ACADEMIC REGULATIONS,
COURSE STRUCTURE
and
DETAILED SYLLABUS

CHOICE BASED CREDIT SYSTEM

R21

B.Tech – Computer Science & Engg.,
(Artificial Intelligence & Machine Learning)

B.Tech - Regular Four Year Degree Programme
(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 COUNCIL

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 **s**tandard 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

$$\text{Thus, CGPA} = \frac{19.5\times6.9+20.5\times7.8+18.0\times5.6+19.0\times6.0+21.5\times6.3+21.5\times8.0+23\times8.0+17\times8.0}{160} = 7.10$$

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.

SCOPE

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 (Artificial Intelligence & Machine Learning)

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 & 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 & Electronics Engineering Lab	ESC	-	-	2	1	30	70	100
A1ME116ES	Workshop Manufacturing Practices	ESC	-	-	4	2	30	70	100
A1AM117ES	Social Innovation	ESC	-	-	3	1.5	30	70	100
Total			**10**	**3**	**16**	**21**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
A1AM101MC	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
A1AM218PW	Engineering Exploration	PW	-	-	2	1	30	70	100
Total			**11**	**2**	**12**	**19**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
A1AM202MC	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
A1AM302PC	Artificial Intelligence	PCC	3	-	-	3	30	70	100
A1AM303PC	Data Structures	PCC	3	-	-	3	30	70	100
A1AM304HS	Economics and Accounting for Engineers	HSMC	3	-	-	3	30	70	100
A1AM305PC	Discrete Mathematics	PCC	3	-	-	3	30	70	100
A1AM306PC	Data Structures Lab	PCC	-	-	3	1.5	30	70	100
A1AM307PC	Python Programming Lab	PCC	-	-	3	1.5	30	70	100
A1AM308PC	IT Workshop	PCC	-	-	3	1.5	30	70	100
Total			**15**	**1**	**9**	**20.5**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
A1AM303MC	Environmental Studies	MC	2	-	-	-	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
A1AM401PC	Database Management Systems	PCC	3	-	-	3	30	70	100
A1AM402PC	Object Oriented Programming through Java	PCC	3	-	-	3	30	70	100
A1AM403ES	Digital Electronics and Computer Organization	ESC	3	-	-	3	30	70	100
A1AM404PC	Operating Systems	PCC	3	-	-	3	30	70	100
A1AM405PC	Operating Systems Lab	PCC	-	-	3	1.5	30	70	100
A1AM406PC	Database Management System Lab	PCC	-	-	3	1.5	30	70	100
A1AM407PC	Java Programming Lab	PCC	-	-	3	1.5	30	70	100
Total			**12**	**-**	**9**	**16.5**	**210**	**490**	**700**
Mandatory Course (Non-Credit)									
A1AM404MC	Gender Sensitization	MC	-	-	2	-	100	-	100
A1AM405MC	Human Values & Professional Ethics	MC	3	-	-	-	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
A1AM501PC	Automata and Compiler Design	PCC	3	-	-	3	30	70	100
A1AM502PC	Introduction To Machine Learning	PCC	3	-	-	3	30	70	100
A1AM503PC	Software Engineering	PCC	3	-	-	3	30	70	100
A1AM504PC	Computer Networks	PCC	3	-	-	3	30	70	100
A1AM505PC	Predictive Analytics and Reinforcement Learning	PCC	3	-	-	3	30	70	100
	Professional Elective-I	PEC	3	-	-	3	30	70	100
A1AM506PC	Machine Learning Through Python Lab	PCC	-	-	2	1	30	70	100
A1EN507HS	Advanced English Communication Skills Lab	HSMC	-	-	2	1	30	70	100
A1AM508PW	Internship/Mini Project	PWC	-	-	-	2	-	100	100
	MOOCs (For B.Tech. Hons Degree)*								
Total			**18**	**-**	**4**	**22**	**240**	**660**	**900**
Mandatory Course (Non-Credit)									
A1AM506MC	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
A1AM601PC	Web Programming through PHP	PCC	3	-	-	3	30	70	100
A1AM602PC	Knowledge Representation and Reasoning	PCC	3	-	-	3	30	70	100
A1AM603PC	Natural Language Processing	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
A1AM604PC	Web Programming Lab	PCC	-	-	2	1	30	70	100
A1AM605PC	Natural Language Processing Lab	PCC	-	-	2	1	30	70	100
A1AM606PW	Comprehensive Viva	PWC	-	-	-	1	-	100	100
	MOOCs (For B.Tech. Hons Degree)*								
Total			**18**	**-**	**4**	**21**	**240**	**660**	**900**
Mandatory Course (Non-Credit)									
A1AM607MC	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
A1AM701PC	Data Warehousing and Data Mining	PCC	3	-	-	3	30	70	100
A1AM702PC	Computer Vision	PCC	3	1	-	4	30	70	100
A1AM703PC	Neural Networks and Deep Learning	PCC	3	1	-	4	30	70	100
	Professional Elective-IV	PEC	3	-	-	3	30	70	100
	Open Elective-II	OEC	3	-	-	3	30	70	100
A1AM704PC	Data Warehousing and Data Mining Lab	PCC	-	-	4	2	30	70	100
A1AM705PW	Project Phase - 1	PWC	-	-	8	4	100	-	100
	MOOCs (For B.Tech. Hons Degree)*								
Total			**15**	**2**	**12**	**23**	**280**	**420**	**700**

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
A1AM801PC	Cognitive Computing	PCC	3	-	-	3	30	70	100
	Professional Elective-V	PEC	3	-	-	3	30	70	100
	Open Elective-III	OEC	3	-	-	3	30	70	100
A1AM802PW	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**	
A1AM501PE	Design and Analysis of Algorithms	A1AM604PE	Reinforcement Learning
A1AM502PE	Soft Computing	A1AM605PE	Cyber Security
A1AM503PE	Distributed Databases	A1AM606PE	Multimedia Computing
PE-III		**PE-IV**	
A1AM607PE	Parallel Computing	A1AM710PE	Big Data Management
A1AM608PE	R-Programming	A1AM711PE	Speech Processing
A1AM609PE	Cloud Computing	A1AM712PE	Cryptography and Network Security
PE-V			
A1AM813PE	Block Chain Technology		
A1AM814PE	Computational Neuroscience		
A1AM815PE	Computer Graphics		

MANDATORY COURSE (NON – CREDIT)			
A1AM101MC	Technical Seminar -1	A1AM405MC	Human Values and Professional Ethics
A1AM202MC	Technical Seminar -2	A1AM506MC	Constitution of India
A1AM303MC	Environmental Studies	A1AM607MC	Essence of Indian Traditional Knowledge
A1AM404MC	Gender Sensitization		

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**
		Computational Complexities	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 Artificial Intelligence and Machine Learning can take Open Electives from all other departments/branches except Open Electives offered by Artificial Intelligence and Machine Learning 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:

The course should enable the students 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. Concept of Sequence and nature of the series.
3. Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
4. 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: SEQUENCES & SERIES

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.
Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

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. 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, 11thReprint, 2010.

APPLIED PHYSICS

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

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To provide an experimental foundation for the theoretical concepts introduced in the lectures.
2. To teach how to make careful experimental observations and how to think about and draw conclusions from such data
3. To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.
4. To introduce the concepts and techniques which have a wide application in experimental science but have not been introduced in the standard courses
5. To teach how to write a technical report this communicates scientific information in a clear and concise manner.

COURSE OUTCOMES:

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

1. Students will demonstrate the concepts in the quantum physics and develop skills in scientific inquiry, problem solving techniques
2. Students will have the knowledge of fundamentals of Semiconductor physics, and apply it to day to day issues.
3. The knowledge of Optoelectronics, enable the students to apply to various systems like communications, solar cell, photo cells and so on.
4. The students can design, characterization and study the properties of Lasers and fibre optics and prepare new models for various engineering applications.
5. Students will evaluate the different parameters of magnetic materials and their applications, and analyze the Electromagnetic theory.

UNIT-I: QUANTUM MECHANICS

Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, quantum operators, Particle in one dimensional box. Bloch theorem.

UNIT-II: SEMICONDUCTOR PHYSICS

Band theory of solids, Intrinsic and Extrinsic semiconductors, Effective mass of electron , density of states. Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p- n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation.

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, 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, Ferroelectrics and Piezoelectrics. Magnetisation, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials.

TEXT BOOKS:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learing.
2. Halliday and Resnick, Physics - Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

REFERENCE BOOKS:

1. Richard Robinett, Quantum Mechanics
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc. (1995).
3. Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptha on NPTEL
4. Solid state physics by A J dekker.

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. Analyze the operation of PN junction diode and rectifiers.
5. 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 startransformations.

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, Characteristicsof 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 Satyabrata Jit 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. Mahmood Nahvi 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:

The course should enable the students to learn:

1. To provide overview in engineering drawing and impart the skill in constructing conic sections and cycloidal curves and scales.
2. To impart knowledge about standard principles of orthographic projection of points, lines and planes.
3. To draw sectional views and pictorial views of right circular solids.
4. To learn them to develop the right circular solids and draw the intersecting curves of penetrating solids
5. Make them to draw orthographic and isometric view of solids and different engineering blocks

COURSE OUTCOMES:

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

1. Construct conic sections and cycloidal curves and scales BIS specifications.
2. Draw projection of line and planes under different angle methods.
3. Draw the projection of solids under different positions using conventional and auxiliary projection methods.
4. Predict the development engineering parts and shape of intersecting curves of penetrating solids
5. Convert the orthographic views into isometric view and vice-versa of Engineering components and right circular solids.

UNIT – I

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

UNIT – V

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:

The course should enable the students to learn:

1. To provide an experimental foundation for the theoretical concepts introduced in the lectures.
2. To teach how to make careful experimental observations and how to think about and draw conclusions from such data
3. To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.
4. To introduce the concepts and techniques which have a wide application in experimental science but have not been introduced in the standard courses
5. To teach how to write a technical report this communicates scientific information in a clear and concise manner.

COURSE OUTCOMES:

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

1. Develop skills to impart practical knowledge in real time solution. Discuss the working and characteristics of the various optoelectronic devices.
2. Analyze various properties of the semi-conductor devices and built the circuits with appropriate components.
3. Recall the magnetic properties of materials and determines the related parameters of magnetic fields.
4. Understand the comparison of results with theoretical calculations.
5. Focus on the principles, concepts, working and applications of new technology.

LIST OF EXPERIMENTS

WEEK – 1 Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode
WEEK – 2 Solar Cell: To study the V-I and P-I characteristics of solar cell
WEEK – 3 Light Emitting Diode: Plot V-I characteristics of light emitting diode Plot V-I characteristics of light emitting diode
WEEK – 4 Hall Effect: To determine Hall co-efficient of a given semiconductor
WEEK – 5 PIN Photo Diode to study the V-I Characteristics of Photo Diode by calculating the photo current.
WEEK – 6 Optical fiber: To determine the numerical aperture and acceptance angle of an optical fiber
WEEK – 7 LASER: To determine the wavelength of a given laser source by using diffraction rating method
WEEK – 8 LCR Circuit: To determine the Resonance frequency and Quality factor of a LCR Circuit
WEEK – 9 Thermistor: To study the variation of resistance with respect to temperature using thermistor.
WEEK – 10 Torsional Pendulum: To determine the rigidity modulus of a given metal wire by using Torsional pendulum.
WEEK – 11 Plank's Constant: To determine value of plank's constant using by measuring Radiation in fixed spectral range.
WEEK – 12 Stewart Gee's experiment: To study the variation of magnetic field along the axis of a circular coil.

TEXT BOOKS:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi – Cengage Learing
2. R. Robinett, "Quantum Mechanics", OUP Oxford, 2006.IIndEdn.
3. P.K Palanisamy, Engineering Physics, Sitech Publications, 2013, IVthEd Nielsen M. A.,
4. L Chung, Quantum Computation & Quantum Information, Cambridge Univ. Press.

REFERENCE BOOKS:

1. "Semiconductor Physics and Devices: Basic Principles" by Donald A Neamen
2. "Optics, Principles and Applications" by K K Sharma.
3. "Principles of Optics" by M Born and E Wolf.
4. "Oscillations and Waves" by Satya Prakash and Vinay Dua

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. Analyze the operation of PN junction diode and rectifiers.
5. 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 KVL and KCL
WEEK – 2 Brake test on DC shunt motor.
WEEK – 3 Swinburne's test on D.C. Shunt machine (predetermination of efficiency of a given D.C. shunt machine working as motor and generator).
WEEK – 4 O.C and S.C test on single phase transformer (predetermination of Efficiency and regulation at given power factor.
WEEK – 5 Brake test on 3- phase induction motor (determination of performance Characteristics).
WEEK – 6 No-Load Characteristics of a Three-phase Alternator

PART-B (Electronics Engineering)

WEEK – 7 Study and operation of (i)Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
WEEK – 8 PN Junction diode characteristics
WEEK – 9 Zener diode characteristics and Zener as voltage Regulator
WEEK – 10 Input & Output characteristics of Transistor in CB / CE configuration
WEEK – 11 Full Wave Rectifier with & without filters
WEEK – 12 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 Satyabrata Jit 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 andComputer 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. Mahmood Nahvi and Joseph A. Edminister, “Electric Circuits”, Schaum’ Outline Series, McGrawHill, (2002).

WORKSHOP MANUFACTURING PRACTICES

I-B. Tech I-Semester **L T P C**
Course Code: A1ME116ES **- - 4 2**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field under team works coupled with precision and safety.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To impart skills and knowledge on preparing various joints using carpentry and fitting operations.
4. To gain practical exposure to tin-smithy, foundry and welding processes.
5. To get exposure on simple electrical wiring operations required for domestic application

COURSE OUTCOMES:

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

1. Handle different engineering materials, tools, equipment and processes with precision and safety.
2. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiselling.
3. Prepare various joints using for engineering application by carpentry and fitting operations
4. Prepare different types of patters, and fabricate various engineering components using smithy and welding processes
5. Apply basic electrical engineering knowledge for house wiring practice

LIST OF ACTIVITIES

I. TRADES FOR EXERCISES:

At least two exercises from each trade

1. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & TenonJoint)
2. Fitting – (V-Fit, Dovetail Fit & Semi-circularfit)
3. Tin-Smithy – (Square Tin, Rectangular Tray & ConicalFunnel)
4. Foundry – (Preparation of Green Sand Mould using Single Piece and SplitPattern)
5. Welding Practice – (Arc Welding & GasWelding)
6. House-wiring – (Parallel & Series, Two-way Switch and TubeLight)
7. Black Smithy – (Round to Square, Fan Hook andS-Hook)

II. TRADES FOR DEMONSTRATION &EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja /Cengage
2. Workshop Manual / K. Venugopal /Anuradha.

REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah/ K. L. Narayana/SciTech
2. Workshop Manual / Venkat Reddy/BSP

SOCIAL INNOVATION

I-B. Tech I-Semester **L T P C**
Course Code: A1AM117ES **- - 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:

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

1. Illustrate the factors affecting social innovation.
2. Illustrate the impact of social innovation in various sectors.
3. Adopt the ethical values in doing innovation, which leads to betterment of society.

UNIT 1

Community Study: Types and features of communities- Rural, Suburban, Urban and regional, Service based learning, Aims of community-based projects, Community visits.

UNIT 2

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

UNIT 3

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

UNIT 4

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 5

Steps for Patent filing and Start-up's, poster presentation.

REFERENCE BOOKS:

1. Social Entrepreneurship for the 21st Century: Innovation Across the Non Profit, Private and Public Sectors; Georgia Levenson Keohane; Tata McGraw Hill
2. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, YeheskelHasenfeld; Palgrave Macmillan
3. Engineering Ethics: An Industrial Perspective; Gail Baura; Elsevier
4. Intellectual Property and Financing Strategies for Technology Startups; Gerald B. Halt, Jr., John C. Donch, Jr., Amber R. Stiles, Robert Fesnak; Springer
5. Fundamentals of Intellectual Property (English) 1st Edition (Paperback, Dr. Kalyan C. Kankanala) Publisher: Asia Law House ISBN: 9789381849514, 938184951X Edition: 1st Edition, 2012.
6. Indian Patent Law (English, Paperback, Kalyan C. Kankanala) Publisher: Oxford University Press- New Delhi, ISBN: 9780198089605, 0198089600 Edition: 2012.

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 course should enable the students to learn:

1. Methods of solving the differential equations of first order.
2. Different methods of solving the differential equations of higher order.
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:

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

1. Identify whether the given differential equation of first order is exact or not
2. Solve higher differential equation and apply the concept of differential equation to real world problems
3. Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped
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: FIRST ORDER ORDINARY DIFFERENTIAL EQUATION:

Exact, linear and Bernoulli's equations; Applications : 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, equation solvable for x and Clairaut's type.

UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER:

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

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 (without proofs) and their applications.

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.

ENGINEERING CHEMISTRY

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

COURSE OBJECTIVES:

The course should enable the students to learn:

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:

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

1. Able to evaluate the MOELD of N2, O2 & F2.
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 alanalysis 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:

The course should enable the students to learn:

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:

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

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

UNIT –I INTRODUCTION - PROBLEM SOLVING AND ALGORITHMIC THINKING

Problem Solving and Algorithmic Thinking Overview – Problem Definition, logical reasoning, Algorithm definition, practical examples, properties, representation, 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, 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, go to 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, arraysof structures, structures and functions, self-referential structures, unions, typedef ,numerations.

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 ((3rdEdition)
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.

ENGLISH FOR EFFECTIVE COMMUNICATION

I-B. Tech II-Semester **L T P C**
Course Code: A1EN205HS **2 - - 2**

COURSE OBJECTIVES:

The course should enable the students to learn:

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:

At the end of this course, students will 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 Building: 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. Basic Writing Skills: 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 References:
2. Swan, M. (2016). Practical English Usage Oxford University Press
3. Exercises in Spoken English. Parts I –III CIEFL, Hyderabad. Oxford University Press

REFERENCE BOOKS:

1. Murphy, R. (2015). Essential Grammar in Use. Cambridge University Press.
2. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
3. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
4. Zisser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.

PROGRAMMING FOR PROBLEM SOLVING LAB

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

COURSE OBJECTIVES:

The course should enable the students to learn:

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:

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

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

LIST OF EXPERIMENTS

WEEK -1

a. Installation and working of Flow algorithm Software.
b. Write and implement basic arithmetic operations using Flow algorithm – 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 displaywhether 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(+,-,*,/,% useswitch)
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
   i) Insert a sub string into a given main string from a given position
   ii) Delete n characters from a given position in a string
b. 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

a. Write a C Program using functions to Reading a complex number
   i. Writing a complex number
   ii. Add two complex numbers
   iii. Multiply two complex numbers
   Note: represent complex number using structure.
b. 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.

ENGINEERING CHEMISTRY LAB

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

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. To determine the rate constant of reactions from concentrations as an function of time.
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:

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

1. Able to analyse the hardness and chloride content in water.
2. Able to Estimate rate constant of a reaction from concentration – time relationships.
3. Able to determine physical properties like adsorption and viscosity.
4. Able to Calculate Rf values of some organic molecules by TLC technique.
5. Able to determine the acid content in the given sample by using potentiometer.

LIST OF EXPERIMENTS

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe2+ by Potentiometry using KMnO4
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol.
9. Thin layer chromatography calculation of Rf values. eg ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a give liquid using stalagnometer.

TEXT BOOKS:

1. P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi, 2014.
2. B.K. Sharma, Engineering Chemistry, Krishna Prakashan, Meerut.
3. O G Palanna, Engineering Chemistry, Tata McGraw Hill, 2009.

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:

The course should enable the students to learn:

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. Get trained 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:

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

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.

LIST OF ACTIVITIES

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
    1. Oral practice: Just A Minute (JAM) Sessions
    2. Describing objects/situations/people
    3. 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.

TEXT BOOKS:

1. Michael Swan. Practical English Usage. Oxford University Press. 2017.
2. Wren & Martin. High School English Grammar and Composition Book. S Chand Publishing. 2017.

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: A1AM218PW **- - 2 1**

COURSE DESCRIPTION:

Course Overview:

This Course provides an opportunity for freshman students to learn in new ecosystem and is one of the unique outcomes of innovative education ecosystem in digital era of our nation. The focus of this course is on Engineering Design Process, Problem Solving, and Multi-disciplinary skills, Ethics and Data Acquisition and Analysis. This course is co-designed and co-taught by faculty members drawn from multiple engineering disciplines; it follows Project Based Learning (PBL) pedagogy with need statements covering broad themes of environmental, educational, smart appliances, smart agriculture, industrial needs etc. are used by students to carve out problem definitions by linking Sustainable Development Goals defined by United Nation. Students work in teams to solve identified problems and serves as a platform for peer learning and push students in Multi-disciplinary design thinking in first year itself.

COURSE OUTCOMES:

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

1. Explain the role of an Engineer as a problem solver.
2. Identify multi-disciplinary approach required in solving an engineering problem
3. Analyse a given problem using process of engineering problem analysis.
4. Build simple systems using engineering design process.
5. Analyse engineering solutions from sustainability perspectives.
6. Use basics of engineering project management skills in doing projects.
7. Demonstrate data acquisition and analysis skills using a tool.

MODULE 1

Introduction to Engineering and Engineering Study: Introduction to Engineering and Engineering Study: Difference between science and engineering, scientist and engineer needs and wants, various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer.

MODULE 2

Engineering Design: Engineering Design Process, Multidisciplinary facet of design, Importance of analysis in engineering design, general analysis procedure, Pair wise comparison chart, Introduction to mechatronics system, generation of multiple solution, decision matrix, Concepts of reverse engineering

MODULE 3

Mechanisms: Basic Components of a Mechanism, Degrees of Freedom or Mobility of a Mechanism, 4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism.

MODULE 4

Platform based development: Introduction to various platform-based development, programming and its essentials, Introduction to transducers and actuators and its interfacing. Concepts of reverse engineering. Data Acquisition and Analysis: Types of Data, Descriptive Statistics techniques as applicable to different types of data, Types of graphs as applicable to different types of data, Usage of data acquisition tools for descriptive statistics, Data Acquisition, Exporting acquired data to analysis using visual representation.

MODULE 5

Project Management: Introduction, Significance of teamwork, Importance of communication in engineering profession, Project management tools: Checklist, Timeline, Gantt Chart, Significance of documentation.
Sustainability: Introduction to sustainability, Sustainability leadership, Life cycle assessment, carbon footprint.

REFERENCE BOOKS:

1. Engineering Fundamentals: An Introduction to Engineering (MindTap Course List) 5th Edition by Saeed Moaveni.
2. Software Project Management (SIE), (Fifth Edition); Bob Hughes,MikeCotterell,Rajib Mall; Published by Tata McGraw-Hill Education Pvt. Ltd (2011) ; ISBN 10: 0071072748 ISBN 13: 9780071072748
3. A Ghosh and AK Malik: Theory of Mechanism and Machine; East West Press (Pvt) Ltd., New Delhi.
4. Arduino Cookbook, 2nd Edition by Michael Margolis: O'Reilly Media
5. Data Acquisition and Analysis - Building an Excel Budget Forecast Workbook by Andrew Greaney (Kindle Edition)ISBN: 1521903468
6. Concepts in Engineering Design – 2016; by Sumesh Krishnan (Author), Dr. Mukul Shukla (Author), Publisher: Notion Press

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.

ARTIFICIAL INTELLIGENCE

II-B.Tech I-Semester **L T P C**
Course Code: A1AM302PC **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To learn the difference between optimal reasoning vs human like reasoning.
2. To understand the notions of state space representation, exhaustive search, heuristic search.
3. To learn different knowledge representation techniques.
4. To understand the applications of AI like Game Playing and Expert Systems.
5. To introduce the concept of Machine Learning.

COURSE OUTCOMES:

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

1. Understand the basics of AI and to formulate efficient problem space and select a search algorithm for a problem.
2. Apply AI techniques to solve problems related to Game playing, Expert systems.
3. Develop Logic programming skills.
4. Represent knowledge using appropriate techniques.
5. Interpret probabilistic and logical reasoning for knowledge.

UNIT-I INTRODUCTION

History, Intelligent Systems, Foundations of AI, Sub areas of AI & Applications. Problem Solving – State-Space Search and Control Strategies, General Problem Solving Techniques 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

Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Algorithm, Predicate Logic, Logic Programming.

UNIT-III KNOWLEDGE REPRESENTATION

Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames. Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web.

UNIT-IV UNCERTAINTY MEASURE

Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory. Introduction to Machine Learning: Machine Learning Systems, Supervised and unsupervised learning, Inductive and Deductive learning.

UNIT-V EXPERT SYSTEM AND APPLICATIONS

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

TEXT BOOKS:

1. Saroj Kaushik, Artificial Intelligence, Cengage Learning, 2011.
2. Russel & Norvig, Artificial Intelligence: A Modern Approach, Pearson Education.

REFERENCE BOOKS:

1. Rich, Knight, Nair: Artificial intelligence, Tata McGraw Hill, Third Edition, 2009.
2. Eugene Charniak, Introduction to Artificial Intelligence, Pearson, 2007.
3. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI, 1990.
4. George Fluger, Artificial Intelligence, 5th Edition, Pearson.

WEB REFERENCES:

1. https://www.vssut.ac.in/lecture_notes/lecture1428643004.pdf
2. https://www.edx.org./course/atificial intelligence-ai-columbiax-csmn-101x-4
3. https://onlinecourses.nptel.ac.in/noc18_cs18/preview

E –TEXT BOOKS:

1. https://www.e-booksdirectory.com/details.php?ebook

MOOCS COURSE:

1. https://swayam.gov.in/
2. https://onlinecourses.nptel.ac.in/106105077

DATA STRUCTURES

II-B.Tech I-Semester **L T P C**
Course Code:A1AM303PC **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Impart the basic concepts of structures, pointers and data structures.
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.

COURSE OUTCOMES:

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

1. Use arrays, pointers and structures to formulate algorithms and programs.
2. Design and implement applications of Linked List.
3. Design and implement Stack ADT using Array and Linked List.
4. Design and implement Queue ADT using Array and Linked List.
5. Solve problems involving graphs and trees.

UNIT I ABSTRACT DATA TYPES

Introduction: Abstract Data Types, Data Structures.

Date Abstract Data Type: Defining the ADT, Using the ADT, Preconditions and Post conditions, implementing the ADT. **Arrays**: The Array Structure, Implementing the Array.

Two-Dimensional Arrays: The Array 2D Abstract Data Type, Implementing the 2-D Array.

Multi-Dimensional Arrays: The Multi array Abstract Data Type, Data Organization, Variable-Length Arguments, Implementing the Multi array.

UNIT II LISTS, TUPLES, DICTIONARIES, SETS AND MAPS

The Python List: Creating a Python List, Appending Items, Extending a List, Inserting Items, List Slice. **Tuples and Dictionary**: Creating a Tuple and Dictionary, Built in functions, Tuple and Dictionary operations and List comprehension.

Sets: The Set Abstract Data Type, List-Based Implementation.

Maps: The Map Abstract Data Type, List-Based Implementation.

UNIT III STACKS AND QUEUES

The Stack ADT: Stack operations, implementing the Stack using a Python List.

Stack Applications: Balanced Delimiters, Evaluating Postfix Expressions.

The Queue ADT: Queue operations, implementing the Queue using a Python List,

Priority Queues: Priority Queue operations, The Priority Queue ADT Implementation

UNIT IV SEARCHING, SORTING AND LINKED STRUCTURES

Searching: The Linear Search, the Binary Search.

Sorting: Bubble Sort, Selection Sort, Insertion Sort, Quick sort, Merge sort

The Singly Linked: Traversing the Nodes, Searching for a Node, Prepending Nodes, Removing Nodes.

Advanced Linked Lists: The Doubly Linked List: Organization, List Operations

UNIT V BINARY TREES, SEARCH TREES AND AVL TREES

Binary Trees: The Tree Structure, the Binary Tree, Properties, Implementation, Tree Traversals. **Search Trees:** The Binary Search Tree, Min and Max Values, Insertions, Deletions, Efficiency of Binary Search Trees.

AVL Trees: Insertion, Deletion, Implementation.

TEXT BOOKS:

1. Data Structures and Algorithms Using Python, Rance D. Necaise, JOHN WILEY & SONS, INC.
2. Reema Thareja, Python Programming using Problem Solving Approach, First Edition, Oxford Higher Education.

REFERENCE BOOKS

1. Core Python Programming, by R.Nageswara Rao
2. Kenneth A.Lambert, Fundamentals of Python
3. Charles Dierach, Introduction to Computer Science using Python

ECONOMICS AND ACCOUNTING FOR ENGINEERS

II-B.Tech I-Semester **L T P C**
Course Code: A1AM304HS **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

To enable the student to understand and appreciate, with a particular insight, the importance of certainbasic issues governing the business operations namely; demand and supply, production function, cost analysis, markets, forms of business organizations, capital budgeting and financial accounting and financial analysis.

COURSE OUTCOMES:

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

1. Understand the market dynamics namely, demand and supply, demand forecasting, elasticity ofdemand 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 ofinputs and cost analysis.
3. Develop an understanding of Markets & New Economic Environment.
4. Analyze how capital budgeting decisions are carried out.
5. Understanding the framework for both manual and computerized accounting process.
6. Know how to analyses 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 Organization: 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: PaybackMethod, 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 internationalPublishers, 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.

DISCRETE MATHEMATICS

II B. Tech- I Semester	**L T P C**
Course Code: A1AM305PC	**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.

DATA STRUCTURES LAB

II B. Tech- I Semester **L T P C**
Course Code: A1AM306PC **- - 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

PYTHON PROGRAMMING LAB

II-B.Tech I-Semester | **L T P C**
Course Code: A1AM307PC | **- - 3 1.5**

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 averageand 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/

IT WORKSHOP LAB

II B. Tech- I Semester **L T P C**
Course Code: A1AM308PC **- - 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: A1AM303MC **2 - - -**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understanding the importance of ecological balance for sustainable development.
2. Acquire the knowledge of importance of natural resources & apply conservation techniques.
3. Analysing the importance of Biodiversity.
4. Estimate the impacts of Environmental pollution, developmental activities and mitigation measures.
5. Evaluation of the environmental policies and regulations.

COURSE OUTCOMES:

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

1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles.
2. Able to apply the conservation methods of natural resources.
3. Able to analyse the conservation techniques of biodiversity.
4. Able to apply pollution control methods.
5. Able to understand and apply environmental regulations which in turn helps in sustainable development.

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.

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. 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: Climate 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.

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,

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

II-YEAR (II-SEMESTER)

DATABASE MANAGEMENT SYSTEMS

II-B.Tech II-Semester	L	T	P	C
Course Code: A1AM401PC	3	-	-	3

COURSE OBJECTIVES:

The course should enable the students to learn:

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.

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. Design a Database using ER Modeling
3. Apply normalization on database design to eliminate anomalies
4. Apply SQL queries and PL/SQL queries to interact with Database
5. Analyze database transactions and can control them by applying ACID properties.

UNIT – I INTRODUCTION

INTRODUCTION: Introduction and applications of DBMS, Purpose of data base, Data Independence, Database System architecture- Levels, Database users and DBA.

DATABASE DESIGN: Database Design Process, ER Diagrams - Entities, Attributes, Relationships, Constraints, keys, extended ER features, Generalization, Specialization, Aggregation, Conceptual design with the E-R model.

UNIT – II RELATIONAL MODEL &SCHEMA REFINEMENT

THE RELATIONAL MODEL: Introduction to the relational model, Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design: E-R to relational, Introduction to views, Destroying/altering tables and views.

SCHEMA REFINEMENT AND NORMAL FORMS: Introduction to schema refinement, functional dependencies, reasoning about FDs. Normal forms: 1NF, 2NF, 3NF, BCNF, properties of decompositions, normalization, and schema refinement in database design.

UNIT – III RELATIONAL ALGEBRA AND CALCULS & SQL

RELATIONAL ALGEBRA AND CALCULUS: Relational algebra operators, relational calculus - Tupleand domain relational calculus.

SQL: Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions – Numeric, date, string functions, set operations, sub-queries, correlated sub-queries,

UNIT – IV SQL &PL/SQL

SQL: Use of group by, having, order by clauses, join and its types, Exist, Any, All clauses. Transaction control commands – Commit, Rollback, Save point,

PL/SQL: Environment, block structure, variables, operators, data types, control structures; cursors, stored procedures, Triggers.

UNIT – V TRANSACTION &CONCURRENCY CONTROL

TRANSACTIONS MANAGEMENT: Transaction concept, transaction state, concurrent executions, Serializability, recoverability, testing for serializability.

CONCURRENCY CONTROL AND RECOVERY SYSTEM: Concurrency control, lock based protocols, time-stamp based protocols, validation based protocols, multiple granularity and deadlock handling. Recovery system - failure classification, storage structure, recovery and atomicity, log based recovery.

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 PublishingHouse, 2013.
4. Michael McLaughlin, Oracle Database 11g PL/SQL Programming, Oracle press.

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. S.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

MOOCSC OURSE:

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

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

II-B.Tech I-Semester **L T P C**
Course Code: A1AM402PC **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.

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 andRunnable 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, calender 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, UpdatedEdition (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.

DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION

II-B.Tech II-Semester **L T P C**
Course Code: A1AM404ES **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understand different number systems.
2. Design combinational and sequential logic circuits
3. Understand concepts of register transfer logic and arithmetic operations.
4. Learn different types of addressing modes and memory organization

COURSE OUTCOMES:

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

1. Able to solve from one number to another number.
2. Able to combinational and sequential logic circuits
3. Identify basic components and design of the CPU: the ALU and control unit.
4. Compare various types of IO mapping techniques
5. Critique the performance issues of cache memory and virtual memory

UNIT – I NUMBER THEORY and BOOLEAN ALGEBRA

Representation of numbers of different radix, conversion of numbers from one radix to another radix, r-1‘s complement and r‘s complement. 4-bit codes. Basic Theorems and Properties of Boolean algebra, Canonical and Standard Forms, Digital Logic Gates, Universal Logic Gates. K- Map Method.

UNIT – II COMBINATIONAL and SEQUENTIAL LOGIC CIRCUITS

Design of Half adder, full adder, half subtractor, full subtractor. Decoder, Encoder, Multiplexer, De-multiplexer and comparator. basic flip-flops, truth tables and excitation tables (NAND RS latch, NOR RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with preset and clear terminals). Classification of sequential circuits (synchronous and asynchronous);

UNIT – III DESIGN

Conversion of flip-flops to other flip-flops. Design of Ripple counters, design of synchronous counters, Johnson counter, ring counter, shift register, bi-directional shift register, universal shift register.

Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and ControlMemory-Reference Instructions, Input-Output and interrupt.

UNIT – IV REGISTER TRANSFER AND MICRO-OPERATIONS:

Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC),.Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.

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 ProcessorArbitration, Inter processor Communication and Synchronization, Cache Coherence.

TEXT BOOKS:

1. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge.
2. Digital Design- Morris Mano, PHI, 3rd Edition.
3. M. Morris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.
4. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGraw-Hill.

REFERENCE BOOKS:

1. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rdEd,John Wiley & SonsInc.
2. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8thedition, Prentice Hall, New Jersy.
3. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education

OPERATING SYSTEMS

II-B.Tech II-Semester **L T P C**
Course Code: A1AM404PC **3 - - 3**

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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.

TEXT BOOKS

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.

REFERENCE BOOKS:

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

OPERATING SYSTEMS LAB

II-B.Tech II-Semester **L T P C**
Course Code: A1AM405PC **- - 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To write programs in Linux environment.
2. To implement the scheduling algorithms.
3. To develop solutions for synchronization problems using semaphores.
4. To implement page replacement algorithms and other memory management techniques.
5. To implement file allocation methods

COURSE OUTCOMES:

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

1. Design and solve synchronization problems.
2. Simulate and implement scheduling concepts.
3. Model a deadlock situation and implementing methods for handling deadlocks.
4. Simulate and implement memory management techniques.
5. Simulate and implement various file management concepts.

LIST OF EXPERIMENTS

WEEK 1

Programs using system calls

a. Write a C program to simulate ls | sort command.
b. Write a C program to implement the Process system calls. Create a new process, create a child process to it and then make it wait and abort.
c. Write a C program to simulate copy the contents of one file to another using system calls.

WEEK 2

Write C programs to simulate the following CPU scheduling algorithms:

a. FCFS b. SJF

WEEK 3

Write C programs to simulate the following CPU scheduling algorithms

a. Priority b. Round Robin

WEEK 4

Write a C program to solve the Producer- Consumer problem using semaphores

WEEK 5

Write a C program to solve the Dining- Philosopher problem using monitors

WEEK 6

Write a C program to simulate Bankers Algorithm for Dead Lock Avoidance.

WEEK 7

Write a C program to simulate Bankers Algorithm for Dead Lock Prevention.

WEEK 8

Write C program to simulate the paging technique of memory management

WEEK 9

Write C program to simulate the segmentation technique of memory management

.

WEEK 10

Write C programs to simulate the following page replacement algorithms:

a. FIFO b. LRU

WEEK 11

Write C programs to simulate the following Directory organization techniques:

a. Single level directory b. Two level directory

WEEK 12

Write C programs to simulate the following File allocation methods:

a. Contiguous b. Linked

TEXT BOOKS:

1. Abraham Silberschatz, Peter Galvin and 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

REFERENCE BOOKS:

1. P.C.P Bhatt, An Introduction to Operating Systems, 2nd Edition, PHI.
2. Terrence Chan, Unix System Programming Using C++, PHI/ Pearson.
3. Andrew S Tanenbaum, Modern Operating Systems, 3rd Edition, PHI

WEB REFERENCES:

1. http://codex.cs.yale.edu/avi/os-book/os9
2. www.cs.uic.edu/~jbell/course notes/operating systems

DATABASE MANAGEMENT SYSTEMS LAB

II-B.Tech II-Semester **L T P C**
Course Code: A1AM406PC **- - 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

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.

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. Design a Database using ER Modeling
3. Apply normalization on database design to eliminate anomalies
4. Apply SQL queries and PL/SQL queries to interact with Database
5. Analyze database transactions and can control them by applying ACID properties.

LIST OF EXPERIMENTS

WEEK -1 DDL Commands

- Creation of Tables using SQL- Overview of using SQL tool and Data types in SQL
- Altering Tables and
- Dropping Tables

WEEK -2 Create Table with Primary key and Foreign Key& DML Commands

Creating Tables (along with Primary and Foreign keys),Practicing DML commands-

- Insert,
- Update
- Delete.

WEEK -3 Selection Queries

Practicing Select command using following operations

- AND, OR
- ORDER BY
- BETWEEN
- LIKE
- Apply CHECK constraint

WEEK -4 Aggregate Functions and Views

Practice Queries using following functions

- COUNT,
- SUM,
- AVG,
- MAX,
- MIN,
  Apply constraint on aggregation using
- GROUP BY,
- HAVING,
  VIEWS Create, Modify and Drop

WEEK -5 Nested Queries

Practicing Nested Queries using

- UNION,
- INTERSECT,
- CONSTRAINTS
- IN

WEEK -6 Co- Related Nested Queries

Practicing Co – Related Nested Queries using

- EXISTS
- ,NOT EXISTS. ANY, ALL

WEEK -7 Join Queries

Practicing Join Queries using

- Inner join
- Outer join
- Equi join
- Natural join

WEEK -8 Triggers

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

WEEK -9 Procedures

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

WEEK -10 Cursors

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

WEEK -11 PL/SQL Part 1

Practice PL/SQL –

- block structure,
- variables,
- data types,

WEEK -12 PL/SQL Part 2

Practice PL/SQL –

- operators,
- control structures;
- aseca

Case study 1: College Management
Case study 2: An Enterprise/Organization
Case study 3: Library Management system
Case study 4: Sailors and shipment system

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 PublishingHouse, 2013.
4. Michael McLaughlin, Oracle Database 11g PL/SQL Programming, Oracle press.

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

JAVA PROGRAMMING LAB

II-B.Tech I-Semester **L T P C**
Course Code: A1AM407PC **- - 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 multithreadingfor 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 Driver).

LIST OF EXPERIMENTS

WEEK – 1 JAVA BASICS

a. Write a java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. 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 emptymethod 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, the program 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 using Generics.

WEEK – 11 COLLECTIONS

a. Create a linked list of elements.

b. Delete a given element from the above list.

c. 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.

GENDER SENSITIZATION

II-B.Tech II-Semester	L	T	P	C
Course Code: A1AM404MC	-	-	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 asequals.

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 of Work.

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/

HUMAN VALUES & PROFESSIONAL ETHICS

II-B.Tech II-Semester **L T P C**
Course Code: A1AM405MC **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

COURSE OUTCOMES:

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

1. Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society
2. Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.
3. Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society
4. Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.
5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

UNIT – I 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 fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill 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 characteristics and activities of 'I' and harmony in 'I', 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 fulfillment 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-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)- 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 fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) 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, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) 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. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

REFERENCE BOOKS:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.

WEB REFERENCES:

1. https://www.uhv.ac.in
2. Story of Stuff, http://www.storyofstuff.com

III-YEAR (I-SEMESTER)

AUTOMATA AND COMPILER DESIGN

III-B.Tech I-Semester **L T P C**
Course Code: A1AM501PC **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To introduce the fundamental concepts of formal languages, grammars and automata theory.
2. To understand deterministic and non-deterministic machines and the differences between decidability and undecidability.
3. Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
4. Topics include phases of compiler, parsing, syntax directed translation, type checking use of symbol tables, intermediate code generation.

COURSE OUTCOMES:

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

1. Able to employ finite state machines for modeling and solving computing problems.
2. Able to design context free grammars for formal languages.
3. Able to distinguish between decidability and undecidability.
4. Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
5. Acquire skills in using lex tool and design LR parsers

UNIT – I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.
Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.
Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with Є-transitions to NFA without Є-transitions. Conversion of NFA to DFA

UNIT – II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.
Pumping Lemma for Regular Languages: Statement of the pumping lemma, Applications of the Pumping Lemma.
Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammars and Languages.

UNIT – III

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA and CFG's, Acceptance by final state.
Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine.
Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines.

UNIT – IV

Introduction: The structure of a compiler,
Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex,
Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers

UNIT – V

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.
Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code.
Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management.

TEXT BOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.

REFERENCE BOOKS:

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, 2nd Edition, Pearson.
2. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.
3. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
4. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

INTRODUCTION TO MACHINE LEARNING

III-B.Tech I-Semester **L T P C**
Course Code: A1AM502PC **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to:

1. Understand all principal elements of Computational Learning Theory
2. Acquire the knowledge of decision tree and decision tree learning algorithms.
3. Study the concept of neural networks and its algorithms to solve problems using neural networks.
4. Obtain the knowledge of Bayesian reasoning and also instance based learning techniques in order to easily master different Machine Learning models
5. Understand the concept of Genetic algorithms and Genetic Programming

COURSE OUTCOMES:

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

1. Describe the concepts of computational intelligence like machine learning and design an exemplarily learning system.
2. Use the concept of Decision Trees in machine learning models.
3. Discuss about the Neural Networks and its usage in machine learning application.
4. Apply Bayesian reasoning and also target based learning techniques to develop a machine learning application.
5. Summarize the concept of Genetic algorithms and Genetic Programming.

UNIT I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate Elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT II

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for Neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses,comparing learning algorithms.

UNIT- III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, and the EM algorithm.

Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT- IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning – Introduction, the learning task, *Q*–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT- V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis
2. Introduction to Machine Learning with Python A guide for data scientists, Andreas ,C. Muller & Sarah Guido, O'Reilly
3. Introduction to Machine learning, Nils J.Nilsson
4. Machine learning for dummies, IBM Limited ed, by Judith Hurwitz and Daniel Kirsch

SOFTWARE ENGINEERING

III-B.Tech I-Semester | **L T P C**
Course Code: A1AM503PC | **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
2. Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

COURSE OUTCOMES:

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

1. Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
2. Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

UNIT – I

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. **A Generic view of process**: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI). **Process models**: The waterfall model, Spiral model and Agile methodology.

UNIT – II

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. **Requirements engineering process**: Feasibility studies, requirements elicitation and analysis,
requirements validation, requirements management.

UNIT – III

Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT – IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.
Metrics for Process and Products: Software measurement, metrics for software quality.

UNIT – V

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. **Quality Management:** Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.

REFERENCE BOOKS:

1. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
4. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

COMPUTER NETWORKS

III-B.Tech II-Semester **L T P C**
Course Code: A1AM504PC **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To introduce the fundamentals 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:

At the end of the course the students are 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: 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: 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: 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: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

UNIT-V

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.

PREDICTIVE ANALYTICS AND REINFORCEMENT LEARNING

III-B.Tech I-Semester **L T P C**
Course Code : A1AM505PC **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Introduces to theory of computational complexity classes
2. Discuss about algorithmic techniques and application of these techniques to problems.
3. Introduce to randomized algorithms and discuss how effective they are in reducing time and space complexity.
4. Discuss about Graph based algorithms and approximation algorithms
5. Discuss about search trees.

COURSE OUTCOMES:

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

1. Ability to classify decision problems into appropriate complexity classes
2. Ability to classify optimization problems into appropriate approximation complexity classes
3. Ability to choose appropriate data structure for the given problem
4. Ability to choose and apply appropriate design method for the given problem.

UNIT – I

Computational Complexity: Polynomial time and its justification, Nontrivial examples of polynomial-time algorithms, the concept of reduction (reducibility), Class P Class NP and NP- Completeness, The P versus NP problem and why it's hard.

UNIT – II

Algorithmic paradigms: Dynamic Programming – Longest common subsequence, matrix chain multiplication, knapsack problem, Greedy – 0-1 knapsack, fractional knapsack, scheduling problem, Huffman coding, MST, Branch-and-bound – travelling sales person problem, 0/1 knapsack problem, Divide and Conquer – Merge sort, binary search, quick sort.

UNIT – III

Randomized Algorithms: Finger Printing, Pattern Matching, Graph Problems, Algebraic Methods, Probabilistic Primality Testing, De-Randomization Advanced Algorithms.

UNIT – IV

Graph Algorithms: Shortest paths, Flow networks, Spanning Trees; Approximation algorithms, Randomized algorithms. Approximation algorithms: Polynomial Time Approximation Schemes.

UNIT – V

Advanced Data Structures and applications: Decision Trees and Circuits, B-Trees, AVL Trees, Red and Black trees, Dictionaries and tries, Maps, Binomial Heaps, Fibonacci Heaps,Disjoint sets, Union by Rank and Path Compression.

TEXT BOOKS:

1. T. Cormen, C. Leiserson, R. Rivest and C. Stein, Introduction to Algorithms, Third Edition, McGraw-Hill, 2009.
2. R. Motwani and P. Raghavan, Randomized Algorithms, Cambridge University Press, 1995.
3. J. J. McConnell, Analysis of Algorithms: An Active Learning Approach, Jones &Bartlett Publishers, 2001.

REFERENCE BOOKS:

1. D. E. Knuth, Art of Computer Programming, Volume 3, Sorting and Searching, Second Edition, Addison-Wesley Professional, 1998.
2. S. Dasgupta, C. H. Papadimitriou and U. V. Vazirani, Algorithms, McGraw-Hill, 2008.

DESIGN AND ANALYSIS OF ALGORITHM
(PROFESSIONAL ELECTIVE-I)

III-B. Tech I-Semester	L	T	P	C
Course Code: A1AM501PE	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 specifiedapplication
3. Ability to understand how the choice of data structures and the algorithm design methodsimpact 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'smatrix multiplication.

UNIT - II
Disjoint Sets: Disjoint set operations, union and find algorithms
Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring

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.

SOFT COMPUTING
(PROFESSIONAL ELECTIVE-I)

III-B.Tech I-Semester	L	T	P	C
Course Code: A1AM502PE	3	-	-	3

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To teach basic neural networks, fuzzy systems, and optimization algorithms concepts and their relations
2. To provide knowledge of Neuron model, and Applications of NN to discuss their work
3. To provide the graduate the better understanding of Fuzzy Logic and Evolutionary Computations

COURSE OUTCOMES:

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

1. To understand neural network (NN) paradigms
2. Apply different supervised learning algorithms on given data
3. Understand feedback neural networks & self-organizing feature map
4. To learn fuzzy logic To have a knowledge of evolutionary computations, genetic algorithm(GA), evolutionary programming, classifier systems, genetic programming parse trees, mathematical foundation of GA variants of GA

UNIT-I

BASICS OF ARTIFICIAL NEURAL NETWORK: Characteristics of Neural Networks, Structure and working of a biological neural network, Artificial neural network: terminology, models of neurons: McCulloch Pitts model, Perceptron model, Adaline model, topology, Basic learning laws.
FUNCTIONAL UNITS FOR ANN FOR PATTERN RECOGNITION TASK: Pattern recognition problem, Basic functional units, PR by functional units.

UNIT-II

FEEDFORWARD NEURAL NETWORKS:
SUPERVISED LEARNING - I: Perceptron's - Learning and memory, Learning algorithms, Error correction and gradient decent rules, Perceptron learning algorithms.
SUPERVISED LEARNING-II: Back propagation, Multi layered network architectures, Back propagation learning algorithm, Example applications of feed forward neural networks.

UNIT-III

FEEDBACK NEURAL NETWORKS & SELF ORGANIZING FEATURE MAP: Introduction, Associative learning, Hopfield network, Error performance in Hopfield networks, simulated annealing, Boltzmann machine and Boltzmann learning, state transition diagram and false minima problem, stochastic update, simulated annealing, Boltzmann machine, bidirectional associative memory, bam stability analysis. Self-organization, generalized learning laws, competitive learning, vector quantization, self-organizing feature map, applications of self-organizing feature map.

UNIT-IV

FUZZY LOGIC: Fuzzy set theory, crisp sets, operations on crisp set, fuzzy sets, fuzzy versus crisp, operations, fuzzy relations, crisp relations, properties. Fuzzy logic Application: Fuzzy Control of Blood Pressure.

UNIT-V

FUZZY LOGIC IN DATABASE AND INFORMATION SYSTEMS: Fuzzy Information, Fuzzy Logic in database Systems, Fuzzy Relational data Models, operations in Fuzzy Relational data Models, Design theory for Fuzzy Relational databases, Fuzzy information Retrieval and Web search, Fuzzy Object Oriented databases.

GENETIC ALGORITHMS: Introduction to Genetic Algorithms, Evolutionary Algorithms.

TEXT BOOKS:

1. Satish Kumar (2004), Neural Networks A classroom Approach, Tata McGraw Hill Publication, New Delhi.
2. Lotfi A. Zadeh(1997), Soft computing and Fuzzy Logic, World Scientific Publishing Co., Inc. River Edge, NJ, USA.

REFERENCE BOOKS:

1. B. Yegnanarayana (2006), Artificial Neural Networks, Prentice Hall of India, New Delhi, India.
2. John Yen, Reza Langari(2006), Fuzzy Logic, Pearson Education, New Delhi, India.
3. S. Rajasekaran, Vijaylakshmi Pari (2003), Neural networks, Fuzzy Logic and Genetic Algorithms Synthesis and Applications, Prentice Hall of India, New Delhi, India.

DISTRIBUTED DATABASES
(PROFESSIONAL ELECTIVE-I)

III-B.Tech I-Semester	L	T	P	C
Course Code: A1AM503PE	3	-	-	3

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Acquire knowledge on parallel and distributed databases and its applications.
2. Study the usage and applications of Object Oriented databases.
3. Learn the modelling and design of databases.
4. Acquire knowledge on parallel and distributed databases and its applications.
5. Equip students with principles and knowledge of parallel and object oriented databases.

COURSE OUTCOMES:

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

1. Describe theoretical and practical aspects of distributed database systems.
2. Study and identify various issues related to the development of distributed database system.
3. Explain design aspects of object oriented database system and related development.
4. Highlight distributed transaction management and reliability; parallel and object database management systems.
5. Describe distributed DBMS architecture and design; query processing and optimization.

UNIT – I

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

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

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, 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

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 Database Integration, Scheme Translation, Scheme Integration, Query Processing Query Processing Layers in Distributed Multi-DBMSs, Query Optimization Issues Transaction Management Transaction and Computation Model, Multi database Concurrency Control, Multi database Recovery, Object Orientation and Interoperability, Object Management Architecture CORBA and Database interoperability, Distributed Component Object Model, COM/OLE and Database Interoperability, PUSH-Based Technologies.

TEXT BOOKS:

1. Distributed Databases Principles & Systems, Stefano Ceri, Giuseppe Pelagatti, TMH.

REFERENCE BOOKS:

1. Principles of Distributed Database Systems, M. Tamer Ozsu, Patrick Valduriez, Pearson Education, 2nd Edition.
2. Distributed Database Systems, Chanda Ray, Pearson.
3. Distributed Database Management Systems, S. K. Rahimi and Frank. S. Haug, Wiley.

MACHINE LEARNING THROUGH PYTHON LAB

III-B.Tech I-Semester	L	T	P	C
Course Code: A1AM506PC	-	-	2	1

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understand all principal elements of Computational Learning Theory.
2. Gain the knowledge of decision tree and decision tree learning algorithms.
3. Study the concept of neural networks and its algorithms to solve problems on neural networks.
4. Obtain the knowledge of Bayesian reasoning and also target based learning techniques in order to easily master different Machine Learning models.
5. Identify the different search methods.

COURSE OUTCOMES:

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

1. Observe the concepts of computational intelligence like machine learning and Design an exemplarily learning system.
2. Apply the algorithms (Decision Tree techniques) to a real-world problem, optimize the models learned and report on the expected accuracy.
3. Analyze the Neural Networks and its usage in machine learning application.
4. Apply Bayesian reasoning and also target based learning techniques to develop a machine learning application.
5. Analyze the different search methods.

LIST OF EXPERIMENTS

WEEK 1

Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

WEEK 2

For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

WEEK 3

Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

WEEK 4

Build an Artificial Neural Network by implementing the Back-propagation algorithm and test the same using appropriate data sets.

WEEK 5

Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

WEEK 6

Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

WEEK 7

Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

WEEK 8

Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

WEEK 9

Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs

WEEK 10

Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library lasses/API.

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis
2. Introduction to Machine Learning with Python A guide for data scientists, Andreas, C. Muller & Sarah Guido, O'Reilly.
3. Introduction to Machine learning, Nils J.Nilsson
4. Machine learning for dummies, IBM Limited ed, by Judith Hurwitz and Daniel Kirsch

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

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

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To provide students with a wide range of vocabulary to enable them to take language tests for higher education and employment
2. To assist students acquire effective and adequate presentation skills
3. To improve communication skills of students by making them participate in different language activities
4. To prepare students for facing interviews self-assuredly.
5. To help students to develop an awareness in studies about the significance of silent reading and comprehension.

COURSE OUTCOMES:

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

1. Students will be able to state meanings, synonyms, antonyms, analogies, idioms, phrases, one-word substitutes, word roots, prefixes and suffixes for words in general.
2. Students will be able to present and interpret data on select topics using pre-existing slides.
3. Students will be able to collect data extensively on a social issue and make it public for the sake of enlightening populace.
4. Students will be able to contribute proactively and extrapolate in group discussions.
5. Students will be able to make impromptu speeches.

LIST OF ACTIVITIES

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

1. Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - 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.

2. Activities on Reading Comprehension –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective goggling.

3. Activities on Writing Skills – Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.

4. Activities on Presentation Skills – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/assignments etc.

5. Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2 nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCE BOOKS:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008. 6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
6. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
7. Job Hunting by Colm Downes, Cambridge University Press 2008.
8. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

CONSTITUTION OF INDIA

III-B.Tech I-Semester **L T P C**
Course Code: A1AM506MC **2 - - -**

COURSE OBJECTIVES:

The course should enable the students to learn:

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:

After completion of the course, 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: Introduction to the constitution of India, the making of the constitution and salient features of the constitution.

UNIT – II

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 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 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: 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.
   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
   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 www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

III-YEAR (II-SEMESTER)

WEB PROGRAMMING THROUGH PHP

III-B.Tech II-Semester	L	T	P	C
Course Code: A1AM601PC	3	-	-	3

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Teach students the basics of server side scripting using PHP
2. Explain web application development procedures
3. Impart servlet 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:

At the end of the course the students are 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. Understand the concept of JAVA SCRIPT.
5. Identify the difference and choose between the JSP and Servlet.

UNIT-I

XHTML: Basic Syntax, Standard structure, Basic Text markup, Images, Hypertext links, Lists, Tables, Frames.

XML: Introduction to XML, Defining XML tags, their attributes and values, Document type definition, XML Schemas, Document Object model.

UNIT-II

Introduction to PHP: Declaring variables, data types, arrays, strings, operations, expressions, control structures, functions, Reading data from web form controls like Text Boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (My SQL as reference), executing simple queries, handling results, Handling sessions and cookies.

UNIT-III

Client side Scripting: Introduction to JavaScript: JavaScript language – declaring variables, scope of variables functions, event handlers (on click, on submit etc.), Document Object Model, Form validations.

UNIT-IV

Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, Reading initialization parameters, Handling Http Request & Responses, Using Cookies and sessions, connecting to a database using JDBC.

UNIT-V

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 and session tracking, connecting to database in JSP.

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.

KNOWLEDGE REPRESENTATION AND REASONING

III-B. Tech II-Semester **L T P C**
Course Code: A1AM602PC **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To impart knowledge about engineering solving and thinking.
2. To familiarize with the syntax and semantics of programming language.
3. To learn the usage of object oriented approach in reasoning problems.
4. To use arrays, pointers, strings and structures in scripting.
5. To understand how to Tradeoff between Expressiveness and Tractability.

COURSE OUTCOMES:

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

1. Apply knowledge thinking to understand, define and solve problems
2. Develop computer programs using programming constructs and control structures
3. Decompose a problem into functions to develop modular reusable code.
4. Use arrays, pointers, strings and structures to scripting and programs.
5. Use action, planning to perform read and write representations.

UNIT –I THE KEY CONCEPTS: KNOWLEDGE, REPRESENTATION, AND REASONING:

Introduction, Why Knowledge Representation and Reasoning?, The Role of Logic, The Language of First-Order Logic, The Syntax, The Semantics, The Pragmatics, Explicit and Implicit Belief, **Expressing Knowledge:** Knowledge Engineering, Vocabulary, Basic Facts, Complex Facts, Terminological Facts, Entailments, Abstract Individuals, **Resolution:** The Propositional Case, Handling Variables and Quantifiers, Dealing with Computational Intractability

UNIT – II REASONING WITH HORN CLAUSES:

Horn Clauses, SLD Resolution, Computing SLD Derivations, **Procedural Control of Reasoning:** Facts and Rules, Rule Formation and Search Strategy, Algorithm Design, Specifying Goal Order, Committing to Proof Methods, Controlling Backtracking, Negation as Failure, Dynamic Databases, **Rules in Production Systems:** Production Systems: Basic Operation, Working Memory, Production Rules, Conflict Resolution, Making Production Systems More Efficient, Applications and Advantages, Some Significant Production Rule Systems

UNIT –III OBJECT-ORIENTED REPRESENTATION:

Objects and Frames, A Basic Frame Formalism, An Example: Using Frames to Plan a Trip, Beyond the Basics, **Structured Descriptions:** Descriptions, A Description Language, Meaning and Entailment, Computing Entailments, Taxonomies and Classification, Beyond the Basics, **Inheritance:** Inheritance Networks, Strategies for Defeasible Inheritance, A Formal Account of Inheritance Networks,

UNIT –IV DEFAULTS:

Introduction, Closed-World Reasoning, Circumscription, Default Logic, Autoepistemic Logic, **Vagueness, Uncertainty, and Degrees of Belief:** Noncategorical Reasoning, Objective Probability, Subjective Probability, Vagueness, **Explanation and Diagnosis:** Diagnosis, Explanation, A Circuit Example, Beyond the Basics.

UNIT –V ACTIONS, PLANNING, THE TRADEOFF BETWEEN EXPRESSIVENESS AND TRACTABILITY:

Actions: The Situation Calculus, A Simple Solution to the Frame Problem, Complex Actions, **Planning:** Planning in the Situation Calculus, The STRIPS Representation, Planning as a Reasoning Task, Beyond the Basics, **The Tradeoff between Expressiveness and Tractability:** A Description Logic Case Study, Limited Languages, What Makes Reasoning Hard?, Vivid Knowledge, Beyond Vivid.

TEXT BOOKS:

1. Ronald J. Brachman,Hector J. Levesque , Knowledge Representation And Reasoning, Morgan Kaufmann Is An Imprint Of Elsevier

REFERENCE BOOKS:

1. Knowledge Representation, Reasoning, and the Design of Intelligent Agents. The Answer-Set Programming Approach
2. Ronald Brachman, Hector Levesque, Knowledge Representation and Reasoning, May 2004.
3. RJ Brachman,·Knowledge representation and reasoning,
4. H Kautz, Knowledge Representation and Reasoning

NATURAL LANGUAGE PROCESSING

III-B.Tech II-Semester | **L T P C**
Course Code: A1AM603PC | **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To explain natural language processing and to learn how to apply basic algorithms in this Field.
2. To facilitate the algorithmic description of the main language levels: morphology, syntax, Semantics, and pragmatics, as well as the resources of natural language data - corpora.
3. To impart basics of knowledge representation, inference, and relations to the artificial Intelligence.

COURSE OUTCOMES:

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

1. Recognize the concepts of Natural Language Processing
2. Familiarize with Text processing, Lexical Analysis, Syntactic and Semantic Analysis aspects.
3. Design and develop NLP with Corpus creation with key focus on Tree Bank annotation
4. Appreciate the nuances of Statistical techniques with modern speech recognition
5. Recognize the applications of NLP in various sectors like healthcare and education.

UNIT – I

CLASSICAL APPROACHES TO NATURAL LANGUAGE PROCESSING: Introduction – Context - Classical Toolkit - Text Preprocessing – Tokenization – Sentence Segmentation - Lexical Analysis – Finite State Morphonology – Finite State Morphology – Paradigm based Lexical Analysis - Syntactic Parsing – Cocke-Kasami-Younger Algorithm – Deductive Parsing – LR Parsing – Constraint based Grammars – Issues in Parsing - Semantic Analysis – Theories and approaches to Semantic Representation – Fine Grained Lexical Semantic Analysis: Case studies - Natural Language Generation – Components of a Generator – Approaches to Text Planning – Linguistic Component.

UNIT – II

ANNOTATION, TAGGING AND PARSING: Corpus Size, Representation, Sampling – Data Capture – Corpus Mark up and Annotation – Multilingual Corpora – Multimodal Corpora -Corpus Annotation Types - Morph syntactic Annotation – Tree banks: Syntactic, Semantic, and Discourse Annotation - Process of Building Tree banks - Applications of Tree banks - Searching Tree banks. Fundamental Statistical Techniques: Binary Linear Classification – One versus-All Method for Multi-Category Classification - Maximum Likelihood Estimation - Generative and Discriminative Models - Mixture Model and EM - Sequence Prediction Models. Part-of-Speech Tagging: General Framework – POS Tagging Approaches – Other Statistical and Machine Learning Approaches. Statistical Parsing: Basics - Probabilistic Context-Free Grammars - Generative Models - Discriminative Models - Beyond Supervised Parsing.

UNIT – III

MULTIWORD EXPRESSIONS, WEB DISTANCE AND WORD SIMILARITY, WORD SENSE DISAMBIGUATION: Multiword Expressions: Linguistic Properties of MWEs – Types of MWEs – MWE Classification – Research Issues - Methods of Word Similarity – Normalized Web Distance Method – Kolmogorov Complexity – Information Distance – Normalized Web Distance – Applications – Word Sense Inventories and Problem Characteristics – Applications of Word Sense Disambiguation – Approaches to Sense Disambiguation: Supervised, Lightly Supervised and Unsupervised.

UNIT – IV

SPEECH RECOGNITION, ALIGNMENT, STATISTICAL MACHINE TRANSLATION: Modern Speech Recognition: Architectural Components – Historical Developments – Speech Recognition Applications – Technical Challenges and Future Research Directions – Alignment: Basics – Sentence Alignment –

Character, Word, Phrase Alignment – Structure and Tree Alignment – Biparsing and ITG Tree Alignment – Statistical Machine Translation: Approaches – Language Models – Parallel Corpora – Word Alignment – Phrase Library – Translation Models – Search Strategies – Research Areas.

UNIT – V

APPLICATIONS: Information Retrieval – Indexing – IR Models – Evaluation and Failure Analysis – Natural Language Processing and Information Retrieval – Question Answering – Generic Question Answering System – Evaluation of Question Answering system – Multilinguality in Question Answering System – Recent trends and Related Works – Information Extraction – IE with Cascaded Finite State Transducers – Learning based Approaches in IE – Report generation – Emerging Applications of Natural language Generation in Information – Biomedical Text Mining – Sentiment Analysis and Subjectivity.

TEXT BOOKS:

1. Introduction to Linguistics and Natural Language Processing (IBM ICE Publications).
2. Daniel and Martin J. H., "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 2009.

REFERENCE BOOKS:

1. Manning C. D. and Schutze H., "Foundations of Statistical Natural Language processing", First Edition, MIT Press, 1999
2. Allen J., "Natural Language Understanding", Second Edition, Pearson Education, 2003.

REINFORCEMENT LEARNING
(PROFESSIONAL ELECTIVE-II)

III-B.Tech II-Semester | **L T P C**
Course Code: A1AM604PE | **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Learn how to define RL tasks and the core principals behind the RL, including policies, value functions, deriving Bellman equations (as assets by the assignments, an exam and quizzes)
2. Implement in code common algorithms following code standards and libraries used in RL (as assessed by the assignments and final project)
3. Understand and work with tabular methods to solve classical control problems (as assessed by the assignments, quizzes and final exam)
4. Understand and work with approximate solutions (deep Q network based algorithms) (as assessed by the assignments and final exam)
5. Learn the policy gradient methods from vanilla to more complex cases (as assessed by the assignments, quizzes and final exam)

COURSE OUTCOMES:

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

1. Understand the need for machine learning for various problem solving
2. Familiarize the basics of Reinforcement Learning
3. Explain various tabular solution methods
4. Familiarize in approximate solution methods
5. Explain about classic conditioning and explore few applications

UNIT-I

Introduction to Machine Learning : Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT-II

Introduction to Reinforcement Learning and optimization: Reinforcement Learning: Introduction - Elements of Reinforcement Learning - Limitations and Scope- An Extended Example: Tic-Tac-Toe- Multi-armed Bandits: K {PAGE} armed, test beds, incremental implementation, Optimal initialization- Gradient Bandit, associative Search.

UNIT-III

Basic Tabular Solution Methods: Finite Markov Decision Processes- Goals, Rewards, Returns, Episodes- Optimal policies and optimal valued functions. Dynamic Programming: Policy Evaluation (Prediction) - Policy Improvement - Policy Iteration - Value Iteration- Asynchronous Dynamic Programming - Generalized Policy Iteration. Monte Carlo Methods: Monte Carlo Prediction - Monte Carlo Estimation of Action Values - Monte Carlo Control - Monte Carlo Control without Exploring Starts - Off-policy Prediction via Importance Sampling. Temporal-Difference Learning: TD Prediction - Advantages of TD - Incremental Implementation - Off-policy Monte Carlo Control

UNIT-IV

Approximate Solution Methods : On-policy Prediction with Approximation : Value-function Approximation -The Prediction Objective (VE) - Stochastic-gradient and Semi-gradient Methods - Linear Methods –Feature Construction for Linear Methods- Nonlinear Function Approximation: Artificial Neural Networks - Least-Squares TD - Memory-based Function Approximation - Kernel-based Function Approximation.

UNIT-V

Classical Conditioning & Case studies Classical Conditioning: Blocking and Higher-order Conditioning - The Rescorla -Wagner Model - TD Model -Simulations - Instrumental Conditioning - Delayed Reinforcement- Cognitive Maps. Case Studies: Samuel's Checkers Player, Optimizing Memory Control, Human-level Video Game Play- Autonomous UAV Navigation and path planning -Drones for Field Coverage.

TEXT BOOKS:

1. Richard S.Sutton and Andrew G. Barto, , Introduction to Reinforcement Learning', 2nd Edition, MIT Press, 2017.
2. Tom M.Mitchell,—Machine Learning, McGraw-Hill Education (India) Private Limited, 2013

REFERENCE BOOKS:

1. Sigaud O.&Buffet O. ,Markov Decision Processes in Artificial Intelligence', editors, ISTE Ld., Wiley and Sons Inc, 2010.
2. Dragun Vrabie,Kyriakos G.Vamvoudakis,Frank L.Lewis.,Optimal Adaptive Control and Differential Games by Reinforcement learning principles,2012.

CYBER SECURITY
(PROFESSIONAL ELECTIVE-II)

III-B.Tech II-Semester	L	T	P	C
Course Code: A1AM605PE	3	-	-	3

COURSE OBJECTIVES:
The course 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.

COURSE OUTCOMES:
After completion of the course, students will be able to:
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

MULTIMEDIA COMPUTING
(PROFESSIONAL ELECTIVE-II)

III-B.Tech II-Semester **L T P C**
Course Code: A1AM606PE **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. This course aims to further develop students' competency in producing dynamic and creative graphic solutions for multimedia productions.
2. To provide the foundation knowledge of multimedia computing, e.g. media characteristics, compression standards, multimedia representation, data formats, multimedia technology development

COURSE OUTCOMES:

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

1. Understand the characteristics of different media; understand the representations of different multimedia data;
2. Understand different data formats; be able to take into considerations in multimedia system designs;
3. Understand the characteristics of human's visual system; understand the characteristics of human's audio system; be able to take into considerations in multimedia techniques design and implementation;
4. Understand different compression principles; understand different compression techniques; understand different multimedia compression standards; be able to design and develop multimedia systems according to the requirements of multimedia applications.

UNIT-I

Fundamental concepts in Text and Image: Multimedia and hypermedia, World Wide Web, Overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

UNIT-II

Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

UNIT-III

Multimedia data compression II: Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding.
MPEG Video Coding: Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

UNIT-IV

Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

UNIT-V

Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand (MOD)..

TEXT BOOKS:

1. Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI Learning, 2004
2. Professional Adobe Flex 3, Joseph Balderson, Peter Ent, et al, Wrox Publications, Wiley India, 2009.

REFERENCE BOOKS:

1. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.
3. Multimedia and communications Technology, Steve Heath, Elsevier (Focal Press).
4. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
5. Multimedia Basics by Weixel Thomson
6. Multimedia Technology and Applications, David Hilman , Galgotia

PARALLEL COMPUTING
(PROFESSIONAL ELECTIVE –III)

III-B.Tech II-Semester **L T P C**
Course Code: A1AM607PE **3 - - 3**

COURSE OBJECTIVES:
The course should enable the students to learn:
1. This course covers the design of advanced modern computing systems.
2. In particular, the design of modern microprocessors, characteristics of the memory hierarchy, and issues involved in multi-threading and multi-processing are discussed.
3. The main objective of this course is to provide students with an understanding and appreciation of the fundamental issues and tradeoffs involved in the design and evaluation of modern computers
4. Understand the concepts and terminology of high performance computing

COURSE OUTCOMES:
After completion of the course, students will be able to:
1. Can analyze the need for high performance and parallel programming models.
2. Can write and analyze the behavior of high performance parallel programs for distributed memory architectures (using MPI).
3. Can write and analyze the behavior of high performance parallel programs for shared memory architectures (using Pthreads and OpenMP).
4. Can write simple programs for the GPU.

UNIT – I
Introduction to Parallel hardware and software, need for high performance systems and Parallel Programming, SISD, SIMD, MISD, MIMD models, Performance issues.

UNIT – II
Processors, PThreads, Thread Creation, Passing arguments to Thread function, Simple matrix multiplication using Pthreads, critical sections, mutexes, semaphores, barriers and conditional variables, locks, thread safety, simple programming assignments.

UNIT – III
Open MP Programming: introduction, reduction clause, parallel for-loop scheduling, atomic directive, critical sections and locks, private directive, Programming assignments, n body solvers using open MP.

UNIT – IV
Introduction to MPI programming: MPI primitives such as MPI_Send, MPI-Recv, MPI_Init, MPI-Finalize, etc., Application of MPI to Trepizoidal rule, Collective Communication primitives in MPI, MPI derived datatypes, Performance evaluation of MPI programs, Parallel sorting algorithms, Tree search solved using MPI, Programming Assignments.

UNIT – V
Introduction to GPU computing, GPUs as Parallel Computers, Architecture of a Modern GPU Graphics pipelines, GPGPU, Data Parallelism and CUDA C Programming, CUDA Threads Organization, Simple Matrix multiplication using CUDA, CUDA memories.

TEXT BOOKS:
1. An Introduction to Parallel Programming, Peter S Pacheco, Elsevier, 2011
2. Programming Massively Parallel Processors A hands-on Approach By David B. Kirk and Wen-mei W. Hwu, Morgan Kaufmann, 2010.
3. Programming Massively Parallel Processors, Kirk & Hwu, Elsevier, 2012

REFERENCE BOOKS:

1. CUDA by example: An introduction to General Purpose GPU Programming, Jason, Sanders, . Edward Kandrit, Perason, 2011
2. CUDA Programming, Shame Cook, Elsevier
3. High Performance Heterogeneous Computing, Jack Dongarra, Alexey & Lastovetsky, Wiley IV. Parallel computing theory and practice, Michel J.Quinn, TMH

R-PROGRAMMING
(PROFESSIONAL ELECTIVE-III)

III-B.Tech II-Semester **L T P C**
Course Code: A1AM608PE **3 - - 3**

COURSE OBJECTIVES:
The course should enable the students to learn:
1. To understand the basic concepts of mobile computing.
2. To learn the basics of mobile telecommunication system.
3. To be familiar with the network layer protocols and Ad-Hoc networks.
4. To know the basis of transport and application layer protocols.
5. To gain knowledge about different mobile platforms and application development

COURSE OUTCOMES:
After successful completion of the course students will be able to:
1. Understand the basics in R programming in terms of constructs, control statements, string functions
2. Understand the use of R for Big Data analytics
3. Learn to apply R programming for Text processing
4. Able to appreciate and apply the R programming from a statistical perspective

UNIT – I
Introduction: Introducing to R – R Data Structures – Help functions in R – Vectors – Scalars – Declarations – recycling – Common Vector operations – Using all and any – Vectorized operations – NA and NULL values – Filtering – Vectorised if-then else – Vector Equality – Vector Element names.

UNIT – II
Matrices, Arrays And Lists: Creating matrices – Matrix operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector/Matrix Distinction – Avoiding Dimension Reduction – Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists.

UNIT – III
Data Frames: Creating Data Frames – Matrix-like operations in frames – Merging Data Frames – Applying functions to Data frames – Factors and Tables – factors and levels – Common functions used with factors – Working with tables - Other factors and table related functions - Control statements – Arithmetic and Boolean operators and values – Default values for arguments - Returning Boolean values – functions are objects – Environment and Scope issues – Writing Upstairs - Recursion – Replacement functions – Tools for composing function code – Math and Simulations in R.

UNIT – IV
OOP: S3 Classes – S4 Classes – Managing your objects – Input/Output – accessing keyboard and monitor – reading and writing files – accessing the internet – String Manipulation – Graphics – Creating Graphs – Customizing Graphs – Saving graphs to files – Creating three-dimensional plots.

UNIT – V
Interfacing: Interfacing R to other languages – Parallel R – Basic Statistics – Linear Model – Generalized Linear models – Non-linear models – Time Series and Auto-correlation – Clustering.

TEXT BOOKS
1. Norman Matloff, “The Art of R Programming: A Tour of Statistical Software Design”, No Starch Press, 2011.
2. Jared P. Lander, “R for Everyone: Advanced Analytics and Graphics”, Addison-Wesley Data & Analytics Series, 2013.

REFERENCE BOOKS

1. Mark Gardener, “Beginning R – The Statistical Programming Language”, Wiley, 2013
2. Robert Knell, “Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R”, Amazon Digital South Asia Services Inc, 2013

CLOUD COMPUTING
(PROFESSIONAL ELECTIVE-III)

III-B.Tech II-Semester **L T P C**
Course Code: A1AM609PE **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students 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:

At the end of the course, the student will be 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: 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: 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-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: 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: 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 Computing Concepts, 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.

COMPUTATIONAL COMPLEXITIES
(OPEN ELECTIVE-I)

III-B. Tech II-Semester **L T P C**
Course Code : A1AM601OE **3 - - 3**

COURSE OBJECTIVES:
The course should enable the students to learn:
1. Introduces to theory of computational complexity classes
2. Discuss about algorithmic techniques and application of these techniques to problems.
3. Introduce to randomized algorithms and discuss how effective they are in reducing time and space complexity.
4. Discuss about Graph based algorithms and approximation algorithms
5. Discuss about search trees.

COURSE OUTCOMES:
After completion of the course, students will be able to:
1. Ability to classify decision problems into appropriate complexity classes
2. Ability to classify optimization problems into appropriate approximation complexity classes
3. Ability to choose appropriate data structure for the given problem
4. Ability to choose and apply appropriate design method for the given problem.

UNIT – I
Computational Complexity: Polynomial time and its justification, Nontrivial examples of polynomial-time algorithms, the concept of reduction (reducibility), Class P Class NP and NP- Completeness, The P versus NP problem and why it's hard.

UNIT – II
Algorithmic paradigms: Dynamic Programming – Longest common subsequence, matrix chain multiplication, knapsack problem, Greedy – 0-1 knapsack, fractional knapsack, scheduling problem, Huffman coding, MST, Branch-and-bound – travelling sales person problem, 0/1 knapsack problem, Divide and Conquer – Merge sort, binary search, quick sort.

UNIT – III
Randomized Algorithms: Finger Printing, Pattern Matching, Graph Problems, Algebraic Methods, Probabilistic Primality Testing, De-Randomization Advanced Algorithms.

UNIT – IV
Graph Algorithms: Shortest paths, Flow networks, Spanning Trees; Approximation algorithms, Randomized algorithms. Approximation algorithms: Polynomial Time Approximation Schemes.

UNIT – V
Advanced Data Structures and applications: Decision Trees and Circuits, B-Trees, AVL Trees, Red and Black trees, Dictionaries and tries, Maps, Binomial Heaps, Fibonacci Heaps,Disjoint sets, Union by Rank and Path Compression.

TEXT BOOKS:
1. T. Cormen, C. Leiserson, R. Rivest and C. Stein, Introduction to Algorithms, Third Edition, McGraw-Hill, 2009.
2. R. Motwani and P. Raghavan, Randomized Algorithms, Cambridge University Press, 1995.
3. J. J. McConnell, Analysis of Algorithms: An Active Learning Approach, Jones &Bartlett Publishers, 2001.

REFERENCE BOOKS:

1. D. E. Knuth, Art of Computer Programming, Volume 3, Sorting and Searching, Second Edition, Addison-Wesley Professional, 1998.
2. S. Dasgupta, C. H. Papadimitriou and U. V. Vazirani, Algorithms, McGraw-Hill, 2008.

COMPUTER NETWORKS
(OPEN ELECTIVE- I)

III-B.Tech II-Semester | **L T P C**
Course Code: A1AM602OE | **3 - - 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To introduce the fundamentals 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:

At the end of the course the students are 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: 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: 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: 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: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

UNIT-V

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.

WEB PROGRAMMING LAB

III-B.Tech II-Semester **L T P C**
Course Code: A1AM604PC **- - 2 1**

COURSE OBJECTIVES:

The course should enable the students 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:

At the end of the course, the student will be 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. Design web application using MVC architecture

LIST OF EXPERIMENTS

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

1. 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)

2. 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

ARTIFICIAL INTELLIGENCE AND NATURAL LANGUAGE PROCESSING LAB

III B. Tech- II Semester **L T P C**
Course Code: A1AM605PC **- - 2 1**

COURSE OBJECTIVES

1. Become familiar with basic principles of AI toward problem solving, knowledge representation,and learning.
2. Knowledge on basic Language processing features, design an innovative application usingNLP components

COURSE OUTCOMES

1. Apply basic principles of AI in solutions that require problem solving, knowledgerepresentation, and learning.
2. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
3. Understand and carry out proper experimental methodology for training and evaluatingempirical NLP systems
4. Able to design, implement, and analyze NLP algorithms

LIST OF EXPERIMENTS (AI)

1) Write a program in prolog to implement simple facts and Queries
2) Write a program in prolog to implement simple arithmetic
3) Write a program in prolog to solve Monkey banana problem
4) Write a program in prolog to solve Tower of Hanoi
5) Write a program in prolog to solve 8 Puzzle problems
6) Write a program in prolog to solve 4-Queens problem
7) Write a program in prolog to solve Traveling salesman problem
8) Write a program in prolog for Water jug problem

LIST OF EXPERIMENTS (NLP)

1. Word Analysis
2. Word Generation
3. Morphology
4. N-Grams
5. N-Grams Smoothing

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach Third Edition Stuart Russell and Peter Norvig, 2010.Pearson Education, Inc. ISBN: 978-0-13-604259-4
2. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication,2014.
3. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition, O'Reilly Media, 2009.

REFERENCE BOOK:

1. Breck Baldwin, —Language Processing with Java and Ling Pipe Cookbook, Atlantic Publisher, 2015.

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

III-B.Tech II-Semester **L T P C**
Course Code: A1AM607MC **2 - - -**

COURSE OBJECTIVES:

The course should enable the students to learn:
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:

At the end of the course, the student 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: 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: 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: 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: 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 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

E-RESOURCES:

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

IV-YEAR (I-SEMESTER)

DATA WAREHOUSING AND DATA MINING

IV-B.Tech I-Semester **L T P C**
Course Code: A1AM701PC **3 - - 3**

COURSE OBJECTIVES:

Study data warehouse principles and its working learn data mining concepts understand association rules mining. Discuss classification algorithms learnhow data is grouped using clustering techniques.

COURSE OUTCOMES:

1. Student should be able to understand why the data warehouse inaddition to database systems.
2. Ability to perform the preprocessing of data and apply miningtechniques on it.
3. Ability to identify the association rules, classification and clusters inlarge data sets.
4. Ability to solve real world problems in business and scientificinformation using data mining

UNIT-I

Data warehouse: Introduction to Data warehouse, Difference between operational database systems and data warehouses, Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction-Transformation-Loading, Logical(Multi-Dimensional), Data Modeling, Schema Design, Star and Snow-Flake Schema, Fact Consultation, Fact Table, Fully Addictive, Semi-Addictive, Non Addictive Measures; Fact- Less-Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

UNIT-II

Introduction to Data Mining: Introduction**,** What is Data Mining, Definition,KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

UNIT-III

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-IV

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 neighbor classification-Algorithm and Characteristics.

UNIT-V

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.

TEXT BOOKS:

1) Data Mining- Concepts and Techniques- Jiawei Han, MichelineKamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.
2) Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, MichaelSteinbanch, Pearson Education.

REFERENCE BOOKS:

1) Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2) Data Warehousing Fundamentals, Pualraj Ponnaiah, Wiley StudentEdition.
3) The Data Warehouse Life Cycle Toolkit – Ralph Kimball, Wiley StudentEdition.
4) Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press

COMPUTER VISION

IV-B.Tech I-Semester **L T P C**
Course Code: A1AM702PC **3 1 - 4**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To review image processing techniques for computer vision
2. To understand shape and region analysis
3. To understand Hough Transform and its applications to detect lines, circles, ellipses
4. To understand three-dimensional image analysis techniques
5. To understand motion analysis

COURSE OUTCOMES:

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

1. Implement fundamental image processing techniques required for computer vision
2. Apply 3D vision techniques
3. Implement boundary tracking techniques
4. Apply chain codes and other region descriptors
5. Apply Hough Transform for line, circle, and ellipse detections

UNIT – I

IMAGE PROCESSING FOUNDATIONS: Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture.

UNIT – II

SHAPES AND REGIONS : Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments

UNIT – III

HOUGH TRANSFORM : Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation

UNIT – IV

3D VISION AND MOTION : Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – splinebased motion – optical flow – layered motion

UNIT – V

APPLICATIONS: Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

TEXT BOOKS:

1. E. R. Davies, “Computer & Machine Vision”, Fourth Edition, Academic Press, 2012.
2. Simon J. D. Prince, “Computer Vision: Models, Learning, and Inference”, Cambridge University Press, 2012.

REFERENCE BOOKS:

1. D. L. Baggio et al., “Mastering Open CV with Practical Computer Vision Projects”, Packt Publishing, 2012.
2. Jan Erik Solem, “Programming Computer Vision with Python: Tools and algorithms for analyzing images”, O'Reilly Media, 2012.
3. Mark Nixon and Alberto S. Aquado, “Feature Extraction & Image Processing for Computer Vision”, Third Edition, Academic Press, 2012.
4. R. Szeliski, “Computer Vision: Algorithms and Applications”, Springer 2011.

NEURAL NETWORKS AND DEEP LEARNING

IV-B.Tech I-Semester | **L T P C**
Course Code: A1AM703PC | **3 1 - 4**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To introduce the foundations of Artificial Neural Networks
2. To acquire the knowledge on Deep Learning Concepts
3. To learn various types of Artificial Neural Networks
4. To gain knowledge to apply optimization strategies.

COURSE OUTCOMES:

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

1. Ability to understand the concepts of Neural Networks
2. Ability to select the Learning Networks in modelling real world systems
3. Ability to use an efficient algorithm for Deep Models
4. Ability to apply optimization strategies for large scale applications.

UNIT – I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, and Back-propagation Network.Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT – II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT – III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed – forward networks , Gradient - Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT – IV

Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier.

UNIT – V

Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

TEXT BOOKS

1. Deep Learning: An MIT Press Book By Ian Good fellow and Yoshua Bengio and Aaron Courville

REFERENCE BOOKS:

1. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall

BIG DATA MANAGEMENT
(PROFESSIONAL ELECTIVE -1V)

IV-B.Tech I-Semester **L T P C**
Course Code: A1AM710PE **3 0 0 3**

COURSE OBJECTIVES:

1. To introduce the concept of Analytics for Business
2. To introduce the tools, technologies & programming languages which is used in day to day analytics cycle

COURSE OUTCOMES:

The course materials are organized to cover an overview of the subject matter and four topics in detail: big data analytics, big data computing environment, machine learning techniques and scaling up machine learning

UNIT - I DATA MANAGEMENT (NOS 2101):

Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/signal/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Preprocessing. Export all the data onto Cloud ex. AWS/Rackspace etc. Maintain Healthy, Safe & Secure Working Environment (NOS 9003) Introduction, workplace safety, Report Accidents & Emergencies, Protect health & safety as your work, course conclusion and assessment.

UNIT - II BIG DATA TOOLS (NOS 2101):

Introduction to Big Data tools like Hadoop, Spark, Impala etc., Data ETL process, Identify gaps in the data and follow-up for decision making. Provide Data/Information in Standard Formats (NOS 9004) Introduction, Knowledge Management, Standardized reporting & compliances, Decision Models, course conclusion. Assessment

UNIT - III BIG DATA ANALYTICS:

Run descriptive to understand the nature of the available data, collate all the data sources to suffice business requirement, Run descriptive statistics for all the variables and observer the data ranges, Outlier detection and elimination.

UNIT - IV MACHINE LEARNING ALGORITHMS (NOS 9003):

Hypothesis testing and determining the multiple analytical methodologies, Train Model on 2/3 sample data using various Statistical/Machine learning algorithms, Test model on 1/3 sample for prediction etc.

UNIT - V (NOS 9004) DATA VISUALIZATION (NOS 2101):

Prepare the data for Visualization, Use tools like Tableau, Qlick View and D3, Draw insights out of Visualization tool. Product Implementation

TEXT BOOK:

1. Student's Handbook for Associate Analytics.

REFERENCE BOOKS:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley, 2006
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira (the authors have kindly made an online version available): http://www.dataminingbook.info/uploads/book.pdf
3. Mining of Massive Datasets Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D. Ullman, Stanford Univ. (http://www.vistrails.org/index.php/Course:_Big_Data_Analysis)

SPEECH PROCESSING
(PROFESSIONAL ELECTIVE –IV)

IV-B.Tech I-Semester **L T P C**
Course Code: A1AM711PE **3 - - 3**

COURSE OBJECTIVES:
The course should enable the students to learn:
1. To understand the fundamentals of the speech processing
2. Explore the various speech models
3. Gather knowledge about the phonetics and pronunciation processing
4. Perform wavelet analysis of speech
5. To understand the concepts of speech recognition

COURSE OUTCOMES:
After completion of the course, students will be able to:
1. Model speech production system and describe the fundamentals of speech.
2. Extract and compare different speech parameters.
3. Choose an appropriate statistical speech model for a given application.
4. Design a speech recognition system.
5. Use different speech synthesis techniques.

UNIT – I
Introduction – knowledge in speech and language processing – ambiguity – models and algorithms – language – thought – understanding – regular expression and automata – words & transducers – N grams.

UNIT – II
Speech Modelling: Word classes and part of speech tagging – hidden markov model – computing likelihood: the forward algorithm – training hidden markov model – maximum entropy model – transformation-based tagging – evaluation and error analysis – issues in part of speech tagging – noisy channel model for spelling.

UNIT – III
SPEECH PRONUNCIATION AND SIGNAL PROCESSING: Phonetics – speech sounds and phonetic transcription – articulatory phonetics – phonological categories and pronunciation variation – acoustic phonetics and signals – phonetic resources – articulatory and gestural phonology.

UNIT – IV
SPEECH IDENTIFICATION: Speech synthesis – text normalization – phonetic analysis – prosodic analysis – dip hone waveform synthesis – unit selection waveform synthesis – evaluation.

UNIT – V
SPEECH RECOGNITION: Automatic speech recognition – architecture – applying hidden markov model – feature extraction: mfcc vectors – computing acoustic likelihoods – search and decoding – embedded training – multipass decoding: n-best lists and lattices- a* (_stack‘) decoding – context-dependent acoustic models: triphones – discriminative training – speech recognition by humans.

TEXT BOOKS:
1. Daniel Jurafsky and James H. Martin, — Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition, Person education, 2013.

REFERENCE BOOKS:

1. Kai-Fu Lee, ―Automatic Speech Recognition, The Springer International Series in Engineering and Computer Science, 1999.
2. Himanshu Chaurasiya, ―Soft Computing Implementation of Automatic Speech Recognition, LAP Lambert Academic Publishing, 2010.
3. Claudio Becchetti, Klucio Prina Ricotti, ―Speech Recognition: Theory and C++ implementation,Wiley publications 2008.
4. Ikrami Eldirawy , Wesam Ashour, ―Visual Speech Recognition, Wiley publications , 2011

CRYPTOGRAPHY AND NETWORK SECURITY
(PROFESSIONAL ELECTIVE-IV)

IV-B.Tech I-Semester **L T P C**
Course Code: A1AM712PE **3 - - 3**

COURSE OBJECTIVES:
The course should enable the students 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:
After completion of the course, students will be 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.

INTRODUCTION TO MACHINE LEARNING
(OPEN ELECTIVE – II)

IV B.Tech I - Semester	L	T	P	C
Course Code: A1AM703OE	3	0	-	3

COURSE OBJECTIVES:
The course should enable the students to:
1. Understand all principal elements of Computational Learning Theory
2. Acquire the knowledge of decision tree and decision tree learning algorithms.
3. Study the concept of neural networks and its algorithms to solve problems using neural networks.
4. Obtain the knowledge of Bayesian reasoning and also instance based learning techniques in order to easily master different Machine Learning models
5. Understand the concept of Genetic algorithms and Genetic Programming

COURSE OUTCOMES:
At the end of the course the students are able to:
2. Describe the concepts of computational intelligence like machine learning and design an exemplarily learning system.
2. Use the concept of Decision Trees in machine learning models.
3. Discuss about the Neural Networks and its usage in machine learning application.
4. Apply Bayesian reasoning and also target based learning techniques to develop a machine learning application.
5. Summarize the concept of Genetic algorithms and Genetic Programming.

UNIT I
Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate Elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT II
Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for Neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses,comparing learning algorithms.

UNIT- III
Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, and the EM algorithm.

Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT- IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning – Introduction, the learning task, *Q*–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT- V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis
2. Introduction to Machine Learning with Python A guide for data scientists, Andreas ,C. Muller & Sarah Guido, O'Reilly
3. Introduction to Machine learning, Nils J.Nilsson
4. Machine learning for dummies, IBM Limited ed, by Judith Hurwitz and Daniel Kirsch

GREEN COMPUTING
(OPEN ELECTIVE – II)

IV-B.Tech I-Semester	L	T	P	C
Course Code: A1AM704OE	3	-	-	3

COURSE OBJECTIVES:
The course should enable the students to learn:
1. To learn the fundamentals of Green Computing.
2. To analyze the Green computing Grid Framework.
3. To understand the issues related with Green compliance.
4. To study and develop various case studies.

COURSE OUTCOMES:
After completion of the course, students will be able to:
1. Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.
2. Enhance the skill in energy saving practices in their use of hardware.
3. Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders.
4. Understand the ways to minimize equipment disposal requirements.

UNIT – I
FUNDAMENTALS: Green IT Fundamentals: Business, IT, and the Environment –Green computing: carbon foot print, scoop on power –Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

UNIT – II
Green Assets and Modeling: Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

UNIT – III
Grid Framework: Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center - Green Grid framework.

UNIT – IV
GREEN COMPLIANCE: Socio-cultural aspects of Green IT –Green Enterprise Transformation Roadmap –Green Compliance: Protocols, Standards, and Audits –Emergent Carbon Issues: Technologies and Future.

UNIT – V
Case Studies: The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

TEXT BOOKS:
1. Bhuvan Unhelkar, Green IT Strategies and Applications-Using Environmental Intelligence, CRC Press, June 2014.
2. Woody Leonhard, Katherine Murray, Green Home computing for dummies, August 2012.

REFERENCE BOOKS:

1. Alin Gales, Michael Schaefer, Mike Ebbers, and Green Data Center: steps for the Journey, Shroff/IBM rebook, 2011.
2. John Lamb, The Greening of IT, Pearson Education, 2009..
3. Jason Harris, Green Computing and Green IT- Best Practices on regulations and industry, Lulu.com, 2008
4. Carl speshocky, Empowering Green Initiatives with IT, John Wiley and Sons, 2010.
5. Wu Chun Feng (editor), Green computing: Large Scale energy efficiency, CRC Press

DATA WAREHOUSING AND DATA MINING LAB

IV-B.Tech I-Semester | **L T P C**
Course Code: A1AM704PC | **- - 4 2**

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 AssessmentDescription:

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 representher 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 tojudge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, andwhen 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) Excelspreadsheet 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. (Unlessyou 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 andacts 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 getGerman 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 oneof 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 attributeshave any significant effect? Discuss. (10 marks)

1. 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)
2. 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)
3. 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)
4. 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, reportyour accuracy using the pruned model. Does your accuracy increase? (10 marks)
5. (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 differentclassifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, trainthis 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) Decision Trees (Source: Tan, MSU)
3. Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)
4. 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 > DayLH2: 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 thehierarchy 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 namessuitably.
Design the Hospital Management system data warehouse using all schemas. Give theexample 4-D cube with assumption names.

IV-YEAR (II-SEMESTER)

COGNITIVE COMPUTING

IV-B. Tech II-Semester	L	T	P	C
Course Code: A1AM801PC	3	-	-	3

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Use the Innovation Canvas to justify potentially successful products.
2. Explain various ways in which to develop a product idea.

COURSE OUTCOMES:

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

1. Understand applications in Cognitive Computing.
2. Understand Natural language processor role in Cognitive computing.
3. Learn future directions of Cognitive Computing.
4. Evaluate the process of taking a product to market.
5. Describe the main components that are involved when building a chatbot and explain their purpose
6. Describe how to build a Chatbot by using the IBM Watson Conversation service

UNIT-I

ARTIFICIAL INTELLIGENCE OVERVIEW Introduction to Artificial Intelligence, Machine Learning, NLP, Computer Vision, Cognitive computing.

UNIT-II

ARTIFICIAL INTELLIGENCE FOUNDATIONS

Introduction to IBM Watson, Evolution from Deep QA to Watson services on IBM Cloud, Build with Watson

UNIT-III

ARTIFICIAL INTELLIGENCE ANALYST

Natural Language Processing, Pipelne & concepts, NLP and IBM Watson

UNIT-IV

Computer Vision

Introduction to Computer Vision, Computer Vision fundamentals, IBM Watson visual recognition service

UNIT-V

Chatbots: Introduction to Chatbots, Chatbot fundamentals, IBM Watson conversation service

TEXT BOOKS:

1. Judith H Hurwitz, Marcia Kaufman, Adrian Bowles , “Cognitive computing and Big Data Analytics” , Wiley

REFERENCE BOOKS:

1. Cognitive Computing: Theory and Applications: Volume 35 (Handbook of Statistics) Hardcover – Import, 9 September 2016 by Vijay V Raghavan (Author), Venkat N. Gudivada (Author), Venu Govindaraju (Author), C.R. Rao Professor (Author).

BLOCK CHAIN TECHNOLOGY
(PROFESSIONAL ELECTIVE-V)

IV-B.Tech II-Semester | **L T P C**
Course Code: A1AM813PE | **3 - - 3**

COURSE OBJECTIVES:
The course should enable the students to:
1. To Introduce block chain technology and Crypto currency

COURSE OUTCOMES:
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.

COMPUTATIONAL NEUROSCIENCE
(PROFESSIONAL ELECTIVE-V)

IV-B.Tech II-Semester **L T P C**
Course Code: A1AM814PE **3 - - 3**

COURSE OBJECTIVES:
The course should enable the students to learn:
1. Understand to know what happens in your brain when you make a decision
2. Gain knowledge mathematical and computational models that are used in the field of theoretical neuroscience
3. Basics of adaptively and learning,
4. Acquire knowledge on Basic models of cognitive processing.
5. Acquire knowledge on implementation model for neuro models

COURSE OUTCOMES:
After completion of the course, students will be able to:
1. To Design Models of single neurons, and small networks
2. Implementation of all simple as well as more complex numerical computations with few neurons.
3. Analyse connected networks in the mean-field limit
4. Formalize biological facts into mathematical models
5. Understand a simple mathematical model of memory formation in the brain

UNIT – I
History of Computational Neuroscience, Models in Computational Neuroscience, Computational Theory of the Brain, Biological Background, Basic synaptic mechanisms and dendritic processing, The generation of action potentials, Stimulation and rising phase, Peak and falling phase, After hyperpolarization and Refractory Period, Hodgkin and Huxley equations – Intro, Neuron - axons,dendritesetc, the four components of Neural Signalling, Neuro transmission: neuro transmitter, receptor, ion channel, channel gating, Electrophysiology -Nernst potential, resting Potential, Goldman-Hodgkin-Katz voltage equation, outline of the Hodgkin-Huxley model. Modelling ion1 channel kinetics, activation and inactivation gates, Complete formulation of Hodgkin-Huxley model. Relation between output firing and constant input current. Discussion of regimes. Software demo. Compartmental models: Cable theory, Compartmental models: Cable theory –Cable Equation, Physical Shape of Neurons and Neuron Simulators.

UNIT – II
Four components of Neural Signaling, Four components of Neural Signaling, Neurotransmission, Population dynamics, Modeling the average behavior of neurons, Hodgkin, Modeling the average behavior of neurons, Huxley Model, Spiking neuron models – Single, Spiking neuron models – Detailed, Spiking neuron models – 2D Model, Integrate and firing model –Leaky integrate-and-fire model, Integrate and firing model –Nonlinear integrate-and-fire model, Integrate and firing model -Stimulation by synaptic currents, noise in spiking neuron model – part I, noise in spikingneuron model – part II, compartmental modeling – I, compartmental modeling –II.

UNIT – III
From artificial neural network to realistic neural networks – Introduction, Modelling the ventral stream, Modelling the dorsa and auditory stream, Mechanical behaviour of ceramics-flexural strength -The Perceptron, Mapping function, Multi-layer Perceptron, Back-propagation – Initution , Derivation, Back-propagation –Loss Function, Back-propagation – Limitation, Support Vector Machines – Introduction, Support Vector Machines – Classification, Support Vector Machines – Regression, Support Vector Machines – Kernel Function, Self-organizing Maps – Introduction, Self-organizing Maps – Variable, Self-organizing Maps – Algorithm, Self-organizing Maps – SOM Initialization, Self-organizing Maps – Kohonen Algorithm.

UNIT – IV

Memory Classification Scheme –Declarative, Non-declarative, Auto-associative network and hippo campus - Learning and retrieval phase, Point-attractor neural networks – Network dynamics and training, Signal-to-noise analysis - Noisy weights and diluted attractor networks Sparse attractor neural networks and correlated patterns-Sparse patterns and expansion recoding Control of sparseness in attractor networks, Chaotic networks-Attractors, Lyapunov functions - The Cohen-Grossberg theorem, Asymmetrical networks, Non-monotonic networks, Complementary memory systems, Distributed model of working memory-Limited capacity of working memory, The spurious synchronization hypothesis, The interacting-reverberating-memory hypothesis, Motor Learning and Control, Feedback controller, Forward and inverse model controller, The cerebellum and motor control.

UNIT – V

Hebbian Learning-Hebbian versus Perceptron Learning, Learning by Error Minimization, Gradient Descent Learning, Stabilizing Hebbian Learning, Principal Component Analysis (PCA)-Eigenvectors-Eigenvalues-Covariancematrix, Singular Value Decomposition, Limits and Extensions of PCA, Variations of Hebbian Learning, Nonlinear Hebbian learning, Linsker's Model of the Visual System, Application of Lateral Inhibition, Lateral Geniculate Nucleus, Striate Cortex, Linsker's model for orientation columns, Reinforcement Learning -Elements of Reinforcement Learning, Markov decision process-Dynamic programming algorithms for solving MDPs, Algorithms for large state spaces, Gradient temporal difference learning.

TEXT BOOKS:

1. Thomas Trappenberg, "Fundamentals of Computational Neuroscience", Oxford University Press, January 2010
2. Richard S. Sutton and Andrew G. Barto, "Reinforcement Learning-An Introduction", 2nd Edition, The MIT Press, 2018

REFERENCE BOOKS:

1. Peter Dayan & LF Abbot**, "**Theoretical Neuroscience: Computational and Mathematical Modelling of Neural Systems"**,** MIT Pres, 2005

COMPUTER GRAPHICS
(PROFESSIONAL ELECTIVE-V)

IV-B.Tech II-Semester | **L T P C**
Course Code: A1AM815PE | **3 - - 3**

COURSE OBJECTIVES:
The course should enable the students to learn:
1. The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
2. Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and colour models; animation; Rendering and implementation; visible surface detection.

COURSE OUTCOMES:
After completion of the course, students will be able to:
1. Acquire familiarity with the relevant mathematics of computer graphics.
2. Be able to design basic graphics application programs, including animation
3. Be able to design applications that display graphic images to given specifications

UNIT – I
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices
Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), midpoint circle and ellipse algorithms
Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT – II
2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems
2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT – III
3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT – IV
3-D Geometric transformations: Translation, rotation, scaling, reflection and shear Transformations, Composite transformations.
3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping

UNIT – V
Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications
Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-tree methods and area sub-division methods

TEXT BOOKS:
1. "Computer Graphics *C version*", Donald Hearn and M. Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH

REFERENCE BOOKS:

1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

COGNITIVE COMPUTING
(OPEN ELECTIVE-III)

IV-B. Tech II-Semester	L	T	P	C
Course Code: A1AM805OE	3	-	-	3

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Use the Innovation Canvas to justify potentially successful products.
2. Explain various ways in which to develop a product idea.

COURSE OUTCOMES:

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

1. Understand applications in Cognitive Computing.
2. Understand Natural language processor role in Cognitive computing.
3. Learn future directions of Cognitive Computing.
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SOFTWARE PROCESS AND PROJECT MANAGEMENT
(OPEN ELECTIVE-III)

IV-B. Tech II-Semester	L	T	P	C
Course Code: A1AM806OE	3	-	-	3

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To acquire knowledge on software process management
2. To acquire managerial skills for software project development
3. To understand software economics

COURSE OUTCOMES:

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

1. Gain knowledge of software economics, phases in the life cycle of software development, project organization, project control and process instrumentation
2. Analyze the major and minor milestones, artifacts and metrics from management and technical perspective
3. Design and develop software product using conventional and modern principles of software project management

UNIT-I

Software Process Maturity Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process. Process Reference Models
Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

UNIT-II

Software Project Management Renaissance Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way. Life-Cycle Phases and Process artifacts Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model-based software architectures.

UNIT-III

Workflows and Checkpoints of process Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments. Process Planning Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT-IV

Project Organizations Line-of- business organizations, project organizations, evolution of organizations, process automation. Project Control and process instrumentation the seven-core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

UNIT-V

CCPDS-R Case Study and Future Software Project Management Practices Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

TEXT BOOKS:

1. Managing the Software Process, Watts S. Humphrey, Pearson Education
2. Software Project Management, Walker Royce, Pearson Education

REFERENCE BOOKS:

1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000 Process Improvement essentials, James R. Persse, O'Reilly, 2006
2. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH,2006
3. Applied Software Project Management, Andrew Stellman & Jennifer Greene,O' Reilly, 2006.
4. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
5. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
6. Agile Project Management, Jim Highsmith, Pearson education, 2004.