

**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 (  $\geq 90$  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.

<b>S. No</b>	<b>Broad Course Classification</b>	<b>Course Group/ Category</b>	<b>Course Description</b>	<b>Credits</b>
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)	--
<b>Total Credits for UGP (B. Tech.)Programme</b>				<b>160</b>

- 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  $\pm 12\%$ ), 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 ( $1/3^{\text{rd}}$  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**

<b>Hour/Week</b>	<b>Online Course Duration</b>	<b>Assigned Credits</b>
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 **30 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  $\geq 65\%$  attendance and has secured not less than 35% marks in the SEE, and a minimum of 40% of marks in the sum Total of the CIE and SEE taken together in such a course, then the student is **PASS** and will be qualified for the award of the degree. No marks or Letter Grade shall be allotted for this courses/activities. However, for non credit courses ‘**Satisfactory**’ or “**Unsatisfactory**” shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

- 12.12. SWAYAM: College intends to encourage the students to do a minimum of one MOOC in discipline and open elective during third year. The respective departments shall give a list of standard MOOCs providers including SWAYAM whose credentials are endorsed by the BoS. In general, MOOCs providers provide the result in percentage. In such case, specified by the college shall follow the grade table mentioned in 14.2. The Credits for MOOC(s) shall be transferred same as given for the respective discipline or open electives. In

case a student fails to complete the MOOCs he/she shall re-register for the same with any of the providers from the list provided by the department. The equivalence of the courses shall be established by the department committee. Still if a student fails to clear the course/s, or in case a provider fails to offer a MOOC in any semester, then in all such cases the college shall conduct the end semester examinations for the same as per the college end semester examination pattern. The syllabi for the supplementary examinations shall be same as that of MOOCs. There shall be no internal assessment however the marks obtained out of 70 shall be scaled up to 100 marks and the respective letter grade shall be allotted. The details of MOOC(s) shall be displayed in Memorandum of Grades of a student, provided he/she submits the proof of completion of it or them to the examination branch through the Coordinator/Mentor, before the end semester examination of the particular semester.

### 13. AWARD OF DEGREE

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

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

Class Awarded	Grade to be Secured
First Class with Distinction	CGPA $\geq$ 8.00
First Class	$\geq$ 6.50 to $<$ 8.00 CGPA
Second Class	$\geq$ 5.50 to $<$ 6.50 CGPA
Pass Class	$\geq$ 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 ( $\geq$ 90% , $\leq$ 100%)	O (Outstanding)	10
Below 90% but not less than 80% ( $\geq$ 80% , $<$ 90% )	A <sup>+</sup> (Excellent)	9
Below 80% but not less than 70% ( $\geq$ 70% , $<$ 80% )	A (Very Good)	8
Below 70% but not less than 60% ( $\geq$ 60% , $<$ 70% )	B <sup>+</sup> (Good)	7
Below 60% but not less than 50% ( $\geq$ 50% , $<$ 60% )	B (above Average)	6
Below 50% but not less than 40% ( $\geq$ 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.

$$\text{Credit Points (CP)} = \text{Grade Point (GP)} \times \text{Credits} \dots \text{ For a Course}$$

- 14.7 The Student passes the Subject/Course only when he gets  $GP \geq 4$  (P Grade or above).
- 14.8 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points ( $\Sigma CP$ ) 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

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

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 x 10 = 30
Course5	3	C	5	3 x 5 = 15
Course6	4	B	6	4 x 6 = 24

$$\text{Thus, SGPA} = 139/20 = 6.95$$

- 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

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

(i.e., up to and inclusive of S Semesters,  $S \geq 2$ ),

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 1<sup>st</sup> 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	Credits : 20.5	Credits : 18.0	Credits : 19.0	Credits : 21.5	Credits : 21.5	Credits : 23	Credits : 17
SGPA : 6.9	SGPA : 7.8	SGPA : 5.6	SGPA : 6.0	SGPA : 6.3	SGPA : 8.0	SGPA : 8.0	SGPA : 8.0

$$\text{Thus, CGPA} = \frac{19.5 \times 6.9 + 20.5 \times 7.8 + 18.0 \times 5.6 + 19.0 \times 6.0 + 21.5 \times 6.3 + 21.5 \times 8.0 + 23 \times 8.0 + 17 \times 8.0}{160} = 7.10$$

- 14.10 For Merit Ranking or Comparison Purposes or any other listing, ONLY the ‘ROUNDED OFF’ values of the CGPAs will be used.
- 14.11 For Calculations listed in Item 12.6–12.10, performance in failed Subjects/Courses (securing F Grade) will also be taken into account, and the Credits of such Subjects/Courses will also be included in the multiplications and summations. However, Mandatory Courses will not be taken into consideration.
- 14.12 Conversion formula for the conversion of GPA into indicative percentage is  
**% of marks scored = (final CGPA - 0.50) x 10**

### 15. DECLARATION OF RESULTS

Computation of SGPA and CGPA are done using the procedure listed in 12.6– 12.10. No SGPA/CGPA is declared, if a candidate is failed in any one of the courses of a given Semester.

### 16. WITH HOLDING OF RESULTS

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

### 17. REVALUATION

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

### 18. SUPPLEMENTARY EXAMINATIONS

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



## **ADVANCED SUPPLEMENTARY EXAMINATION**

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

### **19. TRANSCRIPTS**

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

### **20. RULES OF DISCIPLINE**

- 20.1 Any attempt by any student to influence the teachers, Examiners, faculty and staff of controller of Examination for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.
- 20.2 When the student absents himself, he is treated as to have appeared and obtained zero marks in that course(s) and grading is done accordingly.
- 20.3 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, he is awarded zero marks in that subject(s).
- 20.4 When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Examiner is final.

### **21. MALPRACTICE PREVENTION COMMITTEE**

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

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

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

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

### **22. TRANSITORY REGULATIONS**

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

**23. AMENDMENTS TO REGULATIONS**

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

There shall be no Branch transfers after the completion of Admission Process. Transfer of student is permitted subjected to the rules and regulations of TSCHE (TE Department) and JNTUH in vogue.

The College shall have its own Annual Graduation Day for the award of Degrees issued by the College/University.

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

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

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

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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)**

<b>Class Awarded</b>	<b>Grade to be Secured</b>
First Class with Distinction	CGPA $\geq$ 8.00
First Class	$\geq$ 6.50 to $<$ 8.00 CGPA
Second Class	$\geq$ 5.50 to $<$ 6.50 CGPA
Pass Class	$\geq$ 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**

<b>S. No</b>	<b>Nature of Malpractices / Improper Conduct</b>	<b>Punishment</b>
1 (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the 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)**

<b>I B.Tech - I-Semester</b>									
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
<b>Total</b>			<b>10</b>	<b>3</b>	<b>16</b>	<b>21</b>	<b>240</b>	<b>560</b>	<b>800</b>
<b>Mandatory Course (Non-Credit)</b>									
A1AM101MC	Technical Seminar - I	MC	-	-	2	-	100	-	100

<b>I B.Tech - II-Semester</b>									
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
<b>Total</b>			<b>11</b>	<b>2</b>	<b>12</b>	<b>19</b>	<b>240</b>	<b>560</b>	<b>800</b>
<b>Mandatory Course (Non-Credit)</b>									
A1AM202MC	Technical Seminar-II	MC	-	-	2	-	100	-	100



<b>II B.Tech - I-Semester</b>									
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
<b>Total</b>			<b>15</b>	<b>1</b>	<b>9</b>	<b>20.5</b>	<b>240</b>	<b>560</b>	<b>800</b>
<b>Mandatory Course (Non-Credit)</b>									
A1AM303MC	Environmental Studies	MC	2	-	-	-	100	-	100

<b>II B.Tech - II-Semester</b>									
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
<b>Total</b>			<b>12</b>	<b>-</b>	<b>9</b>	<b>16.5</b>	<b>210</b>	<b>490</b>	<b>700</b>
<b>Mandatory Course (Non-Credit)</b>									
A1AM404MC	Gender Sensitization	MC	-	-	2	-	100	-	100
A1AM405MC	Human Values & Professional Ethics	MC	3	-	-	-	100	-	100

# **DETAILED SYLLABUS**

# **I-YEAR (I-SEMESTER)**

## LINEAR ALGEBRA AND CALCULUS

**I-B. Tech I-Semester**

**Course Code: A1MA101BS**

**L T P C**

**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, 11th Reprint, 2010.

## **APPLIED PHYSICS**

**I-B. Tech I-Semester**

**Course Code: A1AP104BS**

**L T P C**

**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<sub>2</sub>) 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 Learning.
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 Gupta on NPTEL
4. Solid state physics by A J dekker.

## **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

**I-B. Tech I-Semester**

**Course Code: A1EE107ES**

**L T P C**

**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 star transformations.

### **UNIT- II DC MACHINES**

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

### **UNIT – III AC MACHINES**

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

### **UNIT –IV DIODE AND ITS CHARACTERISTICS**

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

### **UNIT – V TRANSISTORS**

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



**TEXT BOOKS:**

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshaiah TMH.
2. Electronic Devices and circuits by J.Millman, C.C.Halkias and 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**

**Course Code: A1ME108ES**

**L T P C**

**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**

**Course Code: A1AP112BS**

**L T P C**

**- - 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 Learning
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**

**Course Code: A1EE115ES**

**L T P C**

**- - 2 1**

### COURSE OBJECTIVES:

**The course should enable the students to learn:**

1. Develop fundamentals, including Ohm's law, Kirchoff'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 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, 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 patterns, 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 & Tenon Joint)
2. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
3. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
4. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
5. Welding Practice – (Arc Welding & Gas Welding)
6. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
7. Black Smithy – (Round to Square, Fan Hook and S-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. Workshop Manual - P. Kanniah/ K. L. Narayana/SciTech
2. Workshop Manual / Venkat Reddy/BSP



## **SOCIAL INNOVATION**

**I-B. Tech I-Semester**  
**Course Code: A1AM117ES**

**L T P C**  
**- - 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  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , 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**  
**Course Code: A1CH202BS**

**L T P C**  
**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 N<sub>2</sub>, O<sub>2</sub> & F<sub>2</sub>.
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 N<sub>2</sub>, O<sub>2</sub> and F<sub>2</sub> molecules.  $\pi$  molecular orbitals of butadiene and benzene. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion orbitals 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 ozonation. Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

### **UNIT - III: ELECTROCHEMISTRY AND CORROSION:**

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

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

Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation analysis of n-butane. Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Rearrangement reactions: Pinacol 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

Course Code: A1CS206ES

L T P C

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 programming 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, arrays of structures, structures and functions, self-referential structures, unions, typedef, enumerations.

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

### **TEXT BOOKS:**

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

**Course Code: A1CS214ES**

**L T P C**

**- - 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 programming 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 display whether the identified largest/smallest number is even or odd
- c. Draw a flowchart to check whether the triangle is equilateral, isosceles or scalene triangle.

#### **WEEK -4**

- a. Write a C program to swap values of two variables with and without using third variable.
- b. Write a C program to enter temperature in Celsius and convert it into Fahrenheit.
- c. Write a C program to calculate Simple and Compound Interest.
- d. Write a C program to calculate  $s = ut + \frac{1}{2}at^2$  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 from the user(+,-,\*,/,% useswitch)
- c. Write a program to compute grade of students using if else ladder. 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≤marks≤ 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  $SUM=1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$
- 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 numbersNote: 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**  
**Course Code: A1CH210BS**

**L T P C**  
**- - 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 a 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 R<sub>f</sub> 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 Fe<sup>2+</sup> by Potentiometry using KMnO<sub>4</sub>
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol.
9. Thin layer chromatography calculation of R<sub>f</sub> 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 stalagmometer.

### **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**  
**Course Code: AIEN213HS**

**L T P C**  
**- - 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, Mike Cotterell, 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**

**Course Code: A1MA301BS**

**L T P C**

**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 Markov 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, 9<sup>th</sup> Edition, Pearson Publications
2. Fundamentals of Mathematical Statistics, Khanna Publications, S C Gupta 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, 8<sup>th</sup> 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**

**Course Code: A1AM302PC**

**L T P C**

**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](https://www.vssut.ac.in/lecture_notes/lecture1428643004.pdf)
2. <https://www.edx.org/course/artificial-intelligence-ai-columbia-csmn-101x-4>
3. [https://onlinecourses.nptel.ac.in/noc18\\_cs18/preview](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

Course Code:A1AM303PC

L T P C

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**

**Course Code: A1AM304HS**

**L T P C**

**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 certain basic 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 of demand and supply, pricing methods and pricing in different market structures.
2. Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.
3. Develop an understanding of 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 analyse and interpret the financial statements through ratio analysis.

### **UNIT – I**

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

### **UNIT – II**

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

### **UNIT – III**

Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business: Features and evaluation of different forms of Business 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: Payback Method, Accounting Rate of return (ARR) and Net Present Value Method (simple problems).

## **UNIT – V**

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

### **TEXT BOOKS:**

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

### **REFERENCE BOOKS:**

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

## DISCRETE MATHEMATICS

**II B. Tech- I Semester**

**Course Code: A1AM305PC**

**L T P C**

**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**  
**Course Code: A1AM306PC**

**L T P C**  
**- - 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**

**Course Code: AIAM307PC**

**L T P C**  
**- - 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 average and percentage of these marks. Call this function from main() and print the result in main

#### **WEEK-4:**

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

#### **WEEK-5:**

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

**WEEK-6:**

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

**WEEK-7:**

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

**WEEK -8:**

- Write python programs to demonstrate Inheritance and Polymorphism.

**WEEK-9:**

- Write python programs to demonstrate Exception Handling in python.

**WEEK-10:**

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

**WEEK-11:**

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

**WEEK-12:**

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

**TEXT BOOKS:**

1. Core Python Programming, by R.Nageswara Rao
2. ReemaThareja, Python Programming using Problem Solving Approach, First Edition, Oxford Higher Education.

**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**  
**Course Code: A1AM308PC**

**L T P C**  
**- - 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**

**Course Code: A1AM303MC**

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

### **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**

**Course Code: A1AM401PC**

**L T P C**  
**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 CALCULUS & SQL**

**RELATIONAL ALGEBRA AND CALCULUS:** Relational algebra operators, relational calculus - Tuple and 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 / Addison wesley, 2007

**WEB REFERENCES:**

1. <http://www.learn-db.com/databases/how-to-convert-er-diagram-to-relational-database>
2. [https://www.w3schools.com/sql/sql\\_create\\_table.asp](https://www.w3schools.com/sql/sql_create_table.asp)
3. [http://www.edugrabs.com/conversion-of-er-model-to-relational-model/?upm\\_export=print](http://www.edugrabs.com/conversion-of-er-model-to-relational-model/?upm_export=print)
4. <http://ssyu.im.nctu.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>

**MOOCSCOURSE:**

1. <https://www.mooc-list.com/tags/dbms-extensions>
2. [https://onlinecourses.nptel.ac.in/noc18\\_cs15/preview](https://onlinecourses.nptel.ac.in/noc18_cs15/preview)

## OBJECT ORIENTED PROGRAMMING THROUGH JAVA

**II-B.Tech I-Semester**

**Course Code: A1AM402PC**

**L T P C**

**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 and Runnable interface, Synchronization, Thread priorities, Inter Thread communication.

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

## **UNIT – V COLLECTION FRAMEWORK**

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

### **TEXT BOOKS:**

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

### **REFERENCE BOOKS:**

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

## DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION

**II-B.Tech II-Semester**

**Course Code: A1AM404ES**

**L T P C**

**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, Demultiplexer 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 Control Memory-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 Processor Arbitration, 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 Jersey.
3. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education

## OPERATING SYSTEMS

**II-B.Tech II-Semester**

**Course Code: A1AM404PC**

**L T P C**

**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, Dining 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**  
**Course Code: A1AM405PC**

**L T P C**  
**- - 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](http://www.cs.uic.edu/~jbell/course%20notes/operating%20systems)

## **DATABASE MANAGEMENT SYSTEMS LAB**

**II-B.Tech II-Semester**  
**Course Code: A1AM406PC**

**L T P C**  
**- - 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, Updating using 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.learn-db.com/databases/how-to-convert-er-diagram-to-relational-database>
2. [https://www.w3schools.com/sql/sql\\_create\\_table.asp](https://www.w3schools.com/sql/sql_create_table.asp)
3. [http://www.edugrabs.com/conversion-of-er-model-to-relational-model/?upm\\_export=print](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**  
**Course Code: A1AM407PC**

**L T P C**  
**- - 3 1.5**

### **COURSE OBJECTIVES:**

**The course should enable the students to learn:**

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

### **COURSE OUTCOMES:**

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

1. Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
2. Understand the use of different exception handling mechanisms and concept of multithreading for robust and efficient application development.
3. Understand and implement concepts on file streams and operations in java programming for a given application programs.
4. Develop java application to interact with database by using relevant software component (JDBC 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 empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

### **WEEK – 6 INTERFACES**

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

### **WEEK – 7 EXCEPTION HANDLING**

Write a program that reads two numbers Num1 and Num2. If Num1 and Num2 were not integers, 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, 4<sup>th</sup> Edition, 2007.
2. P. Radha Krishna, “Object Oriented Programming through Java”, Universities Press, 2<sup>nd</sup> Edition, 2007
3. Bruce Eckel, “Thinking in Java”, Pearson Education, 4<sup>th</sup> Edition, 2006.
4. Sachin Malhotra, Saurabh Chaudhary, “Programming in Java”, Oxford University Press, 5<sup>th</sup> Edition, 2010.

### **REFERENCE BOOKS:**

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

## GENDER SENSITIZATION

**II-B.Tech II-Semester**  
**Course Code: AIAM404MC**

**L T P C**  
**- - 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 asexuals.

### 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 on Gender”*, 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-abdul/>

**WEB REFERENCES:**

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

## **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>