27.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Yashavant Kanetkar, "Let Us C", BPB Publications, New Delhi, 13th Edition, 2012.

REFERENCE BOOKS:

1. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer; 2018
2. King KN, "C Programming: A Modern Approach", Atlantic Publishers, 2nd Edition, 2015.
3. Kochan Stephen G, "Programming in C: A Complete Introduction to the C Programming Language", Sam's Publishers, 3rd Edition, 2004.
4. Linden Peter V, "Expert C Programming: Deep C Secrets", Pearson India, 1st Edition, 1994.

WEB REFERENCES:

1. http://www.flowgorithm.org/documentation/
2. http://www.sanfoundry.com/c-programming-examples
3. http://www.geeksforgeeks.org/c
4. http://www.cprogramming.com/tutorial/c

ENGINEERING CHEMISTRY LAB

I B. TECH- II SEMESTER **L T P C**
Course Code: A1CH210BS **- - 3 1.5**

COURSE OBJECTIVES:

The course consists of experiments related to the principles of chemistry required for engineering student.
The student will learn:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. To determine the rate of corrosion of different metals
3. The measurement of physical properties like adsorption and viscosity.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.
5. To determine the acid content by Potentiometry.

COURSE OUTCOMES:

The experiments will make the student must able to:

1. Analyse the hardness and chloride content in water.
2. Estimate rate corrosion of different metals.
3. Determine physical properties like adsorption and viscosity.
4. Calculate Rf values of some organic molecules by TLC technique.
5. Determine the acid content in the given sample by using potentiometer.

LIST OF EXPERIMENTS:

I. Conductometry

1. Estimation of an HCl by Conductometric titrations
2. Estimation of Acetic acid by Conductometric titrations

II. Potentiometry:

3. Estimation of HCl by Potentiometric titrations
4. Estimation of Fe2+ by Potentiometry using KMnO4

III. Complexometry:

5. Determination of total hardness of water by complexometric method using EDTA

IV. Argentometry:

6. Determination of chloride content of water by Argentometry

V. Rate of corrosion:

7. Measurement of rate of acid corrosion of different metals

VI. Water Quality Parameters (Analytical Chemistry):

8. Determination of BOD & COD

VII. Saponification

9. Determination of acid value of coconut oil

VIII. Partition Coefficient:

10. Determination of partition coefficient of acetic acid between n-butanol and water.

IX. Chromatography

11. Thin layer chromatography calculation of Rf values. egseparation of ortho and para nitro phenols

X. Colligative properties

12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of surface tension of a give liquid using stalagnometer.

XI. Synthesis

14.Synthesis of Aspirin and Paracetamol.

REFERENCE BOOKS:

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5th edition
4. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

I B. TECH- II SEMESTER **L T P C**
Course Code: A1EN213HS **- - 3 1.5**

COURSE OBJECTIVES:

1. Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. Enhance English language skills, communication skills and to practice soft skills.
3. Improve fluency and pronunciation intelligibility by providing an opportunity for practice in speaking.
4. Train students in different interview and public speaking skills such as JAM, debate, role play, group discussion etc.
5. Instill confidence and make them competent enough to express fluently and neutralize their mother tongue influence.

.

COURSE OUTCOMES: Students will be able to attain

1. Recognize differences among various accents and speak with neutralized accent.
2. Neutralization of accent for intelligibility
3. Take part in group activities.
4. Speaking skills with clarity and confidence which in turn enhances their employability
5. Generate dialogues for various situations.

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB (ELCS) SHALL HAVE TWO PARTS:

A. COMPUTER ASSISTED LANGUAGE LEARNING (CALL) LAB
B. INTERACTIVE COMMUNICATION SKILLS (ICS) LAB

LISTENING SKILLS:

OBJECTIVES:

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions.

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

SPEAKING SKILLS:

OBJECTIVES:

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts

- Oral practice: Just A Minute (JAM) Sessions
- Describing objects/situations/people
- Role play – Individual/Group activities

EXERCISE – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.
Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

EXERCISE – II

CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

EXERCISE - III

CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

EXERCISE – IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

EXERCISE – V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills.

Practice: Mock Interviews

REFERENCE BOOKS:

1. Whitby, N. Business Benchmark. Cambridge University Press (with CD) 2nd Edition.
2. Kumar, S. & Lata, P. (2011). Communication Skills. Oxford University Press.
3. Balasubramanian, T. (2008). A Text book of English Phonetics for Indian Students, Macmillan.
4. Thorpe, E. (2006). Winning at Interviews, Pearson Education.
5. Sethi, J. et al. (2005). A Practical Course in English Pronunciation (with CD), Prentice Hall of India.

WEBSITES:

1. https://www. britishcouncil.org
2. https://www. bbc.co.uk
3. https://www. grammarly.com
4. https://www. fluentu.com
5. https://www.cambridgeenglish.org/exams-and-tests/business-preliminary
6. https://www.cambridgeenglish.org/exams-and-tests/business-vantage

ENGINEERING EXPLORATION

I B. TECH- II SEMESTER **L T P C**
Course Code: A1CS218PW **- - 2 1**

COURSE OBJECTIVES:

The course should enable the students to:

1. Understand the Engineering attributes and Ethics.
2. Identify the community problem and its stakeholder.
3. Examine required specifications and gap in existing and required product.
4. Build sustaining interactions among people that create social value by transforming ideas into tangible products, services, or initiatives.
5. Develop skills to work collaboratively, reports and progress updates throughout the lifecycle of the project.

UNIT-I: INTRODUCTION TO ENGINEERING AND ENGINEERING EXPLORATION

Engineering Projects in Community Service, Design Thinking Process-Empathize, Define, Ideate, Prototype, Test.
Engineering Ethics: Introduction to ethics, moral values, significance of professional ethics, code of conduct for engineers, identify ethical dilemmas in different tasks of engineering, applying moral theories and codes of conduct for resolution of ethical dilemmas.

UNIT-II: PROBLEM IDENTIFICATION

Authentic need in the community or society. Identify a real user or stake holder, Interaction with Stakeholders, Viewpoints, Interviewing, Scenario.

UNIT-III: SPECIFICATION DEVELOPMENT

Clear and measurable requirements, criteria for success, Identifying relevant benchmarks, identifyingthe gap between the available and required products, requirements documentation.

UNIT-IV: CONCEPTUAL DESIGN

Ideation-generated multiple ideas, evaluation of ideas, systems model, Architectural Design, prototype development, testing real/simulated users, feedback.

UNIT-V: PROJECT MANAGEMENT

Importance of team work, importance of project life cycle, project management, tools, various toolsused in electronics documentation, importance of communication, usage of communication media.

TEXT BOOKS:

1. Software Engineering: A Practitioner's Approach, Roger S. Pressman, 7th Edition, Mc Graw Hill Education (India) Pvt. Ltd.
2. Software Engineering, Sommerville Ian, 7th Edition, Pearson Education.
3. EPICS Design Process https://sharepoint.ecn.purdue.edu/epics/teams/Public%20Documents/EPICS_ Design_Process.pdf
4. Examples of good practice in Special Needs Education & Community Based Programs, UNESCO PRESS.
5. Project Management, GRY R. Heerkens, McGraw-Hill

WEB REFERENCES:

1. http://www.purdue.edu/epics
2. http://epics.ieee.org/
3. https://www.uninettunouniversity.net/en/epics.aspx
4. http://www.uoitc.edu.iq/images/documents/informatics-institute/exam_materials/Software%20Engineering%20(9th%20Edition)%20by%20Ian%20Sommerville.pdf

5. https://engineering.purdue.edu/EPICS/k12/resources/1.6%20Teacher%20Toolbox%20EPICS
6. %20High%20Design%20Process%20and%20Cycle.pdf
7. https://launchschool.com/books/agile_planning/read/epics_and_stories
8. http://www.enggnotebook.weebly.com/uploads/2/2/7/1/22718186/ge6151-notes.pdf

MOOCS COURSE:

1. https://www.mooc-list.com/tags/design-thinking
2. https://www.class-central.com/tag/design%20thinking

II-YEAR (I-SEMESTER)

COMPUTER ORIENTED STATISTICAL METHODS

II B. TECH- I SEMESTER **L T P C**
Course Code: A1MA301BS **3 1 - 4**

PRE-REQUISITES: Mathematics courses of first year of study.

COURSE OBJECTIVES:

1. Apply the concept of Correlation and regression with rank correlation.
2. To learn the basic ideas of probability and random variables.
3. Discuss various discrete and continuous probability distributions and their properties.
4. Explain the concept of Test of significance.
5. Understand the concept of stochastic process and Markov chains.

COURSE OUTCOMES: After learning the contents of this paper the student must be able to

1. Explain the concept of correlation and regression.
2. Understand the concept of probability and random variables.
3. Explain the concept of probability distributions.
4. Analyze the Testing of hypothesis.
5. Apply the Marcov chain and stochastic process.

UNIT - I: APPLIED STATISTICS

Correlation, Coefficient of Correlation, Multiple Correlation, Rank Correlation, Regression, Regression Coefficient, The lines of Regression , Multiple Regression.

UNIT – II: BASIC PROBABILITY

Probability, Sample Space, Probability of an Event, Conditional probability Multiplication theorem(without proof), Independent events and Baye's theorem.

Random variables: Discrete random variable, Probability distribution function Continuous random variables, Probability density function, Expectation and Variance of Random Variables.

UNIT - III: PROBABILITY DISTRIBUTIONS

Binomial distribution, Poisson distribution, Evaluation of Statistical parameters for these distributions, Poisson approximation to the binomial distribution. Fitting of Binomial and Poisson distributions. Normal distribution, Properties and Evaluation of statistical parameters for Normal distribution.

UNIT – IV TESTING OF HYPOTHESIS

Test of significance: Basic of testing of Hypothesis. Null and alternate Hypothesis, Types of errors, Level of significance, Critical region.

Large sample test for Single proportion, Difference of proportions, Single mean, Difference of means; Small sample tests: Test for single mean, Difference of means and test for ratio of variances.

UNIT – V STOCHASTIC PROCESSES AND MARKOV CHAINS:

Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n- step transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXT BOOKS:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and statistics for Engineers and scientists, 9th Edition, Pearson Publications
2. Fundamentals of Mathematical Statistics, Khanna Publications, S C Guptha and V.K. Kapoor.
3. S.D. Sharma, Operations research Kedarnath and ramnath publishers.

REFERENCE BOOKS:

1. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations
2. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
3. Probability and Statistics for engineers and scientists by Jay.I.Devore.

DATA STRUCTURES

II B. TECH- I SEMESTER **L T P C**
Course Code: A1CS302PC **3 - - 3**

COURSE OBJECTIVES:

1. Impart the basic concepts of data structures and algorithms.
2. Understand concepts linked lists and their applications.
3. Understand basic concepts about stacks, queues and their applications.
4. Understand basic concepts of trees, graphs and their applications.
5. Enable them to write algorithms for sorting and searching and hashing.
6. Use advanced data structures like B-Trees, AVL-trees etc., for efficient problem solving.

COURSE OUTCOMES:

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

1. Evaluate algorithms in terms of time and memory complexity.
2. Formulate new solutions for problems or improve existing code using data structures and algorithms.
3. Implement basic data structures such as arrays, linked lists, stacks and queues.
4. Solve problem involving graphs, trees and heaps
5. Apply Algorithms for solving problems like sorting, searching, and hashing.
6. Implement advanced data structures such as B-Trees, Red-Black, and AVL-Trees

UNIT-I: INTRODUCTION TO DATA STRUCTURES

Basic concepts- Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O,Omega and Theta notations, **Introduction to Linear and Non Linear data structures**-Singly Linked Lists-Operations-Insertion, Deletion, Concatenating singly linked lists, Circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations- Insertion, Deletion. Representation of single, two dimensional arrays, sparse matrices-array and linked representations.

UNIT-II: STACKS AND QUEUES

Stacks-Stack ADT, definition, operations, array and linked implementations in C, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation,

Queues-Queue ADT, definition and operations, array and linked Implementations in C, Circular queues-Insertion and deletion operations, Dequeue (Double ended queue) ADT, array and linked implementations in C.

UNIT-III: TREES AND GRAPHS

Trees – Terminology, Representation of Trees, Binary tree ADT, Properties of Binary Trees, Binary Tree Representations-array and linked representations, Binary Tree traversals, threaded binary trees,

Max Priority Queue-ADT-implementation-Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap. Graphs, Introduction, Definition, Terminology, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph traversals- DFS and BFS.

UNIT-IV: SEARCHING AND SORTING

Searching- Linear Search, Binary Search, Static Hashing-Introduction, hash tables, hash functions, Overflow Handling.

Sorting-Insertion Sort, Selection Sort, Radix Sort, Quick sort, Merge Sort, Heap Sort, Comparison of Sorting methods.

UNIT-V: BINARY SEARCH TREES

Search Trees-Binary Search Trees, Definition, Operations- Searching, Insertion and Deletion, AVL Trees- Definition and Examples, Insertion into an AVL Tree ,B-Trees, Definition, B-Tree of order m, operations-Insertion and Searching, Introduction to Red-Black and Splay Trees(Elementary treatment-only Definitions and Examples), Comparison of Search Trees.

Pattern matching algorithm- The Knuth-Morris-Pratt algorithm, Tries (examples only).

TEXT BOOKS:

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.
2. Fundamentals of Data structures in C, 2nd Edition, E.Horowitz, S.Sahni and Susan Anderson-Freed, Universities Press

REFERENCE BOOKS:

1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education

WEB REFERENCES:

1. https://hackr.io/tutorials/learn-data-structures-algorithms
2. https://www.geeksforgeeks.org/fundamentals-of-algorithms/
3. https://www.udemy.com/introduction-to-algorithms-and-data-structures-in-c/
4. https://leetcode.com

E-TEXT BOOKS:

1. http://www.freetechbooks.com/algorithm-analysis-and-design-t1030.html
2. http://www.freetechbooks.com/algorithmic-problem-solving-t373.html
3. http://www.freetechbooks.com/algorithms-and-data-structures-the-basic-toolbox-t871.html

MOOCS COURSE:

1. https://www.coursera.org/specializations/data-structures-algorithms
2. https://onlinecourses.nptel.ac.in/noc16_cs06/preview

DISCRETE MATHEMATICAL STRUCTURES

II B. TECH- I SEMESTER **L T P C**
Course Code: A1CS303PC **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to:

1. To help students understand discrete and continuous mathematical structures
2. To impart basics of relations and functions
3. To facilitate students in applying principles of Recurrence Relations to calculate generating functions and solve the Recurrence relations
4. To acquire knowledge in graph theory

COURSE OUTCOMES:

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

1. Apply the knowledge of discrete and continuous mathematical structures.
2. Solve various problems on relations and functions.
3. Apply the principles of Recurrence Relations to generate functions and solve various problems on it.
4. Solve problems using the knowledge of graph theory.

UNIT-I: MATHEMATICAL LOGIC

Statements and notations, Connectives, Well-formed formulas, Truth Tables, Tautology, Equivalence implication, Normal forms, Logical Inference, Rules of inference, Direct Method, Direct Method using CP(Conditional Proof), Consistency, Proof of contradiction, Automatic Theorem Proving. Quantifiers, Universal quantifiers. Predicates: Predicative logic, Free & Bound variables.

UNIT-II: RELATIONS

Introduction to set theory**,** Relations, Properties of Binary Relations, Equivalence Relation, Transitive closure, Compatibility and Partial ordering relations, Lattices, Hasse diagram. Functions: inverse Function , Composition of functions, Recursive Functions

UNIT-III: ELEMENTARY COMBINATORICS

Basis of counting, Combinations & Permutations, Enumeration of Combinations and Permutations, Enumeration of Combinations and Permutations With repetitions, Enumerating Permutations with Constrained repetitions, Binomial Coefficients, Binomial and Multinomial theorems, The principles of Inclusion – Exclusion, Pigeon- hole principles and its applications.

UNIT-IV: RECURRENCE RELATION

Generating Functions, Function of Sequences, Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating functions, The method of Characteristics roots, Solution of Inhomogeneous Recurrence Relation.

UNIT-V: GRAPHS

Basic Concepts, Isomorphism and Sub graphs, Trees and their properties, Spanning Trees- DFS,BFS, Minimal Spanning Trees- Prims, Kruskal's Algorithm, Planar Graphs, Euler's Formula, Multi graph and Euler circuits, Hamiltonian Graphs, Chromatic number.

TEXT BOOKS:

1. T1. Discrete Mathematics for computer scientists & Mathematicians, J.L. Mott, A. Kandel, T.P. Baker PHI
2. Discrete Mathematical Structures With Applications to Computer Science, JP Tremblay, R Manohar

REFERENCE BOOKS:

1. R1. Logic and Discrete Mathematics, *Grass Man & Trembley*, Pearson Education.

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

II-B.TECH I-SEMESTER **L T P C**
Course Code: A1CS304PC **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understand the basic object oriented programming concepts and apply them in problem solving.
2. Illustrate inheritance and polymorphism concepts for reusing the program.
3. Demonstrate on the exception handling mechanism.
4. Demonstrate on the multi-tasking by using multiple threads.
5. Develop data-centric applications using JDBC.
6. Understand the basics of java collection framework.

COURSE OUTCOMES:

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

1. Use object oriented programming concepts to solve real world problems.
2. Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
3. Use multithreading concepts to develop inter process communication.
4. Develop java application to interact with database by using relevant software component (JDBC Driver).
5. Solve real world problems using Collections.

UNIT – I JAVA BASICS

JAVA BASICS: Review of Object oriented concepts, History of Java, Java buzzwords, JVM architecture, Data types, Variables, Scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program, constructors, methods, Static block, Static Data, Static
Method String and String Buffer Classes, Using Java API Document.

UNIT – II INHERITANCE, POLYMORPHISM, PACKAGES AND INTERFACES

INHERITANCE AND POLYMORPHISM: Basic concepts, Types of inheritance, Member access rules, Usage of this and Super key word, Method Overloading, Method overriding, Abstract classes, Dynamic method dispatch, Usage of final keyword.

PACKAGES AND INTERFACES: Defining package, Access protection, importing packages, defining and implementing interfaces, and Extending interfaces.

UNIT – III EXCEPTION HANDLING AND FILES

EXCEPTION HANDLING: Exception types, Usage of Try, Catch, Throw, Throws and Finally keywords, Built-in Exceptions, Creating own Exception classes.

I / O STREAMS AND FILES: Concepts of streams, Stream classes- Byte and Character stream, Reading console Input and Writing Console output, File Handling.

UNIT – IV MULTITHREADING AND JDBC

MULTI THREADING: Concepts of Thread, Thread life cycle, creating threads using Thread class and Runnable interface, Synchronization, Thread priorities, Inter Thread communication.

JDBC-Connecting to Database - JDBC Type 1 to 4 drives, connecting to a database, querying a database and processing the results, updating data with JDBC.

UNIT – V COLLECTION FRAMEWORK

COLLECTION FRAMEWORK: Introduction to Java Collections, Overview of Java Collection frame work, Generics, Commonly used Collection classes- Array List, Vector, Hash table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, calendar and Properties.

TEXT BOOKS:

1. Herbert Schildt and Dale Skrien,"Java Fundamentals – A comprehensive Introduction", McGraw Hill, 1st Edition, 2013.
2. Herbert Schildt, "Java the complete reference", McGraw Hill, Osborne, 7th Edition, 2011.
3. T.Budd, "Understanding Object- Oriented Programming with Java", Pearson Education, Updated Edition (New Java 2 Coverage), 1999.

REFERENCE BOOKS:

1. P.J.Dietel and H.M.Dietel, "Java How to program", Prentice Hall, 6th Edition, 2005.
2. P.Radha Krishna, "Object Oriented programming through Java", CRC Press, 1st Edition, 2007.
3. S.Malhotra and S. Choudhary, "Programming in Java", Oxford University Press, 2nd Edition, 2014.

DATA STRUCTURES LAB

II B. TECH- I SEMESTER **L T P C**
Course Code: A1CS305PC **- - 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to:

1. Ability to identify the appropriate data structure for given problem.
2. Design and analyze the time and space complexity of algorithm or program.
3. Effectively use compilers include library functions, debuggers and troubleshooting.
4. Write and execute programs using data structures such as arrays, linked lists to implement stacks, queues.
5. Write and execute programs in C to implement various sorting and searching.
6. Write and execute programs using data structures such as arrays, linked lists to implement trees, graphs, hash tables and search trees.

COURSE OUTCOMES:

The course should enable the students to:

1. Use appropriate data structure for given problem.
2. To analyze the time and space complexity of algorithm or program.
3. Use compilers include library functions, debuggers and troubleshooting.
4. Execute programs using data structures such as arrays, linked lists to implement stacks and queues.
5. Execute write programs in C to implement various sorting and searching.
6. Execute programs using data structures such as arrays, linked lists to implement trees, graphs, hash tables and search trees.

LIST OF EXPERIMENTS

WEEK-1: SINGLE LINKED LIST

Write a C program that uses functions to perform the following:

a) Create a singly linked list of integers.
b) Delete a given integer from the above linked list.
c) Display the contents of the above list after deletion.

WEEK-2: DOUBLE LINKED LIST

Write a C program that uses functions to perform the following:

a) Create a doubly linked list of integers.
b) Delete a given integer from the above doubly linked list.
c) Display the contents of the above list after deletion.

WEEK-3: INFIX TOPOSTFIX CONERSION

Write a C program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array.

WEEK-4: DOUBLE ENDED QUEUE

Write C programs to implement a double ended queue ADT using i) array
and
ii) doubly linked list

WEEK-5: BINARY SEARCH TREES USING RESURSION

Write a C program that uses functions to perform the following:

a) Create a binary search tree of characters.
b) Traverse the above Binary search tree recursively in Postorder.

WEEK-6: BINARY SEARCH TREES USING NON-RESURSION

Write a C program that uses functions to perform the following:

a) Create a binary search tree of integers.
b) Traverse the above Binary search tree non recursively in order.

WEEK-7: SORTING

Write C programs for implementing the following sorting methods to arrange a list of integers in Ascending order:

a) Insertion sort
b) Merge sort

WEEK-8: SORTING

Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order:

a) Quicksort
b) Selection sort

WEEK-9: AVL-TREES

a) Write a C program to perform the following operations on AVL:
    i. Insertion into an AVL.
    ii. Display elements of AVL Tree
b) Write a C program for implementing Heap sort algorithm for sorting a given list of integers in ascending order

WEEK-10: HASHING

Write a C program to implement all the functions of a dictionary (ADT) using hashing.

WEEK-11: PATTERN MATCHING ALGORITHM

Write a C program for implementing Knuth-Morris- Pratt pattern matching algorithm.

WEEK-12: GRAPH TRAVERSAL ALGORITHMS

Write C programs for implementing the following graph traversal algorithms:

a) Depth first traversal
b) Breadth first traversal

TEXT BOOKS:

1. C and Data Structures, Prof. P.S.Deshpande and Prof. O.G. Kakde, DreamtechPress.
2. Data structures using C, A.K.Sharma, 2nd edition, Pearson.
3. Data Structures using C, R.Thareja, Oxford UniversityPress.

WEB REFERENCES:

1. http://www.sanfoundry.com/data structures-examples
2. http://www.geeksforgeeks.org/c
3. http://www.cs.princeton.edu

JAVA PROGRAMMING LAB

II-B.TECH I-SEMESTER **L T P C**
Course Code: A1CS306PC **- - 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Practice object-oriented programs and build java applications.
2. Implement java programs for establishing interfaces.
3. Implement sample programs for developing reusable software components.
4. Create database connectivity in java and implement GUI applications.

COURSE OUTCOMES:

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

1. Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
2. Understand the use of different exception handling mechanisms and concept of multithreading for robust and efficient application development.
3. Understand and implement concepts on file streams and operations in java programming for a given application programs.
4. Develop java application to interact with database by using relevant software component (JDBC
5. Driver).

LIST OF EXPERIMENTS

WEEK – 1 JAVA BASICS

a. Write a java program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a, b, c and use the quadratic formula.
b. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non-recursive functions.

WEEK – 2 ARRAYS

a. Write a java program to sort given list of integers in ascending order.
b. Write a java program to multiply two given matrices.

WEEK – 3 STRINGS

a. Write a java program to check whether a given string is palindrome.
b. Write a java program for sorting a given list of names in ascending order.

WEEK – 4 OVERLOADING & OVERRIDING

a. Write a java program to implement method overloading and constructors overloading.
b. Write a java program to implement method overriding.

WEEK – 5 INHERITANCES

Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

WEEK – 6 INTERFACES

a. Write a program to create interface A in this interface we have two method meth1 and meth2. Implements this interface in another class named My Class.
b. Write a program to give example for multiple inheritances in Java.

WEEK – 7 EXCEPTION HANDLING

Write a program that reads two numbers Num1 and Num2. If Num1 and Num2 were not integers, theprogram would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception.

WEEK – 8 I/O STREAMS

a. Write a java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
b. Write a java program that displays the number of characters, lines and words in a text file.

WEEK – 9 MULTI THREADING

Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number

WEEK – 10 GENERICS

a. Write a Java program to swap two different types of data using Generics.
b. Write a Java program to find maximum and minimum of two different types of data usingGenerics.

WEEK – 11 COLLECTIONS

Create a linked list of elements.
a. Delete a given element from the above list.
b. Display the contents of the list after deletion.

WEEK – 12 CONNECTING TO DATABASE

Write a java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.

TEXT BOOKS:

1. P. J. Deitel, H. M. Deitel, “Java for Programmers”, Pearson Education, PHI, 4th Edition, 2007.
2. P. Radha Krishna, “Object Oriented Programming through Java”, Universities Press, 2nd Edition, 2007
3. Bruce Eckel, “Thinking in Java”, Pearson Education, 4th Edition, 2006.
4. Sachin Malhotra, Saurabh Chaudhary, “Programming in Java”, Oxford University Press, 5th Edition, 2010.

REFERENCE BOOKS:

1. P.J.Dietel and H.M.Dietel, “Java How to program”, Prentice Hall, 6th Edition, 2005.
2. P.Radha Krishna, “Object Oriented programming through Java”, CRC Press, 1st Edition, 2007.
3. S.Malhotra and S. Choudhary, “Programming in Java”, Oxford University Press, 2nd Edition, 2014.

IT WORKSHOP LAB

II B. TECH- I SEMESTER **L T P C**
Course Code: A1CS307PC **- - 3 1.5**

COURSE OBJECTIVES:

The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

PC HARDWARE: Introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible. Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks would be introduced. **Productivity tools** module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX.

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Task 6: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word: to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered: Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4 : Creating a Newsletter : Features to be covered: Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler: Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2 : Calculating GPA: Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Performance Analysis: Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

LaTeX and MS/equivalent (FOSS) tool Power Point

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes: - PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and PowerPoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Task 2: Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson Education.

ENVIRONMENTAL STUDIES

II B. TECH- I SEMESTER **L T P C**
Course Code: A1CS303MC **2 - - -**

COURSE OBJECTIVES:

The course should enable the students to:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

COURSE OUTCOMES:

Upon successful completion of the course, the student should be able to:

1. Identify the natural resources and understand resource management.
2. Identify classification and functioning of Ecosystems.
3. Critique the Importance of biodiversity and its conservation.
4. Analyze the problems related to environmental pollution and management.
5. Apply the role of information technology, Analyze social issues and Acts associated with environment.

UNIT-I: ECOSYSTEMS

Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II: NATURAL RESOURCES: CLASSIFICATION OF RESOURCES

Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III: BIODIVERSITY AND BIOTIC RESOURCES

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV: ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES

Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.
Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V: ENVIRONMENTAL POLICY, LEGISLATION & EIA

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

HUMAN VALUES AND PROFESSIONAL ETHICS

II B. TECH- I SEMESTER **L T P C**
Course Code: A1CS304MC **3 - - -**

COURSE OBJECTIVES:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

COURSE OUTCOMES:

1. It ensures students sustained happiness through identifying the essentials of human values and skills.
2. It facilitates a correct understanding between profession and happiness
3. It helps students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.
4. Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.

UNIT-I:

Course Introduction - Need, basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration - what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self-exploration. Continuous Happiness and Prosperity - A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities - the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT-II:

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT-III:

Understanding Harmony in the Family and Society - Harmony in Human – Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfilment to ensure Ubhay-tripti;

Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

UNIT-IV:

Understanding Harmony in the nature and Existence - Whole existence as Co-existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature - recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astiva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT-V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order. At the level of individual: as socially and ecologically responsible engineers, technologists and managers

At the level of society: as mutually enriching institutions and organizations.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

REFERENCE BOOKS:

1. Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

RELEVANT CDS, MOVIES, DOCUMENTARIES & OTHER LITERATURE:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. AI Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story

II-YEAR (II-SEMESTER)

DIGITAL LOGIC AND DESIGN

II B. TECH- II SEMESTER **L T P C**
Course Code: A1CS401ES **3 - - 3**

COURSE OBJECTIVES:

1. To understand basic number systems, codes and logical gates.
2. To understand the concepts of Boolean algebra.
3. To understand the use of minimization logic to solve the Boolean logic expressions..
4. To understand the design of combinational and sequential circuits.
5. To understand the state reduction methods for Sequential circuits.
6. To understand the basics of various types of memories.

COURSE OUTCOMES:

Upon completion of the Course, the students will be able to:

1. Able to understand number systems and codes.
2. Able to solve Boolean expressions using Minimization methods.
3. Able to design the sequential and combinational circuits.
4. Able to apply state reduction methods to solve sequential circuits.

UNIT-I:

Digital Systems, Binary Numbers, Number base conversions, Octal, Hexadecimal and other base numbers, complements, signed binary numbers, Floating point number representation, binary codes, Error detection and correction, binary storage and registers, binary logic, Boolean algebra and logic gates , Basic theorems and properties of Boolean Algebra, Boolean functions, canonical and standard forms, Digital Logic Gates.

UNIT-II:

Gate–Level Minimization, The K-Map Method, Three-Variable Map, Four-Variable Map, Five-Variable Map , sum of products , product of sums simplification, Don't care conditions , NAND and NOR implementation and other two level implementations, Exclusive-OR function.

UNIT-III:

.Combinational Circuits (CC), Analysis procedure, Design Procedure, Combinational circuit for different code converters and other problems, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Demultiplexers.

UNIT-IV:

Synchronous Sequential Circuits, Latches, Flip-flops, analysis of clocked sequential circuits, Registers, Shift registers, Ripple counters, Synchronous counters, other counters. Asynchronous Sequential Circuits -Introduction, Analysis procedure, Circuits with latches, Design procedure, Reduction of state and follow tables, Race- free state assignment, Hazards

UNIT-V:

Memory: Introduction, Random-Access memory, Memory decoding, ROM, Programmable Logic Array, Programmable Array Logic, Sequential programmable devices. Register Transfer and Microoperations - Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit.

TEXT BOOKS:

1. Digital Design, M. Morris Mano, M.D.Ciletti, 5th edition, Pearson.(Units I, II, III, IV, Part of Unit V)
2. Computer System Architecture, M.Morris Mano, 3rd edition, Pearson.(Part of Unit V)

REFERENCE BOOKS:

1. Switching and Finite Automata Theory, Z. Kohavi, Tata McGraw Hill.
2. Fundamentals of Logic Design, C. H. Roth, L. L. Kinney, 7th edition, Cengage Learning.
3. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman, John Wiley.

COMPUTER ORGANIZATION AND ARCHITECTURE

II B. TECH- II SEMESTER **L T P C**
Course Code: A1CS402PC **3 - - 3**

COURSE OUTCOMES:

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

1. Identify various components of computer and their interconnection
2. Identify basic components and design of the CPU: the ALU and control unit.
3. Compare and select various Memory devices as per requirement.
4. Compare various types of IO mapping techniques
5. Critique the performance issues of cache memory and virtual memory

UNIT-I:

Structure of Computers: Structure of Computers: Computer types, Functional units, Basic operational concepts, Von Neumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point. COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations

UNIT-II:

Basic Computer Organization and Design: Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC.

UNIT-III:

Register Transfer and Micro-Operations: Register Transfer and Micro-Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.
Micro-Programmed Control: Control Memory, Address Sequencing, Micro-Program, Design of Control Unit.

UNIT-IV:

Memory System: MEMORY SYSTEM: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Virtual memory, Secondary Storage, RAID.

UNIT-V:

Memory System: INPUT OUTPUT: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Inter processor Communication and Synchronization, Cache Coherence

TEXT BOOKS:

1. M. Morris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.
2. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGraw Hill.

REFERENCE BOOKS:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.
2. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy.
3. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,

DATABASE MANAGEMENT SYSTEMS

II B. TECH- II SEMESTER **L T P C**
Course Code: A1CS403PC **3 - - 3**

COURSE OVERVIEW:

This course introduces the core principles and techniques required in the design and implementation of database systems. This introductory application-oriented course covers the relational database systems RDBMS - the predominant system for business, scientific and engineering applications at present. It includes Entity-Relational model, Normalization, Relational model, Relational algebra, and data access queries as well as an introduction to SQL. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.

COURSE OBJECTIVES:

The course should enable the students to:

1. **Discuss** the basic database concepts, applications, data models, schemas and instances.
2. **Design** Entity Relationship model for a database.
3. **Demonstrate** the use of constraints and relational algebra operations.
4. **Describe** the basics of SQL and construct queries using SQL
5. **Understand** the importance of normalization in databases.
6. **Demonstrate** the basic concepts of transaction processing and concurrency control.
7. **Understand** the concepts of database storage structures and identify the access techniques.

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Use the basic concepts of Database Systems in Database design
2. Apply SQL queries to interact with Database
3. Apply normalization on database design to eliminate anomalies
4. Analyze database transactions and can control them by applying ACID properties
5. Analyze physical database storage system of database.

UNIT-I:

Introduction: Database system applications, Database system Vs file systems, Advantage of a DBMS, Describing and storing data in a DBMS, Structure of a DBMS, People who work with databases.

Entity Relationship Model (ER Model): Database Design and ER Diagrams, Entities Attributes and Entity sets, Features of ER Model, Conceptual design with the ER model.

UNIT-II:

Introduction to relational model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition language, Basic Structure of SQL Queries, Basic operations, Set Operations, NULL Values, Aggregate Functions, Nested Sub Queries, JOIN Expressions, Views, Transactions, Integrity Constraints, SQL Data types and Schemas, Functions and Procedures, Triggers.

UNIT-III:

Relational Algebra and Calculus: Relational Algebra, Tuple Relational Calculus, Domain Relational Calculus.

Schema Refinement and Normal Forms: Introduction to schema refinement, Functional Dependencies, Reasoning about FDs, Normal Forms: 1NF, 2NF, 3NF, Boyce Codd Normal Form, Properties of decompositions, Multi valued Dependencies, Fourth Normal Form, Join Dependencies and Fifth Normal Form.

UNIT-IV:

Transaction Management: Transaction Concept, A simple transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability.

Concurrency Control and Recovery System: Lock based protocols, Deadlock handling, multiple granularity, Time stamp based protocols, Validation based protocols. Failure Classification, Storage, Recovery and Atomicity, Failure with Non-volatile Storage, Remote backup systems.

UNIT-V:

Storage and File Structure: Overview of Physical Storage Media, Magnetic Disk and Flash Storage, RAID, Tertiary Storage, File Organization, Organization of Records in Files, Data Dictionary storage.

Indexing and Hashing: Basic Concepts, Ordered Indices, B+ Tree Index Files, Multiple Key access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2011.
2. Raghurama Krishnan, Johannes Gehrke, “Data base Management Systems”, TATA McGraw Hill, 3rd Edition, 2007.
3. R.P. Mahapatra & Govind Verma, Database Management Systems, Khanna Publishing House, 2013.

REFERENCE BOOKS:

1. Peter Rob, Carlos Coronel, Database Systems Design Implementation and Management, 7th edition, 2009.
2. Scott Urman, Michael McLaughlin, Ron Hardman, “Oracle database 10g PL/SQL programming”, 6th edition, Tata McGraw Hill,2010
3. .K.Singh, “Database Systems Concepts, Design and Applications”, First edition, Pearson Education, 2006.
4. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson / Addision wesley, 2007.

WEB REFERENCES:

1. http://www.learndb.com/databases/how-to-convert-er-diagram-to-relational-database
2. https://www.w3schools.com/sql/sql_create_table.asp
3. http://www.edugrabs.com/conversion-of-er-model-to-relational-model/?upm_export=print
4. http://ssyu.im.ncnu.edu.tw/course/CSDB/chap14.pdf
5. http://web.cs.ucdavis.edu/~green/courses/ecs165a-w11/8-query.pdf

E-TEXT BOOKS:

1. http://www.freebookcentre.net/Database/Free-Database-Systems-Books-Download.html
2. http://www.ddegjust.ac.in/studymaterial/mca-3/ms-11.pdf

MOOCS COURSE:

1. https://www.mooc-list.com/tags/dbms-extensions
2. https://onlinecourses.nptel.ac.in/noc18_cs15/preview

OPERATING SYSTEMS

II B. TECH- II SEMESTER **L T P C**
Course Code: A1CS404PC **3 - - 3**

COURSEOBJECTIVES:

The course should enable the students to learn:

1. To understand the role of OS in the overall computer system and study the operations performed by OS as a resource manager.
2. To understand the scheduling policies and different memory management techniques for different operating systems.
3. To understand process concurrency and synchronization.
4. To understand the concepts of I/O, storage and file management and introduce system call interface for file and process management.
5. To introduce the goals and principles of protection

COURSEOUTCOMES:

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

1. Acquire a High-level understanding of what are an operating system and the role it plays and the services it provides.
2. Understand process management concepts including scheduling, synchronization.
3. Describe System model for deadlock, Methods for handling deadlocks.
4. Understand memory management including virtual memory.
5. Acquire Knowledge on issues related to file system interface and implementation.

UNIT–I

Overview-Introduction-Operating system objectives, User view, System view, Operating system definition, Computer System Organization, Computer System Architecture, OS Structure, OS Operations, Process Management, Memory Management, Storage Management, Protection and Security, Computing Environments.

Operating System services, User and OS Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, OS Structure.

UNIT–II

Process: Process concepts-The Process, Process State, Process State transitions, Process Control Block, Context Switch.
Threads: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.
Process Scheduling: Scheduling Queues, Schedulers, Scheduling Criteria, Scheduling algorithms, Multiprocessor Scheduling. Case Studies: Linux, Windows.

UNIT–III

Process Synchronization: Inter-process Communication: Background, The Critical Section Problem, Race Conditions, Mutual Exclusion, Peterson's solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization- Bounded Buffer Problem, The Producer/ Consumer Problem, Reader's & Writer Problem, Dinning Philosopher Problem, Event counters, Monitors, Message passing.

Deadlocks: Deadlocks - System Model, Deadlock Characterization: Necessary and sufficient conditions for Deadlock, Methods for Handling Deadlocks: Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

UNIT–IV

Memory Management: Basic Hardware, Address Binding, Logical and physical address space, Dynamic loading, linking and Shared libraries, Swapping, Contiguous Memory Allocation- Fixed and variable partition–Internal and External fragmentation and Compaction; Segmentation, Paging- Hardware support for paging, Protection, shared pages, Structure of Page Table. Case Studies: Linux, Windows.

Virtual Memory Management: Background, Demand Paging-locality of reference, Page fault; Copy-on-Write, Page replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing.

UNIT–V

File Management: Concept of File - Attributes, operations, file types, internal structure, access methods, Directory structure, file protection, file system structure, Allocation methods (contiguous, linked, indexed),Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk formatting- Boot-block, Bad blocks.

Protection: System Protection, Goals of Protection, Principles of Protection.

TEXTBOOKS

1. Abraham Silberschatz, Peter B.Galvin, Greg Gagne, Operating System Concepts, 9th Edition, Wiley Asia Student Edition.
2. William Stallings, Operating Systems: Internals and Design Principles, 5th Edition, Prentice Hall of India.

REFERENCEBOOKS:

1. Charles Crowley, Operating System: A Design-oriented Approach, 1st Edition, Irwin Publishing.
2. Gary J. Nutt, Addison, Operating Systems: A Modern Perspective, 2nd Edition, Wesley.
3. Maurice Bach, Design of the UNIX Operating Systems, 8th Edition, Prentice Hall of India.
4. Daniel P. Bovet, Marco Cesati, Understanding the Linux Kernel, 3rd Edition, O'Reilly and Associates.

WEB REFERENCES:

1. Abraham-Silberschatz-Operating-System-Concepts---9th 2012.12.pdf
2. https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

II B. TECH- II SEMESTER **L T P C**
Course Code: A1CS405HS **3 - - 3**

COURSE OUTCOMES:

At the end of the course, the student will

1. Understand the market dynamics namely, demand and supply, demand forecasting, elasticity of demand and supply, pricing methods and pricing in different market structures.
2. Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.
3. Develop an understanding of
4. Analyse how capital budgeting decisions are carried out.
5. Understanding the framework for both manual and computerized accounting process
6. Know how to analyse and interpret the financial statements through ratio analysis.

UNIT-I:

Introduction & Demand Analysis: Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT-II:

Production & Cost Analysis: Production Function - Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

UNIT-III:

Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business: Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment: Changing Business Environment in Post-liberalization scenario.

UNIT-IV:

Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital - Trading Forecast, Capital Budget, Cash Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of return (ARR) and Net Present Value Method (simple problems).

UNIT-V:

Introduction to Financial Accounting & Financial Analysis: Accounting concepts and Conventions - Introduction IFRS - Double - Entry Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Trasing Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart.

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2013.
3. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2012.

REFERENCE BOOKS:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey & Chrystel, Economics, Oxford University Press, 2012.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting - A Managerial Perspective, Pearson, 2012.
6. S.N. Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Shailaja & Usha: MEFA, University Press, 2012.
10. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
11. Vijay Kumar & Appa Rao, Managerial Economics & Financial Analysis, Cengage 2011.
12. J.V. Prabhakar Rao & P.V. Rao, Managerial Economics & Financial Analysis, Maruthi Publishers, 2011.

PYTHON PROGRAMMING LAB

II B. TECH- II SEMESTER **L T P C**
Course Code: A1CS406PC **1 - 3 2.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understand the basics and function of Python Programming Language.
2. Understand the string operation and sequences used in Python Programming Language.
3. Know the Data Structures in Python Programming Language.
4. Use the reusability concepts in Python Programming Language.
5. Use Exception Handling mechanism in Python Programming Language.

COURSE OUTCOMES:

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

1. Develop programs on data types, operators and expressions
2. Apply the data structures in real time scenarios
3. Write the programs on strings and functions
4. Implement programs on class and related issues.
5. Use of python exception handling and libraries.

LIST OF EXPERIMENTS

WEEK-1:

- Write a program to perform different Arithmetic Operations on numbers in Python
- Write a Python program which accepts the radius of a circle from the user and compute the area
- Write a Python program to get the Python version you are using.
- Write a Python program that accepts an integer (n) and computes the value of n+nn+nnn.

WEEK-2:

- Write a Python program to convert temperatures to and from Celsius, Fahrenheit.
- [Formula: c/5= f-32/9]
- Write a python script to print the current date in the following format “Sun May 29 02:26:23 IST2017”
- A library charges a fine for every book returned late. For first 6 days the fine is 50 paisa, for 10-15days fine is one rupee and above 15 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a python program to accept the number of days the
- Member is late to return the book and display the fine or the appropriate message.

WEEK-3:

- Write a python function to find largest of three numbers
- Write a Python function that prints prime numbers in between 50 and 100
- Write a python program to find factorial of a number using Recursion
- Write a function that receives marks received by a student in 6 subjects and returns the average and percentage of these marks. Call this function from main() and print the result in main

WEEK-4:

- Write a program to demonstrate working with tuples and List in python
- Write a program to demonstrate working with dictionaries in python

WEEK-5:

- Write a program to demonstrate working with Strings and string operations

WEEK-6:

- Write a script named hellow.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
- Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.

WEEK-7:

- Write python programs to demonstrate class & object, static and instance method implementation.

WEEK -8:

- Write python programs to demonstrate Inheritance and Polymorphism.

WEEK-9:

- Write python programs to demonstrate Exception Handling in python.

WEEK-10:

- Write python programs to demonstrate Numpy library and supporting functions.

WEEK-11:

- Write python programs to demonstrate Pandas libraries' supported structures like series,data frame and panel.

WEEK-12:

- Write a python program to demonstrate matplotlib library and supporting functions.

TEXT BOOKS:

1. Core Python Programming, by R.Nageswara Rao
2. ReemaThareja, Python Programming using Problem Solving Approach, First Edition, OxfordHigher Eduction.

REFERENCE BOOKS:

1. Kenneth A.Lambert, Fundamentals of Python
2. Charles Dierach, Introduction to Computer Science using Python.

WEB REFERENCES:

1. https://www.programiz.com/python-programming
2. https://www.javatpoint.com/python-tutorial
3. https://www.geeksforgeeks.org/python-programming-language/

DATABASE MANAGEMENT SYSTEMS LAB

	L	T	P	C
II B. TECH- II SEMESTER				
Course Code: A1CS407PC	-	-	2	1

COURSE OBJECTIVES:

The course should enable the students to:

1. Apply the basic concepts of Database Systems and Applications.
2. Use the basics of SQL and construct queries using SQL in database creation and interaction
3. Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.
4. Analyze and Select storage and recovery techniques of database system.

COURSE OUTCOMES:

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

1. Apply the basic concepts of Database Systems and Applications.
2. Develop an ER model for a given database.
3. Use the basics of SQL and construct queries using SQL in database creation and interaction.
4. Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.

LIST OF EXPERIMENTS

WEEK-1: INTRODUCTION TO E R MODEL

Student should select a case study from given ideas and formulate the problem statement.

WEEK-2: CONCEPTUAL DESIGNING USING ER DIAGRAMS

Conceptual Designing using ER Diagrams (Identifying entities, attributes, keys and relationships between entities, cardinalities, generalization, specialization etc.) Note: Student is required to submit a document by drawing ER Diagram to the Lab teacher.

WEEK-3: CONVERTING ER MODEL TO RELATIONAL MODEL

Converting ER Model to Relational Model (Represent entities and relationships in Tabular form, Represent attributes as columns, identifying keys) Note: Student is required to submit a document showing the database tables created from ER Model.

WEEK-4: NORMALIZATION

Normalization -To remove the redundancies and anomalies in the above relational tables,
Normalize up to Third Normal Form

WEEK-5: CREATION OF TABLES USING SQL

Creation of Tables using SQL- Overview of using SQL tool, Data types in SQL, Creating Tables (along with Primary and Foreign keys), Altering Tables and Dropping Tables.

WEEK-6: DML COMMANDS

Practicing DML commands- Insert, Select, Update, Delete.

WEEK-7: QUERIES

Practicing Queries using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, CONSTRAINTS etc.

WEEK-8: SUB QUERIES

Practicing Sub queries (Nested, Correlated) and Joins (Inner, Outer and Equi).

WEEK-9: AGGREGATE FUNCTIONS

Practice Queries using COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING, VIEWS Creation and Dropping.

WEEK-10: TRIGGERS

Practicing on Triggers - creation of trigger, Insertion using trigger, Deletion using trigger, Updating using trigger.

WEEK-11: PROCEDURES

Procedures- Creation of Stored Procedures, Execution of Procedure, and Modification of Procedure.

WEEK-12: CURSORS

Cursors- Declaring Cursor, Opening Cursor, Fetching the data, closing the cursor.

REFERENCE BOOKS:

1. Database System Concepts, by Silberschatz, Sudarshan, and Korth, 6th edition.
2. Database management System by Raghu Rama Krishna, 3rd edition.

WEB REFERENCES:

1. http://www.learndb.com/databases/how-to-convert-er-diagram-to-relational-database
2. https://www.w3schools.com/sql/sql_create_table.asp
3. http://www.edugrabs.com/conversion-of-er-model-to-relational-model/?upm_export=print
4. http://ssyu.im.ncnu.edu.tw/course/CSDB/chap14.pdf
5. http://web.cs.ucdavis.edu/~green/courses/ecs165a-w11/8-query.pdf

OPERATING SYSTEMS LAB

II B. TECH- II SEMESTER **L T P C**
Course Code: A1CS408PC **- - 2 1**

COURSE OBJECTIVES:

1. To provide an understanding of the design aspects of operating system concepts through simulation
2. Introduce basic Unix commands, system call interface for process management, inter process communication and I/O in Unix

COURSE OUTCOMES:

1. Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
2. Able to implement C programs using Unix system calls

LIST OF EXPERIMENTS

1. Write C programs to simulate the following CPU Scheduling algorithms
    a. FCFS
    b. SJF
    c. Round Robin
    d. priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms
    a. Pipes
    b. FIFOs
    c. Message Queues
    d. Shared Memory
6. Write C programs to simulate the following memory management techniques
    a. Paging
    b. Segmentation

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the UNIX environment, W.R.Stevens, *Pearson* education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

GENDER SENSITIZATION

II B. TECH- II SEMESTER **L T P C**
Course Code: A1CS405MC **- - 2 -**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To provide a critical perspective on the socialization of men and women.
2. To introduce students to information about some key biological aspects of genders. To expose the students to debates on the politics and economics of work.
3. To help students reflect critically on gender violence.
4. To expose students to more egalitarian interactions between men and women.

COURSE OUTCOMES:

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

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT – I UNDERSTANDING GENDER

Gender: Why Should We Study It? (*Towards a World of Equals*: Unit -1) **Socialization:** Making Women, Making Men (*Towards a World of Equals*: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT – II GENDER AND BIOLOGY

Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals*: Unit -4) Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary (*Towards a World of Equals*: Unit -10) Two or Many? Struggles with Discrimination.

UNIT – III GENDER AND LABOUR

Housework: the Invisible Labour (*Towards a World of Equals*: Unit -3)"My Mother doesn't Work." "Share the Load."

Women's Work: Its Politics and Economics (*Towards a World of Equals*: Unit -7)

Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions ofWork.

UNIT – IV ISSUES OF VIOLENCE

Sexual Harassment: Say No! (*Towards a World of Equals*: Unit -6)

Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading:"*Chupulu".*

Domestic Violence: Speaking Out (*Towards a World of Equals*: Unit -8)

Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading:New Forums for Justice.

Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11) Blaming the Victim-"I Fought for my Life…." - Additional Reading: The Caste Face of Violence.

UNIT – V GENDER: CO – EXISTENCE

Just Relationships: Being Together as Equals (*Towards a World of Equals*: Unit -12)

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks- The Brave Heart.

TEXT BOOKS:

1. "Towards a World of Equals: A Bilingual Textbook onGender", A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote,Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State,2015.

REFERENCE BOOKS:

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "I Fought For My Life…and Won." Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

WEB REFERENCES:

1. http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

III-YEAR (I-SEMESTER)

WEB TECHNOLOGIES

III B. TECH- I SEMESTER **L T P C**
Course Code: A1CS501PC **3 - - 3**

COURSE OBJECTIVES:

1. Get best technologies for solving web client/server problems
2. Solve and use JavaScript for dynamic effects and form input entry
3. Recognize appropriate client-side or server-side applications
4. Receive ability to adapt to changing web development and design skills and solid understanding of common design trends.
5. Develop web application software tools i.e. AJAX, PHP and xml etc. and
6. Identify the environments currently available on the market to design web sites

COURSE OUTCOMES:

1. Design web pages using HTML, Cascading Style Sheets and JavaScript
2. Write XML documents and Schemas.
3. Implement server-side programming using JDBC
4. Create dynamic web pages
5. Create web application development using bdk, jsp and servlets.

UNIT-I: INTRODUCTION TO HTML

Basic Tags of HTML, Introduction HTML5, new HTML5 Form input Types. Cascading Style Sheets. Introduction to javascript: declaring variables, functions, event handlers (onClick , onsubmit etc). Form validation.

UNIT-II: INTRODUCTION TO XML

Introduction to XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX. Introduction to web service solution stacks XAMPP: Introduction to content Management Systems Joomla, word press.

UNIT-III: INTRODUCTION TO SERVLETS

Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlet, Deploying Servlet, Servlet API, Reading Servlet parameters, Reading initialization parameters, handling Http Request & Responses. Session tracking, cookies. Connecting to a database using JDBC.

UNIT-IV: INTRODUCTION TO JSP

Introduction to JSP: The anatomy of a JSp page, JSP processing, Declarations, Directives, Expressions, code snippets, implicit objects. Using beans in JSP pages. Using cookies for session tracking. Connecting to database in JSP.

UNIT-V: INTRODUCTION TO PHP

Introduction to PHP: Downloading, installing, configuring PHP, The anatomy of a PHP Page. Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops, Code Blocks and Browser Output, Objects, Strings Processing, Form processing, connecting to database, using cookies, dynamic contents.

TEXT BOOKS:

1. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, BlackBook.
2. Web Technologies, Uttam K Roy, Oxford Press.

REFERENCE BOOKS:

1. Chris Bates, "Web Programming, building internet applications", 2ndEdition, WILEY,Dreamtech, 2008.
2. Herbert Schildt, "The complete Reference Java 2", 8th Edition, TMH, 2011.
3. Hans Bergsten: "Java Server Pages", 3rdEdition, O'Reilly publication, 2008.

MOOCS COURSE:

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in/

COMPUTER NETWORKS

III B. TECH- I SEMESTER **L T P C**
Course Code: A1CS502PC **3 - - 3**

COURSE OBJECTIVES:

Student will be able

1. To introduce the fundamental s of various types of computer networks
2. To demonstrate the TCP/IP and OSI models with merits and demerits
3. To explore the various layers of OSI model
4. To introduce UDP and TCP models

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Identify computer networks and its components.
2. Identify the different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
4. Select and use various sub netting and routing mechanisms.
5. Design a network diagram for a given scenario.

UNIT-I: INTRODUCTION

Introduction: Network applications, network hardware, network software, reference models: OSI, TCP/IP, Internet, Connection oriented network - X.25, frame relay.

The Physical Layer: Theoretical basis for communication, guided transmission media, wireless transmission, the public switched telephone networks, mobile telephone system.

UNIT-II: THE DATA LINK LAYER

The Data Link Layer: Design issues, error detection and correction, elementary data link protocols, sliding window protocols.

The Medium Access Sublayer: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth

UNIT-III: THE NETWORK LAYER

The Network Layer: Network layer design issues, routing algorithms, Congestion control algorithms, Internetworking, the network layer in the internet (IPv4 and IPv6), Quality of Service.

UNIT-IV: THE TRANSPORT LAYER

The Transport Layer: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

UNIT-V: THE APPLICATION LAYER

The Application Layer: Domain name system, electronic mail, World Wide Web: architectural overview, dynamic web document and http.

Application Layer Protocols: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet.

TEXT BOOKS:

1. Computer networks-Andrew S Tanenbaum, 4th edition, Pearson Education Data Communication and Networking-Behrouz. A. Forouzan , fifth edition, TMH, 2013.

REFERENCE BOOKS:

1. Behrouz A. Forouzan (2006), Data communication and Networking, 4th Edition, Mc Graw-Hill, India.
2. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India.

DESIGN AND ANALYSIS OF ALGORITHM

III B. TECH- I SEMESTER **L T P C**
Course Code: A1CS503PC **3 - - 3**

PREREQUISITES:

1. A course on "Computer Programming and Data Structures"
2. A course on "Advanced Data Structures"

COURSE OBJECTIVES:

1. Introduces the notations for analysis of the performance of algorithms.
2. Introduces the data structure disjoint sets.
3. Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
5. Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

COURSE OUTCOMES:

1. Ability to analyze the performance of algorithms
2. Ability to choose appropriate data structures and algorithm design methods for a specified application
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT – I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations-Big oh notation, Omega notation, Theta notation and Little oh notation.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT - II

Disjoint Sets: Disjoint set operations, union and find algorithms

Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graphcoloring

UNIT - III

Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT - IV

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem,Minimum cost spanning trees, Single source shortest path problem.

UNIT - V

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsackproblem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP – Hard and NP-Complete classes, Cook's theorem

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R.Tamassia, John Wiley and sons.

SOFTWARE ENGINEERING

III B. TECH- I SEMESTER **L T P C**
Course Code: A1CS504PC **3 - - 3**

COURSE OBJECTIVES:

To learn

1. To familiarize with basic Software engineering methods and practices, and its applications.
2. To explain layered technology in software engineering
3. To teach software metrics and software risks.
4. To familiarize with software requirements and the SRS documents.
5. To facilitate students in software design

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Understand software development life cycle and select appropriate model suited for diverse software application.
2. Analyze the customer's requirements for a project to be developed and formulate the software requirements document
3. Conceptualize the system through design with emphases on architectural modeling and user interface
4. Classify software testing strategies and recommend testing techniques during the construction of software.
5. Examine the application of metrics and software tools during software development

UNIT-I: INTRODUCTION TO SOFTWARE ENGINEERING

Introduction to Software Engineering: The Evolving nature of software engineering, Changing nature of software engineering, Software engineering Layers, The Software Processes, Software Myths.

Process Models: A Generic Process Model, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Spiral Model, the Unified Process, Personal and Team Process Models, the Capability Maturity Model Integration (CMMI).

UNIT-II: REQUIREMENTS ENGINEERING

Requirements Engineering: Functional and Non-Functional Requirements, The Software requirements Document, Requirements Specification, requirements Engineering, Requirements Elicitation and Analysis, Requirement Validation, Requirement Management, System Modeling: Context Models, Interaction Models, Structural Models, Behavioral Model, Model-Driven Engineering.

Design Concepts: The Design Process, Design Concepts, The Design Models, Architectural Design: Software Architecture, Architectural Genres, Architectural Styles.

UNIT-III: DESIGN AND IMPLEMENTATION

Design and Implementation: Design Patterns, Implementation Issues, Open-Source Development. User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

Software Testing Strategies: A Strategic approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Validation Testing, System Testing, The Art of Debugging, White-Box Testing, Black Box Testing.

UNIT-IV: PRODUCT METRICS

Product Metrics: A Frame Work for Product Metrics, Metrics for the Requirements Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing.

Process and Project Metrices: Metrics in the Process and Project Domains, Software Measurements, Metrics for Software Quality, Risk Management: Risk verses Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinements, Risk Mitigation Monitoring and Management (RMMM), The RMMM Plan.

UNIT-V: OVERVIEW OF QUALITY MANAGEMENT AND PROCESS IMPROVEMENT

Overview of Quality Management and Process Improvement: Overview of SEI -CMM, ISO 9000, CMMI, PCMM, TQM and Six Sigma.

Overview of Case Tools: Software tools and environments: Programming environments; Project management tools; Requirement's analysis and design modeling tools; testing tools; Configuration management tools.

TEXT BOOKS:

1. Roger S. Pressman (2011), Software Engineering, A Practitioner's approach, 7th edition, McGraw Hill International Edition, New Delhi.
2. Sommerville (2001), Software Engineering, 9th edition, Pearson education, India.

REFERENCE BOOKS:

1. K. K. Agarval, Yogesh Singh (2007), Software Engineering, 3rd edition, New Age International Publishers, India.
2. Lames F. Peters, Witold Pedrycz(2000), Software Engineering an Engineering approach, John Wiely & Sons, New Delhi, India.
3. Shely Cashman Rosenblatt (2006), Systems Analysis and Design, 6th edition, Thomson Publications, India.

ARTIFICIAL INTELLIGENCE

(Professional Elective-I)

III B. TECH- I SEMESTER	**L T P C**
Course Code: A1CS501PE	**3 - - 3**

COURSE OBJECTIVES:

To learn the difference between optimal reasoning vs human like reasoning

1. To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities
2. To learn different knowledge representation techniques
3. To understand the applications of AI viz Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing

COURSE OUTCOMES:

At the end of the course students are able to

1. Demonstrate fundamental concepts of artificial intelligence.
2. Select a search algorithm for a problem and characterize its time and space complexities.
3. Discuss various approaches to knowledge representation.
4. Apply AI techniques to solve problems of Game Playing, Expert Systems, Machine Learning and Natural Language Processing
5. Outline advanced knowledge representation techniques.

UNIT-I: INTRODUCTION

Introduction, History, Intelligent Systems, Foundations of AI, Sub areas of AI, Applications. 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. Game Playing, Bounded Look-ahead Strategy and use of Evaluation Functions, Alpha-Beta Pruning.

UNIT-II: LOGIC CONCEPTS AND LOGIC PROGRAMMING & KNOWLEDGE REPRESENTATION

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT-III: EXPERT SYSTEM AND APPLICATIONS & UNCERTAINTY MEASURE – PROBABILITY THEORY

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems Vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells and Tools.

Uncertainty Measure – Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory.

UNIT-IV: MACHINE-LEARNING PARADIGMS & ARTIFICIAL NEURAL NETWORKS

Machine-Learning Paradigms: Introduction. Machine Learning Systems. Supervised and Unsupervised Learning. Inductive Learning. Learning Decision Trees, Deductive Learning. Clustering, Support Vector Machines.

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed Forward Networks, Multi-Layer Feed-Forward Networks, Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks.

UNIT-V: ADVANCED KNOWLEDGE REPRESENTATION TECHNIQUES

Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web Natural Language Processing: Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge.

TEXT BOOKS:

1. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011
2. Russell, Norvig: Artificial intelligence, A Modern Approach, Pearson Education, Second Edition. 2004

REFERENCE BOOKS:

1. Rich, Knight, Nair: Artificial intelligence, Tata McGraw Hill, Third Edition 2009.
2. Introduction to Artificial Intelligence by Eugene Charniak, Pearson.
3. Introduction to Artificial Intelligence and expert systems Dan W.Patterson. PHI.
4. Artificial Intelligence by George Fluger rearson fifth edition.

WEB REFERENCES:

1. http://zsi.tech.us.edu.pl/~nowak/bien/BIEN_introduction.pdf
2. https://epub.uni-regensburg.de/13629/1/ubr06078_ocr.pdf
3. https://lecturenotes.in/subject/128/artificial-intelligence-ai

E-TEXT BOOKS:

1. https://books.google.co.in/books?id=DDNHzcN6jasC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
2. https://books.google.co.in/books?id=YmH1tXFA14MC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

MOOCS COURSE:

1. https://www.edx.org/course/artificial-intelligence-1
2. https://www.appliedaicourse.com/

PRINCIPLES OF PROGRAMMING LANGUAGES

(Professional Elective-I)

III B. TECH- I SEMESTER	**L T P C**
Course Code: A1CS502PE	**3 - - 3**

COURSE OBJECTIVES:

To learn

1. To familiarize various programming methodologies
2. To explain merits and demerits of various programming patterns
3. To gain knowledge of new programming practices
4. To familiarize various debugging techniques.

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Describe syntax and semantics of programming language design and implementation.
2. Compare programming languages and assess programming languages.
3. Use formal description for a programming language and assess using evaluators.
4. Apply different programming paradigms: analyze the principles of imperative, object-oriented, functional and logic programming.
5. Design a new programming language in principle.

UNIT-I:

Preliminary Concepts: concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming, Logic Programming, Programming Language Implementation – Compilation and Virtual Machines, programming environments.

UNIT-II:

Syntax and Semantics: General Problem of describing Syntax and Semantics, formal methods of describing syntax - BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, denotation semantics and axiomatic semantics for common programming language features.

UNIT-III:

Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types, Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization.

UNIT-IV:

Expressions and Statements: Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control Structures – Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements, guarded commands.

UNIT-V:

Subprograms and Blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static and dynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions user defined overloaded operators, co routines.

TEXT BOOKS:

1. Concepts of Programming Languages Robert .W. Sebesta 6/e, Pearson Education.
2. Programming Languages – Louden, Second Edition, Thomson.

REFERENCE BOOKS:

1. Programming languages –Ghezzi, 3/e, John Wiley
2. Programming Languages Design and Implementation – Pratt and Zelkowitz, Fourth Edition
3. PHI/Pearson Education
4. Programming languages –Watt, Wiley Dreamtech
5. LISP Patric Henry Winston and Paul Horn Pearson Education.
6. Programming in PROLOG Clocksin, Springer

DISTRIBUTED DATABASES

(Professional Elective-I)

III B. TECH- I SEMESTER	**L T P C**
Course Code: A1CS503PE	**3 - - 3**

COURSE OBJECTIVES:

1. To understand the theoretical and practical aspects of the database technologies.
2. To understand the need for distributed database technology to tackle deficiencies of the centralized database systems.
3. To introduce the concepts and techniques of distributed database including principles, architectures, design, implementation and major domain of application.

COURSE OUTCOMES:

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

1. Identify the introductory distributed database concepts and its structures.
2. Describe terms related to distributed object database design and management.
3. Produce the transaction management and query processing techniques in DDBMS.
4. Relate the importance and application of emerging database technology

UNIT-I: INTRODUCTION

Features of Distributed versus Centralized Databases, Principles of Distributed Databases, Levels Of Distribution Transparency, Reference Architecture for Distributed Databases, Types of Data Fragmentation, Integrity Constraints in Distributed Databases, Distributed Database Design.

UNIT-II: QUERY PROCESSING

Translation of Global Queries to Fragment Queries, Equivalence transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries. Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries

UNIT-III: TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL

The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions Concurrency Control, Foundation of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

UNIT-IV: RELIABILITY AND SECURITY IN THE DISTRIBUTED DATABASES

Reliability, Basic Concepts, Non-blocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection

UNIT-V: DISTRIBUTED OBJECT DATABASE MANAGEMENT SYSTEMS

Architectural Issues, Alternative Client/Server Architectures, Cache Consistency, Object Management, Object Identifier Management, Pointer Swizzling, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution, Transaction Management, Transaction Management in Object DBMSs, Transactions as Objects

TEXT BOOKS:

1. Distributed Databases - Principles and Systems; Stefano Ceri; Guiseppe Pelagatti; Tata McGraw Hill; 1985.
2. Fundamental of Database Systems; Elmasri & Navathe; Pearson Education; Asia Database System Concepts; Korth & Sudarshan; TMH
3. Principles of Distributed Database Systems; M. Tamer Özsu; and Patrick Valduriez Prentice Hall.

REFERENCE BOOKS:

1. Data Base Management System; Leon & Leon; Vikas Publications
2. Introduction to Database Systems; Bipin C Desai; Galgotia

WEB REFERENCES:

1. https://www.tutorialspoint.com/distributed_dbms/distributed_dbms_databases.htm
2. https://www.geeksforgeeks.org/distributed-database-system/

E-TEXT BOOKS:

1. https://biblio.com.au/distributed-databases-by-ceri-stefano-pelagatti/work/245682
2. https://www.amazon.in/Distributed-Database-Systems-Chhanda-Ray-ebook/dp/B009NEMZ0W

MOOCS COURSE:

1. https://nptel.ac.in/syllabus/106106107/
2. https://www.coursera.org/learn/distributed-database

WEB TECHNOLOGIES LAB

III B. TECH- I SEMESTER **L T P C**
Course Code: A1CS505PC **- - 3 1.5**

COURSE OBJECTIVES:

To learn

1. Teach students the basics of server-side scripting using PHP
2. Explain web application development procedures
3. Impart Servlets technology for writing business logic
4. Facilitate students to connect to databases using JDBC
5. Familiarize various concepts of application development using JSP

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Create web pages using PHP
2. Identify the difference between the HTML PHP and XML documents.
3. Identify the engineering structural design of XML and parse tree
4. Analyze the difference between and PHP and XML.
5. Understand the concept of JAVA SCRIPTS.
6. Identify the difference between the JSP and Servlets.
7. Design web application using MVC architecture
8. Understand the JSP and Servlet concepts.

SYLLABUS

Note:

1. Apache, MySQL and PHP for the Lab Experiments. Though not mandatory, encourage the use of Eclipse platform wherever applicable
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed

I. Install the following on the local machine
   i. Apache Web Server (if not installed)
   ii. Tomcat Application Server locally
   iii. Install MySQL (if not installed)
   iv. Install PHP and configure it to work with Apache web server and MySQL (if not already configured)

II. Write an HTML page including any required JavaScript that takes a number from one text field in the range of 0 to 999 and shows it in range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show “out of range” and if it is not a number, it should show “not a number” message in the result box.

3. Write an HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, words and lines in the text entered using an alert message. Words are separated with while space and lines are separated with new line character.
4. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).
5. Create an XML document that contains 10 users information. Write a Java program, which takes User Id as input and returns the user details by taking the user information from the XML document using (a) DOM Parser and (b) SAX parser.

6. Implement the following web applications using (a) PHP, (b) Servlets and (c) JSP:
   i. A user validation web application, where the user submits the login name and password to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page is returned. Otherwise a failure message is shown to the user.
   ii. Modify the above program to use an xml file instead of database.
   iii. Modify the above program to use AJAX to show the result on the same page below the submit button.
   iv. A simple calculator web application that takes two numbers and an operator (+, -, /, * and %) from an HTML page and returns the result page with the operation performed on the operands.
   v. Modify the above program such that it stores each query in a database and checks the database first for the result. If the query is already available in the DB, or it computes the result and returns it after storing the new query and result on DB.
   vi. A web application takes a name as input and on submit it shows a hello<name>page where<name> is taken from the request. It shows the start time at the right top corner of the page and provides a logout button. On clicking this button, if should show a logout page with Thank You <name> message with the duration of usage (hint: Use session to store name and time).
   vii. A web application that takes name and age from an HTML page. If the age is less than 18, it should send a page with "Hello <name>, you are not authorized to visit this site" message, where <name> should be replaced with the entered name. Otherwise it should send "Welcome <name> to the site" message.
   viii. A web application for implementation: The user is first served a login page which takes user's name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions. If name and password doesn't match, then serves "password mismatch" page If name is not found in the database, serves a registration page, where user's full name is asked and on submitting the full name, it stores, the login name, password and full name in the database (hint: use session for storing the submitted login name and password)
   ix. A web application that lists all cookies stored in the browser on clicking "List Cookies" button.

Add cookies if necessary.

TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill.

REFERENCE BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech
2. Java Server Pages – Hans Bergsten, SPD O'Reilly
3. Java Script, D.Flanagan, O'Reilly, SPD.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming World Wide Web, R.W. Sebesta. Fourth Edition, Pearson.
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson

COMPUTER NETWORKS LAB

III B. Tech I- SEMESTER **L T P C**
Course Code: A1CS506PC **0 0 3 1.5**

COURSE OBJECTIVES:

- To understand the working principle of various communication protocols.
- To understand the network simulator environment and visualize a network topology and
- observe its performance.
- To analyze the traffic flow and the contents of protocol frames.

COURSE OUTCOMES:

- Implement data link layer farming methods.
- Analyze error detection and error correction codes.
- Implement and analyze routing and congestion issues in network design.
- Implement Encoding and Decoding techniques used in presentation layer.
- To be able to work with different network tools.

LIST OF EXPERIMENTS

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting technique used in buffers.
10. Wireshark
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    i. NS2 Simulator-Introduction
    ii. Simulate to Find the Number of Packets Dropped
    iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    iv. Simulate to Find the Number of Packets Dropped due to Congestion
    v. Simulate to Compare Data Rate& Throughput.
    vi. Simulate to Plot Congestion for Different Source/Destination
    vii. Simulate to Determine the Performance with respect to Transmission of Packets

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

III B. TECH- I SEMESTER **L T P C**
Course Code: A1EN507HS **- - 2 1**

INTRODUCTION:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course is a laboratory course to enable students to use 'good' English and perform the following:

i. Gather ideas and information, to organize ideas relevantly and coherently.
ii. Engage in debates.
iii. Participate in group discussions.
iv. Face interviews.
v. Write project/research reports/technical reports.
vi. Make oral presentations.
vii. Write formal letters.
viii. Transfer information from non-verbal to verbal texts and vice versa.
ix. To take part in social and professional communication.

COURSE OUTCOMES:

By the end of the course students will be able to

1. Organize the ideas coherently from the text.
2. Participate in debates, group discussions.
3. Write project/research reports/technical reports/formal letters.
4. Make oral presentations.

SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

WEEK -1: ACTIVITIES ON FUNDAMENTALS OF INTER-PERSONAL COMMUNICATION

Starting a conversation - responding appropriately and relevantly - using the right body language - Role Play in different situations & Discourse Skills- using visuals.

WEEK -2: ACTIVITIES ON BUILDING VOCABULARY

Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary

WEEK -3: ACTIVITIES ON READING COMPREHENSION

General Vs Local Comprehension, reading for facts, guessing meanings from context, Scanning and Skimming.

WEEK -4: ACTIVITIES ON READING FOR SPECIFIC PURPOSES

Inferring meaning, Critical reading & Effective goggling.

WEEK-5: ACTIVITIES ON WRITING SKILLS- TECHNICAL REPORTS

Structure and presentation of different types of writing - letter writing/ Resume writing/ e-correspondence

WEEK-6: ACTIVITIES ON WRITING SKILLS

Technical report writing/ Portfolio writing - planning for writing - improving one's writing.

WEEK- 7: ACTIVITIES ON PRESENTATION SKILLS

Oral presentations (individual and group) through JAM sessions and Seminars.

WEEK- 8: ACTIVITIES ON PRESENTATION SKILLS USING ICT

PPTs and written presentations through posters/ projects/ reports/ e-mails/ assignments etc.

WEEK- 9: ACTIVITIES ON GROUP DISCUSSION

Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process.

WEEK-10: INTERVIEW SKILLS

Pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conferencing and Mock Interviews.

BOOKS RECOMMENDED:

1. Raman, M & Sharma, S. (2009). Technical Communication. Oxford University Press.
2. Rani. S. (2011). Advanced Communication Skills Laboratory Manual. Pearson Education.
3. Anderson, V. (2007). Technical Communication. Cengage Learning pvt. Ltd.
4. Kelly M. Quintanilla & Shawn T. Wahl. (2011). Business and Professional Communication: Keys for Workplace Excellence. Sage South Asia Edition. Sage Publications.
5. Stev. D & David T. Mc Mahan. (2012). The Basics of Communication: A Relational Perspective. Sage South Asia Edition. Sage Publications.
6. Mc Murrey. D & Buckley. J. (2012). Handbook for Technical Communication Cengage Learning.
7. Sen. L. (2009). Communication Skills. PHI Learning Pvt Ltd.
8. Vishvamohan, A. (2009). English for Technical Communication for Engineering Students. Tata Mc Graw Hill.
9. Books on TOFEL/ GRE/ GMAT/ CAT/ IELTS by Barron's/ DELTA/ Cambridge University Press.
10. Tomalin, B & Thomas, B. (2009). International English for Call Centers. Macmillan Publishers

CONSTITUTION OF INDIA

III B. TECH- I SEMESTER **L T P C**
Course Code: A1CS506MC **2 - - -**

COURSE OBJECTIVES:

Students will be able to:

1. Understand the need for constitution
2. Appreciate the fundamental duties and rights of the citizens of India.
3. Explain the role and amendments of constitution in a democratic society.
4. Describe the directive principles of state policy and their significance.
5. List the key features of the constitution, union government and state government.

COURSE OUTCOMES:

Students will be able to:

1. Create awareness about the constitutional values and objectives written in the Indian constitution.
2. List fundamental rights and fundamental duties of Indian citizens.
3. Identify the division of legislative, executive and financial powers between the union and state governments.
4. Understand the working of Indian democracy, its institutions and processes at the local, state and union levels.
5. Explain the functions and responsibilities of election commission of India and union public service commission.

UNIT-I: HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History of Making of the Indian Constitution: Introduction to the constitution of India, the making of the constitution and salient features of the constitution.

UNIT-II: PHILOSOPHY OF THE INDIAN CONSTITUTION

Philosophy of the Indian Constitution: Preamble Salient Features, Contours of Constitutional Rights &Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties, Amendment of the constitutional powers and procedures.

UNIT-III: UNION GOVERNMENT

Union Government: Union Government, Union Legislature (Parliament), Lok Sabha and Rajya Sabha (with powers and functions), president of India (with powers and functions), Prime minister of India (With powers and functions), Union judiciary (Supreme Court), Jurisdiction of the Supreme Court.

UNIT-IV: STATE GOVERNMENT

State Government: State Government, State legislature (Legislative Assembly/ Vidhan Sabha, Legislative council/ Vidhan parishad), powers and functions of the state legislature, State executive, Governor of the state (with powers and functions), the Chief Minister of the state (with powers and functions), State Judiciary (High courts)

UNIT-V: ELECTION COMMISSION

Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXT BOOKS:

1. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd. New Delhi
2. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012
3. The constitution of India, P.M.Bakshi, Universal Law Publishing Co.,
4. The Constitution of India, 1950 (Bare Act), Government Publication.
5. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

REFERENCE BOOKS:

1. M. P. Jain, Indian Constitution Law, 7th Edn. Lexis Nexis, 2014.
2. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.
3. Indian constitution at work, NCERT
4. SubashKashyap, Indian Constitution, National Book Trust
5. J.A. Siwach, Dynamics of Indian Government & Politics
6. D.C. Gupta, Indian Government and Politics
7. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
8. J.C. Johari, Indian Government and Politics Hans
9. J. Raj Indian Government and Politics.

E-RESOURCES:

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

III-YEAR (II-SEMESTER)

AUTOMATA AND COMPLIER DESIGN

III B. TECH- II SEMESTER **L T P C**
Course Code: A1CS601PC **3 - - 3**

COURSE OBJECTIVES:

Automata and compiler Design mainly deals with the languages which are formal and regular and also deals with grammar present in the machine.

COURSE OUTCOMES:

1. Graduates should be able to understand the concept of abstract machines and their power to recognize the languages.
2. Attain the knowledge of language classes & grammar relationship among them with the help of Chomsky hierarchy.
3. Ability to understand the design of a compiler given features of the languages.
4. Ability to implement practical aspects of automata theory.
5. Gain Knowledge of powerful compiler generation tools.

UNIT - I

Formal Language and Regular Expressions: Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis, lex tools.
Context Free grammars and parsing: Context free grammars, derivation, parse trees, ambiguity LL(K) grammars and LL(1) parsing.

UNIT - II

Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.
Semantics: Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow statements.

UNIT - III

Context Sensitive features – Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations.

UNIT - IV

Run time storage: Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation.
Code optimization: Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs.

UNIT - V

Code generation: Machine dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment. Using DAG representation of Block.

TEXT BOOKS:

1. Introduction to Theory of computation. Sipser, 2nd Edition, Thomson.
2. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.

REFERENCE BOOKS:

1. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
2. Compiler Construction, LOUDEN, Cengage Learning.
3. Elements of Compiler Design, A.Meduna, Auerbach Publications, Taylor and Francis Group.
4. Principles of Compiler Design, V.Raghavan, TMH.
5. Engineering a Compiler, K.D.Cooper, L.Torczon, ELSEVIER.
6. Introduction to Formal Languages and Automata Theory and Computation – Kamala Krithivasan and Rama R, Pearson.
7. Modern Compiler Design, D.Grune and others,Wiley-India.
8. A Text book on Automata Theory, S.F.B.Nasir, P.K.Srimani, Cambridge Univ. Press.
9. Automata and Languages, A.Meduna, Springer.

MACHINE LEARNING

III B. TECH- II SEMESTER	L	T	P	C
Course Code: A1CS602PC	3	-	-	3

COURSE OBJECTIVES:

To learn

1. To introduce the fundamental concepts of machine learning and its applications
2. To learn the classification, clustering and regression machine learning algorithms
3. To understand the methods of solving real life problems using the machine learning techniques

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Illustrate the basic concepts of machine learning
2. Implement the classification, clustering and regression algorithms
3. Design and implement a method for solving real life problem using a suitable machine learning technique
4. Combine the evidence from two or more models/methods for designing a system.

UNIT-I:

Introduction and Bayesian Decision Theory: Machine perception - feature extraction - classification, clustering and regression - design cycle - types of learning, Bayesian decision theory - classifiers, discriminant functions, and decision surfaces - univariate and multivariate normal densities - Bayesian belief networks.

UNIT-II:

Component Analysis and Hidden Markov Models: Principal component analysis - Linear discriminant analysis - Independent component analysis. Expectation-maximization algorithm - hidden Markov models: Evaluation - decoding - learning.

UNIT-III:

Classification Algorithms: Perceptron and back propagation neural network - radial basis function neural network - probabilistic neural network - k-nearest-neighbour rule. Support vector machine: Training – multi category generalizations. Decision trees: classification and regression tree - random forest.

UNIT-IV:

Clustering and Regression Algorithm: k-means clustering - fuzzy k-means clustering - Gaussian mixture models - auto associative neural network. Regression analysis - support vector regression.

UNIT-V:

Combining Multiple Learners: Generating diverse learners - model combination schemes - voting - error-correcting output codes - bagging - boosting - mixture of experts revisited - stacked generalization - fine-tuning an ensemble - cascading.

TEXT BOOKS:

1. R. O. Duda, E. Hart, and D.G. Stork, "Pattern classification", Second edition, John Wiley & Sons, Singapore, 2003.
2. Ethem Alpaydin, “Introduction to Machine Learning”, MIT Press, Third Edition, 2014.
3. C. M. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.

REFERENCE BOOKS:

1. M. Mohri, A. Rostamizadeh, and A. Talwalkar, “Foundations of Machine Learning”, MIT Press, 2012.
2. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012.

DEVOPS

III B. TECH- II SEMESTER **L T P C**
Course Code: A1CS603PC **3 - - 3**

COURSE OBJECTIVES:

The main objectives of this course are to:
1. Describe the agile relationship between development and IT operations.
2. Understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability
3. Implement automated system update and DevOps lifecycle

COURSE OUTCOMES:

On successful completion of this course, students will be able to:
1. Identify components of Devops environment
2. Describe Software development models and architectures of DevOps
3. Apply different project management, integration, testing and code deployment tool
4. Investigate different DevOps Software development models
5. Assess various Devops practices
6. Collaborate and adopt Devops in real-time projects

UNIT - I

Introduction: Introduction, Agile development model, DevOps, and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples.

UNIT - II

Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Microservices, and the data tier, DevOps, architecture, and resilience.

UNIT - III

Introduction to project management: The need for source code control, The history of source code management, Roles and code, source code management system and migrations, Shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT - IV

Integrating the system: Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT - V

Testing Tools and automation: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker

TEXT BOOKS:

1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN10: 1788392574
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952

REFERENCE BOOK:

1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10.

COMPUTER VISION

(Professional Elective – II)

III B. TECH- II SEMESTER	**L T P C**
Course Code: A1CS604PE	**3 - - 3**

COURSE OBJECTIVES:

1. To study the development of algorithms and techniques to analyze and interpret the visible worldaround us.
2. Be familiar with both the theoretical and practical aspects of computing with images.
3. To understand the basic concepts of Computer Vision.
4. Understand the geometric relationships between 2D images and the 3D world.
5. Ability to apply the various concepts of Computer Vision in other application areas.

COURSE OUTCOMES:

1. Understand the fundamental problems of computer vision.
2. Implement various techniques and algorithms used in computer vision.
3. Analyze and evaluate critically the building and integration of computer vision algorithms.
4. Demonstrate awareness of the current key research issues in computer vision

UNIT-I: DIGITAL IMAGE FORMATION AND LOW-LEVEL PROCESSING

Digital Image Formation and low-level processing: Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing

UNIT-II: DEPTH ESTIMATION AND MULTI-CAMERA VIEWS

Depth estimation and Multi-camera views: Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration.

Feature Extraction: Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.

UNIT-III: IMAGE SEGMENTATION

Image Segmentation: Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection.

Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods.

UNIT-IV: MOTION ANALYSIS

Motion Analysis: Background Subtraction and Modelling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation.

UNIT-V: SHAPE FROM X

Shape from X: Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; PhotometricStereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges.

Applications: CBIR, CBVR, activity recognition, computational photography, biometrics, stitching and document processing. Recent Trends: 3-D Printing, 3-D sensing, simultaneous location and mapping, GPU, edge-computing, augmented reality, virtual reality cognitive models, fusion and super resolution.

TEXT BOOKS:

1. Computer Vision: Algorithms and Applications by Richard Szeliski, Springer-Verlag.

REFERENCE BOOKS:

1. Computer Vision: A Modern Approach by D. A. Forsyth and J. Ponce, Pearson Education.
2. Multiple View Geometry in Computer Vision by Richard Hartley and Andrew Zisserman, Cambridge University Press.
3. Introduction to Statistical Pattern Recognition by K. Fukunaga, Academic Press, Morgan Kaufmann.
4. Digital Image Processing by R.C. Gonzalez and R.E. Woods, PHI.

ROBOTIC PROCESS AUTOMATION

(Professional Elective – II)

III B. TECH- II SEMESTER	**L T P C**
Course Code: A1CS605PE	**3 - - 3**

COURSE OBJECTIVES:

Aim of the course is to make learners familiar with the concepts of Robotic Process Automation.

COURSE OUTCOMES:

1. Describe RPA, where it can be applied and how it's implemented.
2. Identify and understand Web Control Room and Client Introduction.
3. Understand how to handle various devices and the workload.
4. Understand Bot creators, Web recorders and task editors.

UNIT - I

Introduction to Robotic Process Automation & Bot Creation Introduction to RPA and Use cases – Automation Anywhere Enterprise Platform – Advanced features and capabilities – Ways to create Bots.

UNIT - II

Web Control Room and Client Introduction - Features Panel - Dashboard (Home, Bots, Devices, Audit, Workload, Insights) - Features Panel – Activity (View Tasks in Progress and Scheduled Tasks) – Bots (View Bots Uploaded and Credentials).

UNIT - III

Devices (View Development and Runtime Clients and Device Pools) - Workload (Queues and SLA Calculator) - Audit Log (View Activities Logged which are associated with Web CR) – Administration (Configure Settings, Users, Roles, License and Migration) - Demo of Exposed API's – Conclusion – Client introduction and Conclusion.

UNIT - IV

Bot Creator Introduction – Recorders – Smart Recorders – Web Recorders – Screen Recorders – Task Editor – Variables - Command Library – Loop Command – Excel Command – Database Command - String Operation Command - XML Command.

UNIT - V

Terminal Emulator Command - PDF Integration Command - FTP Command - PGP Command – Object Cloning Command - Error Handling Command - Manage Windows Control Command – Workflow Designer - Report Designer.

TEXT BOOKS:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. with the leading RPA tool – UiPath Kindle Edition.

REFERENCES:

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition.

DISTRIBUTED SYSTEMS

(Professional Elective – II)

III B. TECH- I SEMESTER	**L T P C**
Course Code: A1CS606PE	**3 - - 3**

COURSE OBJECTIVES:

To learn

1. To layout foundations of Distributed Systems.
2. To introduce the idea of middleware and related issues
3. To understand in detail the system level and support required for distributed system
4. To understand the issues involved in studying data and design of distributed algorithms

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Identify the advantages and challenges in designing distributed algorithms for different primitives like mutual exclusion, deadlock detection, agreement, etc.
2. Design and develop distributed programs using sockets and RPC/RMI.
3. Differentiate between different types of faults and fault handling techniques in order to implement fault tolerant systems.
4. Analyze different algorithms and techniques for the design and development of distributed systems subject to specific design and performance constraints.

UNIT-I:

Introduction: Definition of Distributed Systems, Goals, Types of Distributed Systems.

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

System Models: Introduction, Architectural Models, Fundamental Models.

UNIT-II:

Time and Global States: Introduction, Clocks Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed Debugging.

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication, Consensus and Related Problems.

UNIT-III:

Inter Process Communication: Introduction, the API for the Internet Protocols, External Data Representation and Marshalling, Client-Server Communication, Group Communication, and Case Study: IPC in UNIX.

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects, Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI.

UNIT-IV:

Distributed File Systems: Introduction, File Service Architecture, and Case Study 1: Sun Network File System, Case Study 2: The Andrew File System.

Name Services: Introduction, Name Services and the Domain Name System, Directory Services, Case Study of the Global Name Services.

Distributed Shared Memory: Introduction, Design and Implementation Issues, Sequential Consistency and IVY case study, Release Consistency, Munin Case Study, Other Consistency Models.

UNIT-V:

Transactions and Concurrency Control: Introduction, Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison of Methods for Concurrency Control.

Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery.

TEXT BOOKS:

1. Distributed Systems, Concepts and Design, George Koulouris, J Dollimore and Tim Kind berg, Pearson Education, 41 Edition. 2009.

REFERENCE BOOKS:

1. Distributed Systems, Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 2nd Edition, PHI.
2. Distributed Systems, an Algorithm Approach, Sukumar Ghosh, Chapman Hall/CRC, Taylor & Fransis Group, 2007.

MOBILE APPLICATION DEVELOPMENT

(Professional Elective – III)

III B. TECH- II SEMESTER	**L T P C**
Course Code: A1CS607PE	**3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to:

1. To facilitate students to understand android SDK
2. To help students to gain a basic understanding of Android application development
3. To inculcate working knowledge of Android Studio development tool

COURSE OUTCOMES:

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

1. Describe the components and compare different mobile application models/architectures and patterns.
2. Apply the mobile development framework knowledge to develop an application for android devices.
3. Use the various layout structures to design an Android application with rich uses interactive interfaces
4. Develop an application that focus on user experience design, native data handling and background tasks and notification
5. Develop applications for Android Devices and deploy in mobile stores (ex: google play store).

UNIT-I: INTRODUCTION TO ANDROID

Setting up Android Studio Development Environment, Creating an Example Android App in Android Studio, Creating and Configuring the Android Studio AVD Emulator, Android Architecture, The Anatomy of an Android Application.

UNIT-II: ANDROID VIEW, VIEWGROUP AND LAYOUTS

Android Views: Text View, Edit Text, Button, Checkbox, Radio Button, Image Button, Progress Bar, Spinner, View Groups and Layouts: Linear Layout, Relative Layout, Table Layout, Frame Layout, Scroll View, Web View and Grid View, Event Handling.

UNIT-III: ACTIVITY AND INTENTS

Understanding Activities, Activity Lifecycle and Intents: Explicit Intent and Implicit Intents, Animating User Interfaces: Image Rotation and Interpolators, Working with Menu.

UNIT-IV: ANDROID USER INTERFACE DESIGN ESSENTIALS

Fragments, Android Floating Action Button, Working with App Bar Creating a Tabbed Interface, An Android List View and Recycler View, Implementing an Android Navigation Drawer, Android Broadcast Intents and Broadcast Receivers, Services.

UNIT-V: ANDROID DATABASE, TESTING AND PUBLISHING APPS

Android SQLite Database, Introduction to Firebase, Firebase User Authentication, reading and writing data to Firebase database, Shared Preferences, Content Providers, Testing and Debugging, Publishing and Deploying Android application to the world.

TEXT BOOKS:

1. Neil Smyth, "Android Studio 3.0 Development Essentials – Android 8 Edition", Payload Media, 3rd Edition, 2017.
2. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)
3. Neil Smyth, "Firebase Essentials – Android Edition", Payload Media, 1st Edition, 2017.

REFERENCE BOOKS:

1. Reto Meier, ―Professional Android 2 Application Development‖, Wiley India Pvt Ltd
2. Mark L Murphy, ―Beginning Android‖, Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, Edition: IB. A. Forouzan, R. F. Gillberg, "C Programming and Data Structures", Cengage Learning, India, 3rd Edition, 2014.

WEB REFERENCES:

1. https://developer.android.com/
2. https://google-developer-training.gitbooks.io/android-developer-fundamentals-course-concepts/content/en/
3. https://google-developer-training.gitbooks.io/android-developer-fundamentals-course-practicals/content/en/

E-TEXT BOOKS:

1. https://developer.android.com/
2. http://enos.itcollege.ee/~jpoial/allalaadimised/reading/Android-Programming-Cookbook.pdf

MOOCS COURSE:

1. https://www.coursera.org/specializations/android-app-development

SCRIPTING LANGUAGES

(Professional Elective-III)

III-B.Tech II-Semester	**L**	**T**	**P**	**C**
Course Code: A1CS608PE	**3**	**0**	**0**	**3**

PREREQUISITES:

1. A course on "Computer Programming and Data Structures".
2. A course on "Object Oriented Programming Concepts".

COURSE OBJECTIVES:

1. This course introduces the script programming paradigm.
2. Introduces scripting languages such as Perl, Ruby and TCL.
3. Learning TCL.

COURSE OUTCOMES:

1. Comprehend the differences between typical scripting languages and typical system andapplication programming languages.
2. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select anappropriate language for solving a given problem.
3. Acquire programming skills in scripting language

UNIT - I

Introduction: Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, **Ruby and web:** Writing CGI scripts, cookies, Choice of Web servers, SOAP and web services RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT - II

Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interperter.

UNIT - III

Introduction to PERL and Scripting : Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Namesand Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern andregular expressions, subroutines.

UNIT - IV

Advanced perl Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Isses.

UNIT - V

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOKS:

1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Progamming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition.

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

SOFTWARE TESTING METHODOLOGIES

(Professional Elective –III)

III B. TECH – II SEMESTER **L T P C**
Course Code: A1CS609PE **3 0 0 3**

COURSE OUTCOMES:

1. Design and develop the best test strategies in accordance to the development model.

UNIT I:

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs

UNIT II:

Flow graphs and Path Testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT III:

Transaction Flow Testing: Transaction flows, transaction flow testing techniques. Dataflow testing:-Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT IV:

Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT V:

Paths, Path products and Regular expressions: Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

UNIT VI:

Logic Based Testing: Overview, decision tables, path expressions, kv charts, specifications.

UNIT VII:

State, State Graphs and Transition Testing: State graphs, good & bad state graphs, state testing, Testability tips.

UNIT VIII:

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. Usage of JMeter and Winrunner tools for functional / Regression testing, creation of test script for unattended testing, synchronization of test case, Rapid testing, Performance testing of a data base application and HTTP connection for website access.

TEXT BOOKS:

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

REFERENCE BOOKS:

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

OPERATING SYSTEMS

(Open Elective –I)

III B. TECH – II SEMESTER **L T P C**
Course Code: A1CS601OE **3 0 0 3**

COURSE OBJECTIVES:

1. To provide an understanding of the design aspects of operating system concepts through simulation
2. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

COURSE OUTCOMES:

1. Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
2. Able to implement C programs using Unix system calls.

UNIT I

Operating System Overview: Computer System Overview- Basic Elements, Instruction Execution, Interrupts Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization.
Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

UNIT II

Process Management: Processes – Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling – Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues;
Process Synchronization – The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT III

Storage Management: Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT IV

File Systems And I/O Systems: Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface – File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware,Application I/O interface, Kernel I/O subsystem, Streams, Performance.

UNIT V

Case Study: Linux System -Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS – iOS and Android – Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System

TEXT BOOKS:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne,8th edition, John Wiley.
2. Operating systems- A Concept based Approach-D.M.Dhamdhere. 2nd Edition. TMH

REFERENCE BOOKS:

1. Operating Systems - Internals and Design Principles. Stallings, sixth Edition-2009. Pearson education.
2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition PHI.
3. Principles of Operating Systems , B.L.Stuart. Cengage learning, India Edition. Operating Systems. A.S.Godboie.2nd Edition, TMH

DATABASE MANAGEMENT SYSTEMS

(Open Elective –I)

III B. TECH - II SEMESTER **L T P C**
Course Code: A1CS602OE **3 0 0 3**

COURSE OVERVIEW:

This course introduces the core principles and techniques required in the design and implementation of database systems. This introductory application-oriented course covers the relational database systems RDBMS - the predominant system for business, scientific and engineering applications at present. It includes Entity-Relational model, Normalization, Relational model, Relational algebra, and data access queries as well as an introduction to SQL. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.

COURSE OBJECTIVES: The course should enable the students to:

1. Discuss the basic database concepts, applications, data models, schemas and instances.
2. Design Entity Relationship model for a database.
3. Demonstrate the use of constraints and relational algebra operations.
4. Describe the basics of SQL and construct queries using SQL
5. Understand the importance of normalization in databases.
6. Demonstrate the basic concepts of transaction processing and concurrency control.
7. Understand the concepts of database storage structures and identify the access techniques.

COURSE OUTCOMES: At the end of the course the students are able to:

1. Use the basic concepts of Database Systems in Database design
2. Apply SQL queries to interact with Database
3. Apply normalization on database design to eliminate anomalies
4. Analyze database transactions and can control them by applying ACID properties
5. Analyze physical database storage system of database.

UNIT-I

Introduction: Database system applications, Database system Vs file systems, Advantage of a DBMS, Describing and storing data in a DBMS, Structure of a DBMS, People who work with databases.

Entity Relationship Model (ER Model): Database Design and ER Diagrams, Entities Attributes and Entity sets, Features of ER Model, Conceptual design with the ER model.

UNIT-II

Introduction to relational model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition language, Basic Structure of SQL Queries, Basic operations, Set Operations, NULL Values, Aggregate Functions, Nested Sub Queries, JOIN Expressions, Views, Transactions, Integrity Constraints, SQL Data types and Schemas, Functions and Procedures, Triggers.

UNIT-III

Relational Algebra and Calculus : Relational Algebra, Tuple Relational Calculus, Domain Relational Calculus. Schema Refinement and Normal Forms: Introduction to schema refinement, Functional Dependencies, Reasoning about FDs, Normal Forms: 1NF, 2NF, 3NF, Boyce Codd Normal Form, Properties of decompositions, Multi valued Dependencies, Fourth Normal Form, Join Dependencies and Fifth Normal Form.

UNIT-IV

Transaction Management: Transaction Concept, A simple transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability.

Concurrency Control and Recovery System: Lock based protocols, Deadlock handling, multiple granularities, Time stamp based protocols, and Validation based protocols. Failure Classification, Storage, Recovery and Atomicity, Failure with Non-volatile Storage, Remote backup systems.

UNIT-V

Storage and File Structure: Overview of Physical Storage Media, Magnetic Disk and Flash Storage, RAID, Tertiary Storage, File Organization, Organization of Records in Files, Data Dictionary storage.

Indexing and Hashing: Basic Concepts, Ordered Indices, B+ Tree Index Files, Multiple Key access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2011.
2. Raghurama Krishnan, Johannes Gehrke, "Data base Management Systems", TATA McGraw Hill, 3rd Edition, 2007.
3. R.P. Mahapatra & Govind Verma, Database Management Systems, Khanna Publishing House, 2013.

REFERENCE BOOKS:

1. Peter Rob, Carlos Coronel, Database Systems Design Implementation and Management, 7th edition, 2009.
2. Scott Urman, Michael McLaughlin, Ron Hardman, "Oracle database 10g PL/SQL programming ", 6th edition, Tata McGraw Hill,2010
3. .K.Singh, "Database Systems Concepts, Design and Applications", First edition, Pearson Education, 2006.
4. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Pearson / Addision wesley, 2007.

WEB REFERENCES:

1. http://www.learndb.com/databases/how-to-convert-er-diagram-to-relational-database
2. https://www.w3schools.com/sql/sql_create_table.asp
3. http://www.edugrabs.com/conversion-of-er-model-to-relational-model/?upm_export=print
4. http://ssyu.im.ncnu.edu.tw/course/CSDB/chap14.pdf
5. http://web.cs.ucdavis.edu/~green/courses/ecs165a-w11/8-query.pdf

E-TEXT BOOKS:

1. http://www.freebookcentre.net/Database/Free-Database-Systems-Books-Download.html
2. http://www.ddegjust.ac.in/studymaterial/mca-3/ms-11.pdf

MOOCS COURSE

1. https://www.mooc-list.com/tags/dbms-extensions
2. https://onlinecourses.nptel.ac.in/noc18_cs15/preview

DEVOPS LAB

III B. TECH- II SEMESTER	L	T	P	C
Course Code: A1CS604PC	-	-	3	1.5

COURSE OBJECTIVES:

1. Describe the agile relationship between development and IT operations.
2. Understand the skill sets and high-functioning teams involved in
3. DevOps and related methods to reach a continuous delivery capability
4. Implement automated system update and DevOps lifecycle

COURSE OUTCOMES:

1. Identify components of Devops environment
2. Apply different project management, integration, testing and code deployment tool
3. Investigate different DevOps Software development, models
4. Demonstrate continuous integration and development using Jenkins

LIST OF EXPERIMENTS:

1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code written in exercise 1.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application developed in exercise 7 using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium.

TEXT BOOKS:

1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN-10: 1788392574
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952

REFERENCE BOOKS / LEARNING RESOURCES:

1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley
2. Edureka DevOps Full Course - https://youtu.be/S_0q75eD8Yc

MACHINE LEARNING LAB

III B. TECH- II SEMESTER **L T P C**
Course Code: A1CS605PC **- - 3 1.5**

COURSE OBJECTIVE:

The objective of this lab is to get an overview of the various machine learningtechniques and can able to demonstrate them using python.

COURSE OUTCOMES: After the completion of the course the student can able to:

1. Understand complexity of Machine Learning algorithms and their limitations;
2. Understand modern notions in data analysis-oriented computing;
3. Be capable of confidently applying common Machine Learning algorithms in practice andimplementing their own;
4. Be capable of performing experiments in Machine Learning using real-world data.

LIST OF EXPERIMENTS:

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is theprobability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbours classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5. The following training examples map descriptions of individuals onto high, medium and lowcredit-worthiness.
   medium skiing design single twenties no -> highRisk
   high golf trading married forties yes -lowRisk
   low speedway transport married thirties yes -> medRisk
   medium football banking single thirties yes -> lowRisk high
   flying media married fifties yes - highRisk
   low football security single twenties no -> medRisk
   medium golf media single thirties yes -> medRisk
   medium golf transport married forties yes -> lowRisk
   high skiing banking single thirties yes -> highRisk
   low golf unemployed married forties yes -> highRisk

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

III B. TECH- II SEMESTER **L T P C**
Course Code: A1CS607MC **2 - - -**

COURSE OBJECTIVES:

To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the importance of roots of knowledge system.

COURSE OUTCOMES:

After completion of the course, students will be able to:

1. Upon completion of the course, the students are expected to:
2. Understand the concept of Traditional knowledge and its importance
3. Know the need and importance of protecting traditional knowledge.
4. Know the various enactments related to the protection of traditional knowledge.
5. Understand the concepts of Intellectual property to protect the traditional knowledge.

UNIT-I: INTRODUCTION TO TRADITIONAL KNOWLEDGE

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

UNIT-II: PROTECTION OF TRADITIONAL KNOWLEDGE

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

UNIT-III: LEGAL FRAME WORK AND TK: A

Legal frame work and TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

UNIT-IV: TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT-V: TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK. 139

TEXT BOOKS:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.

REFERENCE BOOKS:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.
2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2

WEB REFERENCES:

1. https://www.youtube.com/watch?v=LZP1StpYEPM

IV-YEAR (I-SEMESTER)

BIG DATA ANALYTICS

IV B. TECH- I SEMESTER | **L T P C**
Course Code: A1CS701PC | **3 1 - 4**

COURSE OBJECTIVES:

To learn

1. To introduce the terminology, technology and its applications
2. To introduce the concept of Analytics and Visualization
3. To demonstrate the usage of various Big Data tools and Data Visualization tools

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Compare various file systems and use an appropriate file system for storing different types of data.
2. Demonstrate the concepts of Hadoop ecosystem for storing and processing of unstructured data.
3. Apply the knowledge of programming to process the stored data using Hadoop tools and generate reports.
4. Connect to web data sources for data gathering, Integrate data sources with hadoop components to process streaming data.
5. Tabulate and examine the results generated using hadoop components

UNIT-I:

Introduction to Big Data: Data and its importance, Big Data - definition, implications of Big Data, addressing Big Data implications using Hadoop, Hadoop Ecosystem

Hadoop Architecture:

Hadoop Storage : HDFS, Hadoop
Processing : Map Reduce Framework
Hadoop Server Roles : Name Node, Secondary Name Node and Data Node, Job Tracker, Task Tracker

HDFS-Hadoop Distributed File System: Design of HDFS, HDFS Concepts, HDFS Daemons, HDFS High Availability, Block Abstraction, FUSE: File System in User Space. HDFS Command Line Interface (CLI), Concept of File Reading and Writing in HDFS.

UNIT-II:

Mapreduce Programming Model: Introduction to Map Reduce Programming model to process Big Data, key features of Map Reduce, Map Reduce Job skeleton, Introduction to Map Reduce API, Hadoop Data Types, Develop Map Reduce Job using Eclipse, bulit a Map Reduce Job export it as a java archive(.jar file).

Mapreduce Job Life Cycle: Understanding Mapper, Combiner, Partitioner, Shuffle & Sort and Reduce phases of Map Reduce Application, Developing Map Reduce Jobs based on the requirement using given datasets like weather dataset.

UNIT-III:

Introduction to Pig: Understanding pig and pig Platform, introduction to Pig Latin Language and Execution engine, running pig in different modes, Pig Grunt Shell and its usage.

Pig Latin Language –Semantics –Data Types in Pig: Pig Latin Basics, Key words, Pig Data types, Understanding Pig relation, bag, tuple and writing pig relations or statements using Grunt Shell, expressions, Data processing operators, using Built in functions.

Writing Pig Scripts Using Pig Latin: Writing pig scripts and saving them text editor, running pig scripts from command line.

UNIT-IV:

Introduction to Hive: Understanding Hive Shell, Running Hive, Understanding Schema on read and Schema on write.

Hive Ql Data Types, Semantics: Introduction to Hive QL (Query Language), Language semantics, Hive Data Types.

HIVE DDL, DML and HIVE Scripts: Hive Statements, Understanding and working with Hive Data Definition Languages and Manipulation Language statements, Creating Hive Scripts and running them from hive terminal and command line.

UNIT-V:

Sqoop: Introduction to Sqoop tool, commands to connect databases and list databases and tables, command to import data from RDBMS into HDFS, Command to export data from HDFS into required tables of RDBMS.
Flume: Introduction to Flume agent, understanding Flume components Source, Channel and Sink.
Oozie: Introduction to Oozie, Understanding work flow Management.

TEXT BOOKS:

1. Hadoop: The Definitive Guide, 4th Edition - O'Reilly Media
2. Chris Eaton, Dirk deroos et al., “Understanding Big data”, McGraw Hill, 2012.
3. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

REFERENCE BOOKS:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.
2. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

CRYPTOGRAPHY AND NETWORK SECURITY

IV B. TECH- I SEMESTER **L T P C**
Course Code: A1CS702PC **3 - - 3**

COURSE OBJECTIVES:

To learn

1. To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
2. To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
3. To familiarize Digital Signature Standard and provide solutions for their issues.
4. To familiarize with cryptographic techniques for secure (confidential) communication of two parties over an insecure (public) channel; verification of the authenticity of the source of a message

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Identify basic security attacks and services
2. Use symmetric and asymmetric key algorithms for cryptography
3. Design a security solution for a given application
4. Analyze Key Management techniques and importance of number Theory.
5. Understanding of Authentication functions the manner in which Message Authentication Codes and Hash Functions works.

UNIT-I:

Introduction: Security trends, The OSI Security Architecture, Security Attacks, Security Services and Security Mechanisms, A model for Network security.

Classical Encryption Techniques: Symmetric Cipher Modes, Substitute Techniques, Transposition Techniques, Stenography.

UNIT-II:

Block Cipher and Data Encryption Standards: Block Cipher Principles, Data Encryption Standards, the Strength of DES, Block Cipher Design Principles.

Advanced Encryption Standards: Evaluation Criteria for AES, the AES Cipher.

More on Symmetric Ciphers: Multiple Encryption, Triple DES, Block Cipher Modes of Operation, Stream Cipher and RC4.

UNIT-III:

Public Key Cryptography and RSA: Principles Public key crypto Systems the RSA algorithm, Key Management, Diffie Hellman Key Exchange.

Message Authentication and Hash Functions: Authentication Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACs.

Hash and Mac Algorithm: Secure Hash Algorithm, Whirlpool, HMAC, CMAC. DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature Standard.

UNIT-IV:

Authentication Application: Kerberos, X.509 Authentication Service, Public Key Infrastructure. EMAIL SECURITY: Pretty Good Privacy (PGP) and S/MIME.

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT-V:

Web Security: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats.

FIREWALL: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. William Stallings (2006), Cryptography and Network Security: Principles and Practice, 4th edition, Pearson Education, India.
2. William Stallings (2000), Network Security Essentials (Applications and Standards), Pearson Education, India.

REFERENCE BOOKS:

1. Charlie Kaufman (2002), Network Security: Private Communication in a Public World, 2nd edition, Prentice Hall of India, New Delhi.
2. Atul Kahate (2008), Cryptography and Network Security, 2 nd edition, Tata Mc Grawhill, India.
3. Robert Bragg, Mark Rhodes (2004), Network Security: The complete reference, Tata Mc Grawhill, India.

DATA MINING

IV B. TECH- I SEMESTER	L	T	P	C
Course Code: A1CS703PC	3	-	-	3

COURSE OBJECTIVES:

1. Learn data mining concepts understand association rules mining.
2. Discuss classification algorithms learn how data is grouped using clustering techniques.
3. To develop the abilities of critical analysis to data mining systems and applications.
4. To implement practical and theoretical understanding of the technologies for data mining
5. To understand the strengths and limitations of various data mining models

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Perform the preprocessing of data and apply mining techniques on it.
2. Identify the association rules, classification and clusters in large data sets.
3. Solve real world problems in business and scientific information
4. Classify web pages, extracting knowledge from the web

UNIT-I: INTRODUCTION TO DATA MINING

Introduction to Data Mining: Introduction, What is Data Mining, Definition, Knowledge Discovery from Data (KDD), What Kinds of Data can be Mined, Data Mining Tasks, Integration of Data Mining System with a Database or Data Warehouse System, Types of Data Sets and Attribute Values

Preprocessing: Data Quality, Major Tasks in Data Pre-processing, Data Cleaning and Data Integration, Data Reduction, Data Transformation and Data Discretization, Measures of Similarity and Dissimilarity- Basics

UNIT-II: ASSOCIATION RULES

Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

UNIT-III: CLASSIFICATION

Classification: Problem Definition, General Approaches to solving a classification problem ,Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbour classification-Algorithm and Characteristics.

UNIT-IV: CLUSTERING

Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms**,** Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Outlier Detection.

UNIT-V: WEB AND TEXT MINING

Web and Text Mining: Introduction, web mining, web content mining, web structure mining, we usage mining, Text mining –unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

TEXT BOOKS:

1. Data Mining: Concepts and Techniques - Jiawei Han, Micheline Kamber, Jian Pei (2012), 3rd edition, Elsevier, United States of America.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education
3. Data mining Techniques and Applications, Hongbo Du Cengage India Publishing

REFERENCE BOOKS:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Mining Principles & Applications – T.V Sveresh Kumar, B.Esware Reddy, Jagadish S Kalimani, Elsevier.
3. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press

NATURAL LANGUAGE PROCESSING

(Professional Elective – IV)

IV B. TECH- I SEMESTER	**L T P C**
Course Code: A1CS710PE	**3 - - 3**

COURSE OBJECTIVES:

1. To learn the fundamentals of natural language processing
2. To understand the use of CFG and PCFG in NLP
3. To understand the role of semantics of sentences and pragmatics
4. To apply the NLP techniques to IR applications

COURSE OUTCOMES:

1. To tag a given text with basic Language features
2. To design an innovative application using NLP components
3. To implement a rule-based system to tackle morphology/syntax of a language
4. To design a tag set to be used for statistical processing for real-time applications
5. To compare and contrast the use of different statistical approaches for different types of NLP applications.

UNIT-I: INTRODUCTION

Introduction: Origins and challenges of NLP – Language Modelling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.

UNIT-II: WORD LEVEL ANALYSIS

Word Level Analysis: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT-III: SYNTACTIC ANALYSIS

Syntactic Analysis: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs – Feature structures, Unification of feature structures.

UNIT-IV: SEMANTICS AND PRAGMATICS

Semantics and Pragmatics: Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT-V: DISCOURSE ANALYSIS AND LEXICAL RESOURCES

Discourse Analysis and Lexical Resources: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Cantering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, Prop Bank, Frame Net, Brown Corpus, British National Corpus (BNC).

TEXT BOOKS:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition.

REFERENCE BOOKS:

1. Breck Baldwin, ―Language processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.
2. Richard M Reese, ―Natural Language Processing with Java, OReilly Media, 2015.
3. Nitin Indurkhya and Fred J. Damerau, ―Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
4. Tanveer Siddiqui, U.S. Tiwary, ―Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

INTERNET OF THINGS

(Professional Elective – IV)

IV B. TECH- I SEMESTER	**L T P C**
Course Code: A1CS711PE	**3 - - 3**

COURSE OBJECTIVES:

To learn

1. To understand the fundamentals of Internet of Things.
2. To learn about the basics of IOT protocols.
3. To build a small low cost embedded system using Raspberry Pi and Arduino board.
4. To apply the concept of Internet of Things in the real-world scenario.

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Design a portable IoT using Arduino/ equivalent boards and relevant protocols.
2. Develop web services to access/control IoT devices.
3. Analyze various protocols for IoT
4. Deploy an IoT application.
5. Analyze applications of IoT in real time scenario

UNIT-I: INTRODUCTION TO IoT

Introduction: Definition, Characteristics of IOT, IOT Architectural view, Physical design of IOT, Logical design of IOT, IOT Enabling technologies, Application of IOT.

UNIT-II: IoT ARCHITECTURE

Domain specific IOT's: Introduction, Home Automation, Cities, Environment, Energy, retail, Logistics, Agriculture, Industry, Health.

Machine-to-machine (M2M): Introduction, Difference between IOT and M2M, SDN (software defined networking) and NFV (network function virtualization) for IOT.

UNIT-III: IoT PROTOCOLS & BUILDING IoT WITH ARDUINO

Developing Internet of things: Introduction, IoT platforms design methodology, Need for IoT systems management.

UNIT-IV: BUILDING IoT WITH RASPBERRY PI

IoT Physical devices & End points: Basic building blocks of IoT device, About Board, Raspberry Pi Interfaces, Other IoT devices.

UNIT-V: CASE STUDIES AND REAL – WORLD APPLICATIONS

Case Studies Illustrating IoT design: Home automation, Weather Monitoring, Agriculture, Cities.

TEXT BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of things(A-Hand-on-Approach)" 1st Edition, Universal Press

REFERENCE BOOKS:

1. Rajkamal,"Internet of Things", Tata McGraw Hill publication
2. Hakima Chaouchi "The Internet of Things: Connecting Objects", Wiley pcation.
3. Charless Bell "MySQL for the Internet of things", Apress publications.
4. Francis dacosta "Rethinking the Internet of things: A scalable Approach to
5. Connecting everything", 1st edition, A press publications 2013.
6. Donald Norris "The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black", McGraw Hill publication.

CLOUD COMPUTING

(Professional Elective – IV)

IV B. TECH- I SEMESTER	**L T P C**
Course Code: A1CS712PE	**3 - - 3**

COURSE OBJECTIVES:

To learn

1. To inculcate the concepts of distributed computing
2. To familiarize the concepts of cloud computing and services
3. To explain cloud platform and types of cloud
4. To explain resource management in cloud

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Understand the fundamental principles of distributed computing
2. Create virtual machines and virtual templates.
3. Create Cloud platform using Virtual machines
4. Identify suitable business models of cloud computing

UNIT-I: INTRODUCTION TO VIRTUALIZATION AND TECHNOLOGIES

Introduction to Virtualization and Technologies: Introduction to Virtualization: Definition, Objectives, Characteristics, Benefits of virtualization, Taxonomy of virtualization technologies, Pros and cons of virtualization. Virtualization Technologies: VMware, Hyper-V, Zen and virtual iron.

UNIT-II: FUNDAMENTAL CLOUD COMPUTING AND MODELS

Fundamental Cloud Computing and Models: Cloud Computing: Origin and influences, Basic concepts and terminology, Goals and benefits, Risks and challenges. Cloud Models, roles and boundaries, Cloud characteristics, Cloud delivery models, Cloud deployment models.

UNIT-III: CLOUD COMPUTING MECHANISMS AND ARCHITECTURE

Cloud Computing Mechanisms and Architecture: Cloud-Enabling Technology: Broadband networks and internet architecture, Data center technology, Virtualization technology, Web technology, Multitenant technology, Service technology. Cloud Architectures: Architecture - Workload distribution, Resource pooling, Dynamic scalability, Elastic resource capacity, Service load balancing, Cloud bursting, Elastic disk provisioning, Redundant storage.

UNIT-IV: CLOUD SECURITY AND DISASTER RECOVERY

Cloud Security and Disaster Recovery: Cloud Security: Data, Network and host security, Cloud security services and cloud security possible solutions. Cloud Disaster Recovery: Disaster recovery planning, Disasters in the cloud, Disaster management, Capacity planning and cloud scale.

UNIT-V: CLOUD CASE STUDIES

Cloud Case Studies: Case Studies: Software-as-a-Service (SaaS) - Salesforce.com, Facebook; Platform–as-a-Service (PaaS) - Google App Engine, MS-Azure and IBM Bluemix; Infrastructure-as-a- Service (IaaS) - Amazon EC2, Amazon S3 and Netflix.

TEXT BOOKS:

1. Thomas Erl and RicardoPuttini Cloud ComputingConcepts, Technology and Architecture, Pearson, 2013.
2. Ivanka Menken and Gerard Blokdijk, Cloud Computing Virtualization Specialist Complete Certification Kit-Study Guide Book, Lightning Source, 2009.

REFERENCE BOOKS:

1. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt Ltd, 2011.
2. Rajkumar Buyya, James Broberg and Andrzej Goscinski, Cloud Computing Principles and Paradigms, John Wiley and Sons, 2011.
3. John W. Rittinghouse and James F. Ransome, Cloud Computing Implementation, Management and Security, CRC Press, Taylor & Francis Group, 2010.

PHP PROGRAMMING

(Open Elective –II)

IV B. TECH - I SEMESTER **L T P C**

Course Code: A1CS703OE **3 0 0 3**

COURSE OBJECTIVES:

1. To understand the Concepts of PHP and Ajax

UNIT I

Essentials of PHP - Operators and Flow Control - Strings and Arrays

UNIT II

Creating Functions - Reading Data in Web Pages - PHP Browser – Handling Power.

UNIT III

Object - Oriented Programming –Advanced Object-Oriented Programming.

UNIT IV

File Handling –Working with Databases – Sessions, Cookies, and FTP

UNIT V

Ajax – Advanced Ajax – Drawing Images on the Server.

TEXT BOOK:

1. The PHP Complete Reference, Steven Holzner, McGraw Hill Education, 2007

CYBER SECURITY

(Open Elective –II)

IV B. TECH - I SEMESTER **L T P C**

Course Code: A1CS704OE **3 0 0 3**

COURSE OBJECTIVES:

The courses should enable the students to learn:

1. To familiarize various types of cyber-attacks and cyber-crimes
2. To give an overview of the cyber laws
3. To study the defensive techniques against these attacks.

COURSEOUTCOMES:

After completion of the course, students will be able to:

1. The students will be able to understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

UNIT–I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT–II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

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

Cyber Security: Organizational Implications: Introduction cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations. Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT–V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains-medical, financial, etc. Cybercrime: Examples and Mini-Cases Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCE BOOKS:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group

BIG DATA ANALYTICS LAB

IV B. TECH- I SEMESTER	L	T	P	C
Course Code: A1CS704PC	-	-	3	1.5

COURSE OBJECTIVES:

To learn

1. To introduce the terminology, technology and its applications
2. To introduce the concept of Analytics for Business
3. To introduce the tools, technologies & programming languages this is used in day to day analytics cycle.

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Connect to Hadoop cluster, experiment with various Linux and HDFS commands to store data.
2. Apply the knowledge of Map Reduce programming to process the stored data in HDFS.
3. Make use of database operations to store results in tables and generate reports.
4. Connect to web data sources for data gathering, integrate data sources with Hadoop components to process streaming data.
5. Generate reports using data visualization tools.

LIST OF EXPERIMENTS:

WEEK 1:

i. Perform setting up and installing Vmware for Hadoop and Linux.
ii. Basic Linux Commands

WEEK 2:

Run basic HDFS shell commands

WEEK 3:

Implement the following file management tasks in Hadoop:

i. Adding files and directories
ii. Retrieving files
iii. Deleting files and directories.

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

WEEK 4:

i. Write the steps to export JAR using eclipse.
ii. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm

WEEK 5:

Write a Map Reduce program that mines weather data.
(Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented).

WEEK 6:

Run Pig and perform basic PIG commands.

WEEK 7:

Write Pig Latin scripts to sort, group, join, project, and filter your data.

WEEK 8:

Run HIVE and perform basic HIVE commands to create a table and enter data into tables.

WEEK 9:

Use Hive to create, alter, and drop databases, tables, views, functions, and indexes

WEEK 10:

Use CDH and HUE to analyze data and generate reports for sample datasets

WEEK 11:

Importing and exporting Data in HDFS using Sqoop from MySql database

WEEK 12:

Use data visualization tool to generate reports on sample datasets.

DATA MINING LAB

IV B. TECH- I SEMESTER **L T P C**
Course Code: A1CS705PC **0 0 3 1.5**

COURSE OBJECTIVES:

1. To obtain practical experience using data mining techniques on real world data sets
2. Emphasize hands-on experience working with all real data sets.

COURSE OUTCOMES:

1. Ability to add mining algorithms as a component to the exiting tools.
2. Ability to apply mining techniques for realistic data.

LIST OF SAMPLE PROBLEMS:

Task 1: Credit Risk Assessment

Description:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient. To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

The German Credit Data:

Actual historical credit data is not always easy to come by because of confidentiality rules.
Here is one such dataset, consisting of 1000 actual cases collected in Germany. Credit dataset (original) Excel spreadsheet version of the German credit data.
In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer!)

A few notes on the German dataset:

1. DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
2. Owns telephone. German phone rates are much higher than in Canada so fewer people own telephones.
3. Foreign worker. There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents.
4. There are 20 attributes used in judging a loan applicant. The goal is to classify the applicant into one of two categories, good or bad.

Subtasks: (Turn in your answers to the following tasks)

1. List all the categorical (or nominal) attributes and the real-valued attributes seperately. (5 marks)
2. What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes. (5 marks)
3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training. (10 marks)
4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy? (10 marks)
5. Is testing on the training set as you did above a good idea? Why or Why not ? (10 marks)
6. One approach for solving the problem encountered in the previous question is using cross-validation? Describe what is cross-validation briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why? (10 marks)
7. Check to see if the data shows a bias against "foreign workers" (attribute 20), or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done.

To remove an attribute, you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss. (10 marks)

8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.) (10 marks)
9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifcations equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross validation results. Are they significantly different from results obtained in problem 6 (using equal cost)? (10 marks)
10. Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model? (10 marks)
11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase? (10 marks)
12. (Extra Credit): How can you convert a Decision Trees into "if-then-else rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one ! Can you predict what attribute that might be in this dataset ? OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and oneR. (10 marks)

Task Resources:

1. Mentor lecture on Decision Trees
2. Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross Validation)
3. Decision Trees (Source: Tan, MSU)
4. Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)
5. Weka resources:

- Introduction to Weka (html version) (download ppt version)
- Download Weka
- Weka Tutorial
- ARFF format
- Using Weka from command line

Task 2: Hospital Management System

Data Warehouse consists Dimension Table and Fact Table.

REMEMBER The following

Dimension

The dimension objects (Dimension):

- Name
- Attributes (Levels) , with one primary key
- Hierarchies

One time dimension is must.

About Levels and Hierarchies

Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels.

For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels:

H1: YearL > QuarterL > MonthL > WeekL > DayL

H2: YearL > WeekL > DayL

The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth.

About Unique Key Constraints

When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level)

Design a Hospital Management system data warehouse (TARGET) consists of Dimensions Patient, Medicine, Supplier, Time. Where measures are 'NO UNITS', UNIT PRICE.

Assume the Relational database (SOURCE) table schemas as follows

TIME (day, month, year),

PATIENT (patient_name, Age, Address, etc.,)

MEDICINE (Medicine_Brand_name, Drug_name, Supplier, no_units, Uinit_Price, etc.,)

SUPPLIER :(Supplier_name, Medicine_Brand_name, Address, etc.,)

If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level names suitably.

Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube with assumption names.

IV-YEAR (II-SEMESTER)

ORGANIZATIONAL BEHAVIOUR

IV B. TECH- II SEMESTER **L T P C**
Course Code: A1CS801HS **3 - - 3**

COURSE OBJECTIVES:

The objective of the course is to provide the students with the conceptual framework and the theories underlying Organizational Behaviour.

UNIT- I:

Introduction to OB - Definition, Nature and Scope – Environmental and organizational context – Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behaviour. Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization – Social perception – Attribution Theories – Locus of control –Attribution Errors –Impression Management.

UNIT- II:

Cognitive Processes-II: Personality and Attitudes – Personality as a continuum – Meaning of personality - Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and organizational commitment-Motivational needs and processes- Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotional intelligence – Self-Efficacy.

UNIT- III:

Dynamics of OB-I: Communication – types – interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision-making techniques – creativity and group decision making. Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra-individual conflict - strategies to cope with stress and conflict.

UNIT- IV:

Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teams in modern work place.

UNIT- V:

Leading High performance: Job design and Goal setting for High performance- Quality of Work Life- Socio technical Design and High-performance work practices - Behavioural performance management: reinforcement and punishment as principles of Learning –Process of Behavioural modification - Leadership theories - Styles, Activities and skills of Great leaders.

REFERENCE BOOKS:

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. McShane: Organizational Behaviour, 3e, TMH, 2008
3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.
4. Newstrom W. John & Davis Keith, Organisational Behaviour-- Human Behaviour at Work, 12/e, TMH, New Delhi, 2009.
5. Pierce and Gardner: Management and Organisational Behaviour: An Integrated perspective, Thomson, 2009.
6. Robbins, P. Stephen, Timothy A. Judge: Organisational Behaviour, 12/e, PHI/Pearson, New Delhi, 2009.
7. Pareek Udai: Behavioural Process at Work: Oxford & IBH, New Delhi, 2009.
8. Schermerhorn: Organizational Behaviour 9/e, Wiley, 2008.
9. Hitt: Organizational Behaviour, Wiley, 2008
10. Aswathappa: Organisational Behaviour, 7/e, Himalaya, 2009

PREDICTIVE ANALYTICS

(Professional Elective – V)

IV B. TECH- II SEMESTER	**L T P C**
Course Code: A1CS813PE	**3 - - 3**

COURSE OBJECTIVES:

To learn

1. To introduce the terminology, technology and its applications
2. To introduce the concept of predictive analysis
3. To introduce linear regression, time series concepts
4. To introduce the tools, technologies, programming languages which are used in day to day analytics cycle.

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Identify basic terminology of Data Analytics
2. Compare learning with classification
3. Develop the knowledge skill and competences using tools and training
4. Analyze the importance of Analytics in business perspective.

UNIT-I:

Introduction to Predictive Analytics & Linear Regression (NOS 2101): What and Why Analytics, Introduction to Tools and Environment, Application of Modelling in Business, Databases & Types of data and variables, Data Modelling Techniques, Missing imputations etc. Need for Business Modelling, Regression—Concepts, Blue property- assumptions- Least Square Estimation, Variable Rationalization, and Model Building etc.

UNIT-II:

Logistic Regression (NOS 2101): Model Theory, Model fit Statistics, Model Conclusion, Analytics applications to various Business Domains etc.

Regression Vs Segmentation --- Supervised and Unsupervised Learning, Tree Building --- Regression, Classification, over fitting, pruning and complexity, Multiple Decision Trees etc.

UNIT-III:

Develop Knowledge, Skill and Competences (NOS 9005): Introduction to Knowledge skills & competences, Training & Development, Learning & Development, Policies and Record keeping, etc.

UNIT-IV:

Time Series Methods / Forecasting, Feature Extraction (NOS 2101): ARIMA, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average, Energy etc and Analyze for prediction.

UNIT-V:

Working with Documents (NOS 0703): Standard Operating Procedures for documentation and Knowledge sharing, defining purpose and scope documents, understanding structure of documents – case studies, articles, white papers, technical reports, minutes of meeting etc., Style and format, Intellectual Property and Copyright, Document preparation tools – Visio, PowerPoint, Word, Excel etc., Version Control, Accessing and updating corporate knowledge base, Peer review and feedback.

TEXT BOOKS:

1. Student's Handbook for Associate Analytics-III.

REFERENCE BOOKS:

1. Gareth James Daniela Witten Trevor Hastie Robert Tibshirani. An Introduction to Statistical Learning with Applications in R

BLOCK CHAINTECHNOLOGY

(Professional Elective-V)

IV-B.TECH – II SEMESTER	**L**	**T**	**P**	**C**
Course Code: A1CS814PE	**3**	**-**	**-**	**3**

COURSEOBJECTIVES:

The course should enable the students to:

1. To Introduce block chain technology and Crypto currency

COURSEOUTCOMES:

After completion of the course, students will be able to:

1. Learn about research advances related to one of the most popular technological areas today.

UNIT–I

Introduction: Block chain or distributed trust, Protocol, Currency, Cryptocurrency, How a Cryptocurrency works, Crowd funding.

UNIT–II

Extensibility of Blockchain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Blockchain Environment.

UNIT–III

Blockchain Science: Gridcoin, Folding coin, Blockchain Genomics, Bitcoin MOOCs.

UNIT–IV

Currency, Token, Tokenizing, Campuscoin, Coindrop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency.

UNIT–V

Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations.

TEXT BOOKS:

1. Blockchain Blue prints for Economy by Melanie Swan

REFERENCE BOOKS:

1. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, by Daniel Drescher.

CYBER SECURITY

(Professional Elective-V)

III-B.Tech II Semester	**L T P C**
Course Code:A1CS815PE	**3 - - 3**

COURSE OBJECTIVES:

1. To understand various types of cyber-attacks and cyber-crimes
2. To learn threats and risks within context of the cyber security
3. To have an overview of the cyber laws & concepts of cyber forensics
4. To study the defensive techniques against these attacks

COURSE OUTCOMES:

1. Analyze and evaluate the cyber security needs of an organization.
2. Understand Cyber Security Regulations and Roles of International Law.
3. Design and develop a security architecture for an organization.
4. Understand fundamental concepts of data privacy attacks

UNIT – I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy..

UNIT – II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

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, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

UNIT – IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations

UNIT – V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc Cybercrime: Examples and Mini-Cases Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. MiniCases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B.B. Gupta, D.P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335,2018.

REFERENCE BOOKS:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

LINUX PROGRAMMING

(Open Elective –III)

IV B. TECH - II SEMESTER **L T P C**
Course Code: A1CS805OE **3 0 0 3**

COURSE OBJECTIVES:

1. To understand and make effective use of Linux utilities and Shell scripting language (bash) to solve Problems.
2. To implement in C some standard Linux utilities such as ls, mv, cp etc. using system calls.
3. To develop the skills necessary for systems programming including file system programming, process and signal management, and interprocess communication.
4. To develop the basic skills required to write network programs using Sockets.

COURSE OUTCOMES:

1. Work confidently in Linux environment.
2. Work with shell script to automate different tasks as Linux administration.

UNIT - I

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities,etworking commands, Filters, Text processing utilities and Backup utilities. Sed-Scripts, Operation, Addresses, Commands, awk-Execution, Fields and Records, Scripts, Operation, Patterns, Actions, Associative Arrays, String and Mathematical functions, System commands in awk, Applications.

Shell programming with Bourne again shell(bash)- Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

UNIT - II

Files and Directories- File Concept, File types, File System Structure, file metadata-Inodes, kernel support for files, system calls for file I/O operations- open, create, read, write, close, lseek, dup2, file status information-stat family, file and record locking- fcntl function, file permissions - chmod, fchmod, file ownership-chown, lchown, links-soft and hard links - symlink, link, unlink.

Directories-Creating, removing and changing Directories-mkdir, rmdir, chdir, obtaining current working directory-getcwd, Directory contents, Scanning Directories-opendir, readdir, closedir, rewinddir functions.

UNIT - III

Process - Process concept, Layout of a C program image in main memory. Process environment-environment list, environment variables, getenv, setenv, Kernel support for process, process identification, process control - process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process, system call interface for process management-fork, vfork, exit, wait, waitpid, exec family, Process Groups, Sessions and Controlling Terminal, Differences between threads and processes.

Signals - Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

UNIT - IV

Interprocess Communication - Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pies-creation, IPC between related processes using unnamed pipes, FIFOs- creation, IPC between unrelated processes using FIFOs (Named pipes), differences between unnamed and named pipes, open and close library functions.

Message Queues- Kernel support for messages, APIs for message queues, client/server example.

Semaphores-Kernel support for semaphores, APIs for semaphores, file locking with semaphores.

UNIT - V

Shared Memory- Kernel support for shared memory, APIs for shared memory, shared memory example. Sockets- Introduction to Berkeley Sockets, IPC over a network, Client-Server model, Socket address structures (unix domain and Internet domain), Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs-Single Server-Client connection, Multiple simultaneous clients, Socket options-setsockopt and fcntl system calls, Comparison of IPC mechanisms.

TEXT BOOKS:

1. Unix System Programming using C++, T. Chan, PHI.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3. Unix Network Programming, W. R. Stevens, PHI.

REFERENCE BOOKS:

1. Beginning Linux Programming, 4th Edition, N. Mathew, R. Stones, Wrox, Wiley India Edition.
2. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson.
3. SystemProgramming with C andUnix, A. Hoover, Pearson.
4. Unix System Programming, Communication, Concurrency and Threads, K. A. Robbins, Pearson Education.
5. Unix shell Programming, S. G. Kochan and P. Wood, 3rd edition, Pearson Education.
6. Shell Scripting, S. Parker, Wiley India Pvt. Ltd.
7. Advanced Programming in the unixEnvironment, 2nd edition, W. R. Stevens and S. A. Rago, Pearson Education.
8. Unix and Shell Programming, B. A. Forouzan and R. F. Gilberg, Cengage Learning.
9. Linux System Programming, Robert Love, O'Reilly, SPD.

R PROGRAMMING

(Open Elective –III)

IV B. TECH - II SEMESTER **L T P C**
Course Code: A1CS806OE **3 0 0 3**

COURSE OBJECTIVES:

1. Understanding and being able to use basic programming concepts
2. Automate data analysis
3. Working collaboratively and openly on code
4. Knowing how to generate dynamic documents
5. Being able to use a continuous test-driven development approach

COURSE OUTCOMES:

1. Be able to use and program in the programming language R
2. Be able to use R to solve statistical problems
3. Be able to implement and describe Monte Carlo the technology
4. Be able to minimize and maximize functions using R

UNIT – I

Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

UNIT – II

Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes

Vectors**:** Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations

UNIT – III

Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATA FRAMES, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations

UNIT - IV

FACTORS AND TABLES, Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables , Extracting a Subtable, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions

UNIT - V

OBJECT-ORIENTED PROGRAMMING: S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation

TEXT BOOKS:

1. R Programming for Data Science by Roger D. Peng
2. The Art of R Programming by Prashanth singh, Vivek Mourya, Cengage Learning India.