ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS
SR20
(CHOICE BASED CREDIT SYSTEM (CBCS))

$$\textbf{1}$$

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING
For

B. Tech. - *Regular Four Year Degree Course*
(Applicable for the batches admitted from 2020- 21)

B. Tech. - *Lateral Entry Scheme*
(Applicable for the batches admitted from 2021-22)
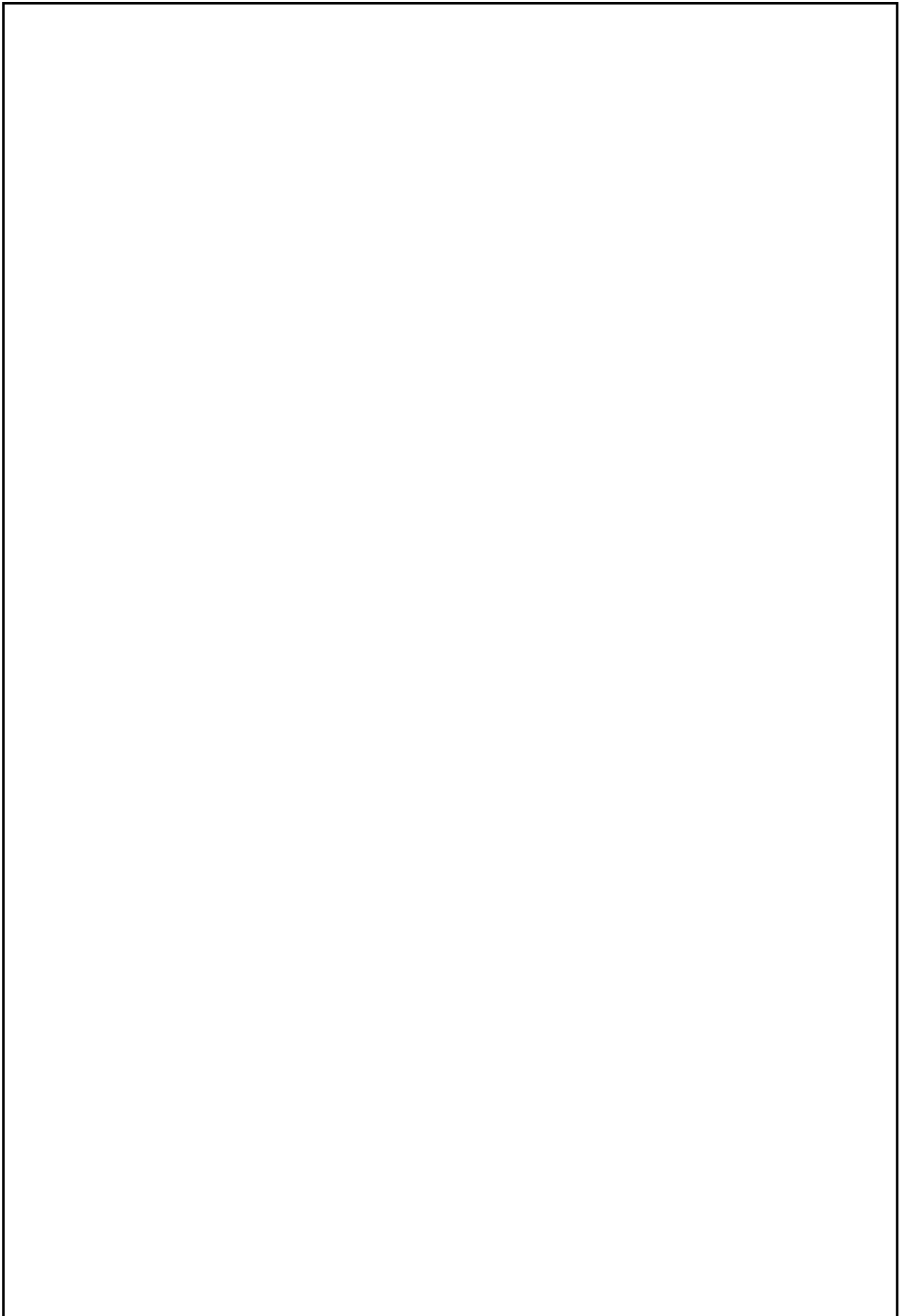### (I to II years Syllabus)

Giving Wings to Thoughts
St. Peter's Engineering College
(UGC - Autonomous)

Approved by AICTE, Affiliated to JNTUH, Accredited by NAAC & NBA

Maisammaguda, Dhullapally (V), Kompally Road, Ranga Reddy (Dist.), Hyderabad-500 100, Telangana State

B.Tech. - Regular Four Year Degree Program
(For batches admitted from the academic year 2020-21)
&
B.Tech. - Lateral Entry Scheme
(For batches admitted from the academic year 2021-22)

PREAMBLE

Institution is gearing up for several initiatives towards academic excellence, quality improvement and administrative reforms. In view of this priority and in-keeping with the Institute Vision and Mission process was already initiated towards introduction of semester system, grading system and credit system.

The above initiatives acquired further strength with University Grants Commission (UGC) guidelines, informing all the Universities/ Autonomous Colleges regarding UGC s new initiatives, on speedy and substantive academic and administrative reforms regarding higher education. Given this background St.Peter's Engineering College has framed this REGULATION-2020 and in short, it will be referred to as SR20.

Academic Programmes of the Institute are governed by rules and regulations approved by the Governing Body. The academic rules and regulations are applicable to the students admitted into four year undergraduate programmes offered by the college leading to Bachelor of Technology (B.Tech) degree from the academic year 2020-21 onwards and lateral entry students admitted from the academic year 2021-2022 onwards.

INSTITUTE VISION

VISION: To promote quality education accessible to all sections of the Society without any discrimination of caste, creed, color, gender and religion and help students to discover their true potential.

INSTITUTE MISSION

IM$_1$: To provide and equip stakeholders with knowledge and skills, social values and ethics, scientific attitude and orientations for lifelong learning.

IM$_2$: To create an environment conductive to inhabiting their total involvement and participation

IM$_3$: Provide infrastructure to arm the students with the competence to be at the forefront of cutting-edge technology and entrepreneurship in highly competitive global market.

INSTITUTE QUALITY POLICY: St. Peter's Engineering College strives to establish a system of quality assurance to continuously address, monitor and evaluate the quality of education offered to students, thus promoting effective teaching-learning processes for the benefits of our students and making our institution a centre of excellence for engineering and technological studies.

1. UNDER GRADUATE PROGRAMS OFFERED (E&T)

St.Peter's Engineering College, an autonomous college affiliated to JNTUH, offers 4 Year (8 Semesters) Bachelor of Technology (B.Tech.) Degree Programme, under Choice Based Credit System (CBCS) with effect from the Academic Year 2020 - 21 onwards, in the following Branches of Engineering:

(i) B.Tech. - Civil Engineering

(ii) B.Tech. - Electrical and Electronics Engineering

(iii) B.Tech. - Mechanical Engineering

(iv) B.Tech. - Electronics and Communication Engineering

(v) B.Tech - Computer Science and Engineering

(vi) B.Tech - Information Technology

(vii) B.Tech - Computer Science and Engineering
      [Artificial Intelligence & Machine Learning]

2.ADMISSION CRITERIA AND MEDIUM OF INSTRUCTION

2.1 Admission into first year of four year B.Tech. (Regular) Degree Programme:

2.1.1 Eligibility: A candidate seeking admission into the first year of four year B. Tech. Degree Programme should have:

i) Passed either Intermediate Public Examination (IPE) conducted by the Board of Intermediate Education,

Telangana, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination with Mathematics, Physics and Chemistry as optional subjects recognized by Board of Intermediate Education, Telangana.

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

2.1.2 Admission Procedure: Admissions are made into the first year of four year B.Tech. Degree   Programme as per the stipulations of the TSCHE.

(i)   Category A: 70% of the seats are filled through TSEAMCET counselling.

(ii)   Category B: 30% of the seats are filled by the Management.

2.2   Admission into the second year of four year B. Tech. (Regular) Degree Programme

  Under Lateral Entry Scheme.

2.2.1 Eligibility: A candidate seeking admission under Lateral Entry Scheme (LES) into the II year I Semester B. Tech. Regular Degree Programme should have passed the qualifying examination (B.Sc. Mathematics or Diploma in concerned course) and have secured a rank at Engineering Common Entrance Test TSECET (FDH). Admissions are made in accordance with the instructions received from the Convener, TSECET and Government of Telangana State.

2.2.2 Admission Procedure: Admissions are made into the II year of four year B.Tech. (Regular) Degree Programme through Convener, TSECET (FDH) against the sanctioned intake in each Programme of study as lateral entry student.

2.3   Branch Transfers: There shall be no Branch transfers after the completion of Admission Process.

2.4   Medium of Instruction: The Medium of Instruction and Examinations for the entire B.Tech. programme will be in English only.

3.   B.Tech. PROGRAMME STRUCTURE

3.1   Admitted under Four year B. Tech. (Regular) degree Programme:

A student after securing admission shall complete the B.Tech. Programme in a minimum period of four academic years (8 semesters), and a maximum period of eight academic years (16 semesters) starting from the date of commencement of first year first semester, failing which the student shall forfeit their seat in B.Tech course. Each student shall secure 160 credits (with SGPA ≥ 5 (each Semester) and CGPA ≥ 5) required for the completion of the under graduate programme and award of the B.Tech. Degree.

3.2   Admitted under Lateral Entry Scheme (LES) into B. Tech. degree Programme:

3.2.1   The LES students after securing admission shall pursue a course of study for not less than three academic years (6 Semesters) and not more than six academic years (12 Semesters), failing which the students shall forfeit their seat in B.Tech programme.

3.2.2   The student shall register for 122 credits and secure 122 credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree.

3.3   UGC / AICTE specified definitions / descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations / Norms, which are listed below:

3.3.1 Semester Scheme:

Each B.Tech. (Regular) Programme is of 4 Academic Years (8 Semesters) and B.Tech. (LES) Programme is of 3 Academic Years (6 Semesters)), with the academic year being divided into two semesters of 22 weeks (≥ 90 Instructional days per semester), each Semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)', Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and Curriculum / Course Structure as suggested by AICTE.

3.3.2 Credit Courses:

All Subjects / 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:

(i) One Credit - for One hour /Week / Semester for Theory / Lecture (L) Courses; or Tutorials

(ii) One Credit - for Two hours / Week / Semester for Laboratory / Practical (P) Courses

All Mandatory Courses, Industrial Visit, Guest Lecture, Tutorials, etc., will not carry any Credits.

(iii) All Value Added Courses in each semester carry 1 credit for two hours/week/semester except in I & II Semester of I B.Tech.

Mandatory Courses

Course Code	Course Name
AS20-00MC01	Environmental sciences
AS20-00MC02	Gender sensitization
AS20-00MC03	Constitution of India
AS20-00MC04	Professional ethics
AS20-00MC05	Artificial intelligence
AS20-00MC06	Cyber security

3.3.3 Subject / Course Classification and Nomenclature:

SPEC has followed almost all the guidelines specified by AICTE / UGC / JNTUH for the classification of all subjects / courses offered at B.Tech. Programme and are mentioned below.

Department of Artificial Intelligence & Machine Learning

S. No.	Broad Course Classification	Course Group / Category	Course Description	Range of Credits
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes - Mathematics, Physics and Chemistry Subjects	10%-15%
2		ES – Engg. Sciences	Includes fundamental engineering subjects.	15%-20%
3		HS – Humanities And Social Sciences	Includes subjects related Humanities, Social Sciences and Management.	5%-10%
4	Core Courses (CoC)	PC – Professional Core	Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.	30%-40%
5	Elective Courses (ElC)	PE – Professional Electives	Includes Elective subjects related to the Parent Discipline / Department /Branch of Engg.	5%-15%
6		OE – Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/ Department /Branch of Engg.	5%-10%
7	Core Courses	Project Work	B.Tech. Project or UG Project or UG Major Project.	5%-15%
8		Industrial Training / Mini- Project	Industrial Training/ Internship/ UG Mini-Project/ Mini-Project.	
9		Value Added Courses	Technical Training based on core contents related to Parent Discipline/ Department/ Branch of Engg.	
10	Mandatory Courses (MC)	Mandatory Courses (MC)	Mandatory Courses (non-credit)	-
Total Credits for UGP (B. Tech.) Programme				160 (100%)

4.   COURSE REGISTRATION

4.1 A 'faculty advisor or counselor' shall be assigned to a group of 15 students, who advises the student about the B.Tech. programme, its course structure and curriculum, choice / option for subjects / courses, based on his/her competence, progress, pre-requisites and interest.

  The academic section of the college invites 'registration forms' from students before the beginning of the semester through online submission, ensuring 'date and time stamping'. The online registration requests for any 'current semester' shall be completed before the commencement of SEEs (Semester End Examinations) of the 'preceding semester'.

4.2 A student can apply for online registration, only after obtaining the 'written approval' from his faculty advisor or counselor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with Head of the Department, faculty advisor and the student.

4.3 Subject / course options exercised through online registration are final and cannot be changed or inter-changed; further, alternate choices will not be considered. However, if the subject / course that has already been listed for registration by Head of the 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.

4.4 **Open electives:** Students have to choose one open elective wherever offered from the list of open electives given for their stream. However, student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

4.5 **Professional electives:** Students have to choose professional elective wherever offered from the list of professional electives given. However, students may opt for professional elective subjects offered in the related area.

4.6 **Mandatory Courses (Non-Credit):** All mandatory courses where ever offered require prior registration.

4.7 **Value Added Courses:** Students have to choose one value added course in each semester (2-1 to 3-2) wherever offered from the list of value added courses given for their stream. In 4-1 a value added course is common to all the departments and is mandatory.

5. SUBJECTS / COURSES TO BE OFFERED

A subject/course may be offered to the students, if only a minimum 1/3 of students register to the course.

i) More than one faculty member 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 'first come first serve basis and CGPA criterion' (i.e. the first focus shall be on early on-line entry from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

ii) If more entries for registration of a subject come into picture, then the concerned Head of the Department shall take necessary decision, whether or not to offer such a subject / course for two (or multiple) sections.

6. ATTENDANCE REQUIREMENTS

6.1 A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum 75% of attendance in aggregate (excluding the days of midterm examinations) for all the subjects / courses (excluding attendance in mandatory courses) in that semester.

6.2 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. A stipulated fee shall be payable towards

condoning of shortage of attendance. Shortage of attendance below 65% in aggregate shall in no case be condoned.

6.3 Students whose shortage of attendance is not condoned in any semester are not eligible to take the end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those subjects registered in that semester in which student was detained, by seeking re-admission into that semester as and when offered; in case the there are any professional electives and / or open electives, the same may also be re-registered, if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the same set of elective subjects offered under that category.

6.4 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

7. ACADEMIC REQUIREMENTS

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no. 6.

7.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course, if the student secures not less than 35% marks in the semester end examination (SEE), and a minimum of 40% of marks in the sum total of the Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) taken together; in terms of letter grades, this implies securing C grade or above in that subject / course.

7.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to industry oriented mini-project, if the student secures not less than 40% of the total marks.

The student would be treated as failed, if student

(i) If the student does not submit a report on his industry oriented mini-project before the evaluation committee as per the schedule,

(ii) secures less than 40% of marks in industry oriented mini-project evaluations.

Student may reappear once for each of the above evaluations, when they are scheduled again; if he fails in such 'one re-appearance' evaluation also, student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.3   Promotion Rules
7.3.1   Four year B.Tech. (Regular):

Sl. No.	Promotions	Conditions to be fulfilled
1.	First year first semester to first year second semester	Regular course of study of first year first semester
2.	First year second semester to second year first semester	(i) Regular course of study of first year second semester. (ii) Must have secured at least 19 credits out of 38 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester to second year second semester	Regular course of study of second year first semester.
4.	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 47 credits out of 79 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5.	Third year first semester to third year second semester	Regular course of study of third year first semester.
6.	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 72 credits out of 120 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7.	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

7.3.2 Four year B.Tech. (LES):

S. No.	Promotion	Conditions to be fulfilled
1.	Second year first semester to second year second semester	Regular course of study of second year first semester.
2.	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 25 credits out of credits i.e., 60% credits up to second year secon semester from all the relevant regular a supplementary examinations, whether the stude takes those examinations or not.
3.	Third year first semester to third year second semester	Regular course of study of third year first semeste
4.	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 49 credits out of credits i.e., 60% credits up to third year secon semester from all the relevant regular a supplementary examinations, whether the stude takes those examinations or not.
5.	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semest

7.4   A student has to register for all subjects covering 160 credits (122 credits in case of LES) as specified and listed (with the relevant course / subject classifications as mentioned) in the course structure, fulfill all the attendance and academic requirements for 160 credits (122 credits in case of LES) securing a minimum of 'C' grade or above in each subject, and 'earn all 160 credits (122 credits in case of LES) securing SGPA 5.0 (in each semester), and CGPA (at the end of each successive semester) 5.0, to successfully complete the under graduate programme.

7.5   A student eligible to appear in the semester end examination for any subject / course, but absent from it

or failed (thereby failing to secure 'C' grade or above) may reappear for that subject / course in the supplementary examination as and when conducted. In such cases, internal marks (CIE) assessed earlier for that subject / course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that subject.

7.6 A student detained in a semester due to shortage of attendance may be re-admitted when the same semester is offered in the next academic year for fulfillment of academic requirements. The academic regulations under which the student has been readmitted shall be applicable. However, no grade allotments or SGPA / CGPA calculations will be done for the entire semester in which student has been detained.

7.7 A student detained due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits. The academic regulations under which the student has been readmitted shall be applicable.

8. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

8.1 The performance of a student in each semester shall be evaluated subject-wise / course-wise (irrespective of credits assigned) with a maximum of 100 marks. These evaluations shall be based on 30 marks allotted for CIE (Continuous Internal Evaluation) and 70 marks for SEE (Semester End Examination), and a letter grade corresponding to the percentage of marks obtained shall be given.

8.2 Evaluation of Theory Subjects / Courses

A) **Continuous Internal Evaluation:** For each theory subject, during the semester, there shall be 2 mid-term examinations of 30 marks each. Each mid-term examination consists of Descriptive paper for 25 marks and assignment for 5 marks and the average of the two mid-term examinations marks shall be taken as the final marks.

I. 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. Each Internal Examination is conducted for 30 marks.

II. The Descriptive paper shall be conducted for duration of 1 hour and 30 Minutes. Each descriptive paper consists of three compulsory questions (May contain Sub Questions carrying 2/3/5/10 marks) each with internal choice covering the prescribed syllabus.

1. Unit 1(10 Marks)
2. Unit 2(10 Marks)
3. Unit 3(5 Marks)
   Total = 25 Marks

III. First assignment (One video from each(1,2,3)Units) should be submitted before the commencement of the first mid-term examinations, and the second assignment(One video from each(3,4,5)Units) should be submitted before the commencement of the second mid-term examinations. Five Marks for each Assignment.

Assignment 1(Videos Submission)

Unit 1 – 2 Marks, Unit 2 – 2 Marks, Unit 3 – 1 Mark.

Assignment 2(Videos Submission)

Unit 3 – 1 Mark, Unit 4 – 2 Marks, Unit 5 – 2 Marks.

The marks secured by the student in I and II Internal examinations are considered and the AVERAGE of the two Internal examinations shall be taken as the final marks secured by the student towards Continuous Internal Evaluation in the theory subject. If he/she is absent for any test, he/she will be awarded zero marks for that test.

B) Semester End Examinations:

The duration of SEE is 3 hours. The details of the question paper pattern are as follows:

• The end semester examinations will be conducted for 70 marks consisting of two parts viz.

i) Part- A for 20 marks, ii) Part - B for 50 marks.

- Part-A is compulsory question which consists of ten questions (two from each unit) carry 2 marks each.

- Part-B consists of five questions carrying 10 marks each. One question from each unit (may contain sub-questions) with internal choice.

8.3   **Evaluation of Practical Subjects / Courses:** In any semester, a student has to complete all the experiments / exercises in each laboratory course and get the record certified by the concerned Head of the Department to be eligible for Semester End Examination. For practical subjects, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 30 internal marks and 70 marks for Semester End Examination (SEE). The semester end examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the clusters of colleges which are decided by the examination branch of the Parent Institution.

C)   **Continuous Internal Evaluation (CIE):** Out of the 30 marks, 15 marks are allocated for day- to-day work evaluation and 10 Marks for Lab Examination and 5 marks for Viva voce which will be conducted by the faculty (Subject Experts Nominated by HoD) for a duration of two hours and the best of the two mid-term examinations is taken into account.

Absence in Laboratory Internal Examinations:

If any student is absent in both the laboratory internal examinations on health grounds for any valid reasons approved by the college academic committee, only one test shall be conducted on all experiments and the marks secured out of 30 marks shall be divided by two, which shall be awarded against the said laboratory Internal Evaluation.

D)   **Semester End Examination (SEE):** The SEE for practical subject / course shall be conducted at the end of the semester with a duration of 3 hours by one internal and one external examiner appointed by the Head of the

Institution as per the recommendation of the concerned Head of the Department.

8.4   Evaluation of Design / Drawing Subjects / Courses: For the subjects such as Engineering Graphics, Machine Drawing and estimation, the distribution shall be 30 marks for CIE (15 marks for day-to-day work and 15 marks for internal examination) and 70 marks for SEE. There shall be two internal examinations in a semester and the average of the two shall be considered for the award of marks for internal examinations. For subjects like Engineering Graphics/Engineering Drawing, the SEE shall consist of five questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions. There shall be no Part – A, and Part – B system.

8.5   Evaluation of Major Project: Out of a total of 100 marks for the major project work, 30 marks shall be for Internal Evaluation and 70 marks for the End Semester evaluation. The End Semester evaluation (viva-voce) shall be conducted by committee. The committee consists of an external examiner, Head of the Department, the supervisor of project and a senior faculty member of the department. The topics for industry oriented mini project, and project work shall be different from each other. The evaluation of project work shall be conducted at the end of the IV year II Semester. The Departments have to evolve rubrics for evaluation of Project work. The marks may be distributed among various components like selection of topic, problem statement, literature review, methodology, oral and written presentation of the work done and performance in viva-voce examination.

8.6   Evaluation of Mandatory Non-Credit Courses:

For Non Credit subjects the distribution shall be 100 marks for the Semester End- Examination (SEE). The Semester End Examination will be conducted for 100 marks. The question paper consists of 8 questions where each question should contain a/b or a/b/c or a/b/c/d from different units. Out of 8 questions any 5 questions

should be answered carrying 20 marks each. A Student must secure minimum 40 marks to pass.

For non credit courses, 'Satisfactory' or "Not Satisfactory" is indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

8.7 Evaluation of Value Added Courses

Students have to submit a project by the end of the semester, which will be evaluated by the Project Review Committee consisting of Head of the Department, a Senior Faculty of the department and concerned faculty of that Course and the Project will be evaluated for 75 marks in which 50 marks are allotted by evaluating the submitted project and 25 marks is considered as internal review marks. Remaining 25 marks are obtained by conducting Quiz (Multiple Choice Questions) during the Internal I & II Examinations and the average is considered.

8.8 MOOCs/SWAYAM Courses:

Meeting with the global requirements, to inculcate the habit of self learning and in compliance with UGC guidelines, MOOC (Massive Open Online Course) courses have been introduced as electives. The proposed MOOCs courses would be additional choices in all the elective groups subject to the availability during the respective semesters and respective departments will declare the list of the courses at the beginning of the semester. Course content for the selected MOOCs courses shall be drawn from respective MOOCs links or shall be supplied by the department. Evaluation of the Course shall be done by the provider. Student has to submit the certificate of MOOCs given from the provider.

If a student fails in the MOOCs Examination conducted by Provider then the student may be allowed to write Supplementary Examination in the subsequent semester wherein the evaluation and Assessment will be done by the Parent Institution.

There shall be one Mid Sessional Examination (30 marks) obtained from the Assignment of the NPTEL/SWAYAM Course ,semester end evaluation (Descriptive exam for

70 marks) shall be done along with the other regular courses by the parent Institution. Three credits will be awarded upon successful completion of each MOOCs course. Students who are interested to do MOOCs courses need to register at their department office by the start of the semester against the courses that are announced by the department.

9. GRADING PROCEDURE

9.1 Marks will be awarded to indicate the performance of each student in each theory subject, lab/practical's, design/drawing practice, industry oriented mini-project and major project. Based on the percentage of marks obtained in Continuous Internal Evaluation plus Semester End Examination, both taken together, as specified in item 8 above, a corresponding letter grade shall be given.

9.2 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+ (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+ (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

9.3   A student obtaining 'F' grade in any subject shall be considered 'failed' and will be required to reappear as 'supplementary student' 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.

9.4   A letter grade does not imply any specific % of marks.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 if he is detained.

9.5   A student earns grade point (GP) in each subject/course, on the basis of the letter grade obtained by him in that subject/course (excluding mandatory non-credit courses). Then the corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/course.

Credit Points (CP) = Grade Point (GP) x Credits

9.6   The student passes the subject/course only when he gets GP 5 (C grade or above).

9.7   The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (SðCP) secured from all subjects / courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to two decimal places. SGPA is thus computed as

SGPA = $\{ \sum_{i=1}^{N} Ci\ Gi \} / \{ \sum_{i=1}^{N} Ci \}$ …. 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 i[th] Subject, and G_i represents the grade points (GP) corresponding to the letter grade awarded for that i[th] subject.

9.8 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

$$\text{CGPA} = \left\{ \sum_{j=1}^{N} C_j\, G_j \right\} / \left\{ \sum_{j=1}^{N} C_j \right\}$$ .... for all S Semesters registered

where 'N' is the total no. of subjects (as specifically required and listed under the course structure of the parent department) the student has 'registered' from the 1st semester onwards upto 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 j^{th} 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.

Illustration of calculation of SGPA

Course/ Subject	Credits	Letter Grade	Grade Point	Credits Points
Course 1	3	A	8	3 X 8 = 24
Course 2	3	B+	7	3 X 7 = 21
Course 3	3	B	6	3 X 6 = 18
Course 4	3	A	8	3 X 8 = 24
Course 5	3.5	C	5	3.5 X 5 = 17.5
Course 6	1.5	A	8	1.5 X 8 = 12
Course 7	1.5	O	10	1.5 X 10 =15
Course 8	2	O	10	2 X 10 = 20
	20.5			154.5

SGPA = 154.5/20.5 = 7.53

Illustration of calculation of CGPA

Semester	Credits	SGPA	Credits * SGPA
Semester 1	20.5	7.24	20.5 X 7.24 = 148.42
Semester 2	17.5	6.48	17.5 X 6.48 = 113.4
Semester 3	20.5	7.43	20.5 X 7.43 = 152.315
Semester 4	20.5	8.21	20.5 X 8.21 = 168.305
Semester 5	20.5	7.65	20.5 X 7.65 = 156.825
Semester 6	20.5	6.42	20.5 X 6.42 =131.61
Semester 7	21	7.75	21 X 7.75 = 162.75
Semester 8	19	8.25	19 X 8.25 = 156.75
Total Credits	160	Total	1190.375

CGPA = 1190.375/160 = 7.43

9.9 For merit ranking or comparison purposes or any other listing, only the 'rounded off' values of the CGPAs will be used.

9.10 For calculations listed in Item 9.6–9.10, 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.

10 PASSING STANDARDS

10.1 A student shall be declared 'successful' or 'passed' in a semester, if the student secures a GP $\geq$5 ('C' grade or above) in every subject/course in that semester (i.e. when student gets an SGPA 5.00 at end of that particular semester); and a student shall be declared 'successful' or 'passed' in the entire under graduate programme, only when he/she gets a CGPA 5.00 for the award of the degree as required.

10.2 A Student shall be declared 'successful' or 'passed' in any non-credit subject/ course, if he secures a ' Certificate' for that mandatory course.

After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the

registered students of that semester, indicating the letter grades and credits earned. it will show the details of the courses registered (course code, title, no. of credits, grade earned etc.), credits earned, SGPA, and CGPA.

11 DECLARATION OF RESULTS

11.1 Computation of SGPA and CGPA are done using the procedure listed in 9.6– 9.9.

11.2 For Final percentage of marks equivalent to the computed final CGPA, the following formula may be used:

Percentage of Marks = (final CGPA – 0.5) x 10

12 AWARD OF DEGREE

12.1 After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. degree he shall be placed in one of the following four classes based on CGPA:

Class Awarded	Grade to be Secured	Remarks
First Class with Distinction	> 8 CGPA	From the aggregate marks secured from
First Class	≥6.5 to < 8 CGPA	160 Credits for
Second Class	≥5.5 to<6.5CGPA	Regular Students
Pass Class	≥5.0to<5.5CGPA	and144 Credits for
FAIL	CGPA < 5	Lateral Entry Students.

12.2 First class with distinction will be awarded to those students who clear all the subjects in single   attempt during his / her regular course of study by fulfilling the following conditions:

(i) Should have passed all the subjects/courses in 'first appearance' within the first 4 academic years (or 8 sequential semesters) for B.Tech. (Regular) and first 3 academic years (or 6 sequential semesters) for B.Tech. (LES) from the date of commencement of first year first semester for B.Tech. (Regular) and II year I semester for B.Tech. (LES).

(ii) Should have secured a CGPA e•8.00, at the end of each of the 8 sequential semesters (6 sequential semesters for LES), starting from I year I semester (starting from II year I semester for LES) onwards.

(iii) Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason, shall be placed in 'first class with distinction'.

12.3 Award of Medals: Students fulfilling the conditions listed under item 12.2 alone will be eligible for award of 'College Ranks' and 'Medals'.

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

12.5 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 transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

13. WITH HOLDING OF RESULTS

If the student has not paid the fee to college at any stage, or has dues pending against his/her name due to any reason what so ever, or if any case of indiscipline is pending against him/her, the result of the student may be withheld, and he/she will not be allowed to go into the next higher semester.

14. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations for odd semester subjects will be conducted along with even semester regular examinations and vice versa.

15. TRANSITORY REGULATIONS

A. For students detained due to shortage of attendance:

1. A Student who has been detained in I year of R18 Regulations due to lack of attendance, shall be permitted to join I year I semester of SR20 Regulations and he is required to complete the study of B.Tech. programme

within the stipulated period of eight academic years from the date of first admission in I Year.

2. A student, who has been detained in any semester of II, III and IV years of R18 regulations for want of attendance, shall be permitted to join the corresponding semester of SR20 regulations and is required to complete the study of B.Tech. within the stipulated period of eight academic years from the date of first admission in I Year. The SR20 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester.

See rule (C) for further Transitory Regulations.

B. For students detained due to shortage of credits:

A student of R18 Regulations, who has been detained due to lack of credits, shall be promoted to the next semester of SR20 Regulations only after acquiring the required credits as per the corresponding regulations of his/her first admission. The student is required to complete the study of B.Tech. within the stipulated period of eight academic years from the year of first admission. The SR20 Academic Regulations are applicable to a student from the year of readmission o n ward s .

See rule (C) for further Transitory Regulations.

C. For readmitted students in R18 Regulations:

1. A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.

2. The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including SR20 Regulations. The performance evaluation of the student will be done after the exemption of two subjects if total credits acquired are d•206, three subjects if total credits acquired are > 206 (see R16 Regulations for exemption details).

3. If a student readmitted to SR20 Regulations, has any subject with 80% of syllabus common with his/her

previous regulations, that particular subject in R18 Regulations will be substituted by another subject to be suggested by the SPEC Academic Council.

Note: If a student readmitted to SR20 Regulations, has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in SR20 Regulations, the Principal shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

D. Promotion Rule: Where the credits allotted to a semester/year under the regulations studied in are different from that under SR20 regulations for the corresponding semester/year, the promotion rules of SR20 vide section 7.3 shall be applied after normalization. Normalization is done by scaling down or up the number of credits of a semester/year under the previous regulations to equal the number of credits of the corresponding semester/year under SR20 regulations and revising the secured credits also in the same proportion.

16 STUDENT TRANSFERS

There shall be no transfers from other colleges/streams.

17 RULES OF DISCIPLINE

17.1 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.

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

17.3 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).

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

18. MALPRACTICE

18.1 Malpractice Prevention Committee: A malpractice prevention committee shall be constituted to examine and punish the student who does malpractice / behaves indiscipline in examinations.

The committee shall consist of:

a) Controller of Examinations - Chairman

b) Addl. Controller of Examinations.- Convener

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 and submit the report to Head of the Institution.

18.2 Malpractice Rules: Disciplinary Action for Improper Conduct in Examinations

S. No.	Nature of Malpractices/ Improper Conduct	Punishment
1(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the can-didate 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.
1(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 the 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 caseis 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 theAcademic 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 writesto the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6	Refuses to obey the orders of the 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,	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.

	or indulges in any other act of mis-conduct or mischief which result in damage to or destruction of property in the exami-nation 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 con-duct of the examination.	
7	Leaves the exam hall taking away answer script or intentionally tears off 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 exami-nations 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 examination. 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 the /a 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 cance- llation 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 perform- ance in that subject and all other subjects the candidate has appeared including practical exami- nations and project work of that semester/year exami- nations.
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.	

19. SCOPE

i)   The Academic Regulations should be read as a whole, for the purpose of any interpretation.

ii)   The above mentioned rules and regulations are applicable in general to both B.Tech. (Regular) and B.Tech. (LES), unless and otherwise specific.

iii) 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.

20. REVISION AND AMENDMENTS TO REGULATIONS

The Academic Council may revise or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the dates notified by the Academic Council.

....

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING CURRICULUM

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING VISION AND MISSION

VISION

To emerge as a centre for computer technology meeting the needs of society.

MISSION

DM1. To provide quality education towards academic and industry requirements.

DM2. To offer state-of-art infrastructure for research and professional skill development through value added programs.

DM3. To promote student centric activities that encourages interpersonal skills.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO: 1 Learn and Integrate
Graduates shall apply knowledge to solve computer science and allied engineering problems with continuous learning.

PEO: 2 Think and Create
Graduates are inculcated with a passion towards higher education and research with social responsibility.

PEO: 3 Communicate and Organize
Graduates shall pursue career in industry, empowered with professional and interpersonal skills.

PROGRAM OUTCOMES (POs)

1. **ENGINEERING KNOWLEDGE:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **PROBLEM ANALYSIS:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **DESIGN/DEVELOPMENT OF SOLUTIONS:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public

health and safety, and the cultural, societal, and environmental considerations.

4. **CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **MODERN TOOL USAGE:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **THE ENGINEER AND SOCIETY:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **ENVIRONMENT AND SUSTAINABILITY:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **ETHICS:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **INDIVIDUAL AND TEAM WORK:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **COMMUNICATION:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions.

11. **PROJECT MANAGEMENT AND FINANCE:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **LIFE-LONG LEARNING:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcome's (PSOs):

PSO 1. APPLICATIONS OF COMPUTING DOMAIN AND RESEARCH :

Able to use the professional , managerial, interdisciplinary skill set, and domain specific tools, in development processes, identify the research gaps, and provide innovative solutions to them.

PSO 2. COMPETITIVE APPLICATIVE:

An ability to succeed in competitive examinations like GATE, TOEFL,GRE etc.

GENERAL, COURSE STRUCTURE & THEME & SEMESTER-WISE CREDIT DISTRIBUTION

SR 20

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credits
3 Hours Practical (Lab)/week	1.5 credit

B. Range of credits - A total of 160 credits are required for a student to be eligible to get Under Graduate degree in Engineering.

C. Structure of Undergraduate Engineering program:

S.No.	Category	Code	Break up of Credits
1	Humanities and Social Sciences including Management courses	HSMC	13
2	Basic Science courses	BSC	17.5
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/ computer etc	ESC	32
4	Professional core courses	PC	55.5
5	Professional Elective courses relevant to chosen specialization/ branch	PE	15
6	Open subjects – Electives from other technical and /or emerging Subjects	OE	12
7	Project work, seminar, value added courses and internship in industry or elsewhere	PW	15
8	Mandatory Courses[Environmental Sciences, Gender Sensitization, Constitution of India, Professional Ethics, Artificial Intelligence, Cyber Security]	MC	(non-credit)
	Total		160

I. Semester-wise structure of curriculum

[L= Lecture, T = Tutorials, P = Practicals & C = Credits]

COURSE CODE	COURSE TITLE	COURSE AREA	HOURS/WEEK			CREDIT	Internal Marks	External marks	Total Marks
			L	T	P				
I BTECH I SEM									
AS20-00BS06	LINEAR ALGEBRA AND ADVANCED CALCULUS	BSC	3	1	-	3	30	70	100
AS20-00BS08	APPLIED PHYSICS	BSC	3	1	-	3	30	70	100
AS20-05ES01	PROGRAMMING FOR PROBLEM SOLVING	ESC	3	1	-	3	30	70	100
AS20-02ES01	BASIC ELECTRICAL ENGINEERING	ESC	3	1	-	3	30	70	100
AS20-03ES02	ENGINEERING GRAPHICS AND DESIGN	ESC	2	-	3	3.5	30	70	100
PRACTICAL COURSES									
AS20-00BS09	APPLIED PHYSICS LAB	BSC	-	-	3	1.5	30	70	100
AS20-05ES02	PROGRAMMING FOR PROBLEM SOLVING LAB	ESC	-	-	3	1.5	30	70	100
AS20-03ES04	ENGINEERING PRACTICES	ESC	-	-	4	2	30	70	100
VALUE ADDED COURSE									
AS20-00HS03	SOFT SKILLS-I	HSMC	3	0	0	0	-	100	100
						TOTAL 17.5			
I BTECH II SEM									
COURSE CODE	COURSE TITLE	COURSE AREA	L	T	P	CREDIT	Internal Marks	External marks	Total Marks
AS20-00BS01	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	BSC	3	1	-	3	30	70	100
AS20-00BS02	ENGINEERING CHEMISTRY	BSC	3	1	-	3	30	70	100
AS20-05ES03	DATA STRUCTURES THROUGH C++	ESC	3	1	-	3	30	70	100
AS20-04ES01	ELECTRONIC DEVICES & CIRCUITS	ESC	3	1	-	3	30	70	100
AS20-00HS01	ENGLISH	ESC	2	-	-	2	30	70	100
PRACTICAL COURSES									
AS20-05ES04	DATA STRUCTURES THROUGH C++ LAB	ESC	-	-	3	1.5	30	70	100
AS20-00HS02	ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB	HSMC	-	-	3	1.5	30	70	100
AS20-00BS03	ENGINEERING CHEMISTRY LAB	BSC	-	-	4	2	30	70	100
VALUE ADDED COURSE									
AS20-00HS04	SOFT SKILLS -II	HSMC	3	0	0	0		100	100
						TOTAL 20.5			

COURSE CODE	COURSE TITLE	COURSE AREA	HOURS/WEEK			CREDIT	Internal Marks	External marks	Total Marks
			L	T	P				
II BTECH I SEM									
AS20-00BS10	PROBABILITY AND RANDOM PROCESSES	BSC	3	1	0	3	30	70	100
AS20-05ES05	COMPUTER ARCHITECTURE	ESC	3	0	0	3	30	70	100
AS20-04ES06	DIGITAL ELECTRONICS	ESC	3	1	0	3	30	70	100
AS20-05PC12	COMPUTER NETWORKS	PCC	3	1	0	3	30	70	100
AS20-13PC01	INTRODUCTION TO UAV SYSTEMS & DRONES	PCC	3	1	0	3	30	70	100
PRACTICAL COURSES									
AS20-05ES06	IT WORKSHOP LAB	ESC	0	0	3	1.5	30	70	100
AS20-04ES07	DIGITAL ELECTRONICS LAB	ESC	0	0	3	1.5	30	70	100
AS20-05PC14	COMPUTER NETWORKS LAB	PCC	0	0	3	1.5	30	70	100
MANDATORY COURSE									
AS20-00MC02	GENDER SENSITISATION	MC	3	0	0	0		100	100
VALUE ADDED COURSE									
AS20-12PW01	IOT (PROJECT) – IN HOUSE INTERFACING WITH ARDUINO AND RASPBERRY PI	PW	0	0	2	1	-	100	100
AS20-13PW01	ROBOTICS & ITS APPLICATION	PW	0	0	2	1	-	100	100
AS20-12PW02	GRAPHIC DESIGN (PHOTOSHOP, CORAL DRAW, 3D MAX)	PW	2	0	0	1	-	100	100
AS20-05PW01	PROJECT BASED LEARNING JAVA	PW	0	0	2	1	-	100	100
AS20-05PW02	PROJECT BASED LEARNING C++	PW	0	0	2	1	-	100	100
					TOTAL	20.5			

Department of Artificial Intelligence & Machine Learning

II BTECH II SEM									
COURSE CODE	COURSE TITLE	COURSE AREA	HOURS/WEEK			CREDIT	Internal Marks	External marks	Total Marks
			L	T	P				
AS20-00HS07	UNIVERSAL HUMAN VALUES II	HSMC	3	1	0	3	30	70	100
AS20-05PC04	DATABASE MANAGEMENT SYSTEMS	PCC	3	1	0	3	30	70	100
AS20-12PC03	PRINCIPLES OF OPERATING SYSTEMS	PCC	3	1	0	3	30	70	100
AS20-13PC02	INTRODUCTION TO IOT	PCC	3	1	0	3	30	70	100
AS20-13PC03	ARTIFICIAL INTELLIGENCE FOR ROBOTICS	PCC	3	1	0	3	30	70	100
PRACTICAL COURSES									
AS20-05PC08	DATABASEMANAGEMENT SYSTEMSLAB	PCC	0	0	3	1.5	30	70	100
AS20-13PC04	IOT LAB	PCC	0	0	3	1.5	30	70	100
AS20-13PC05	ARTIFICIAL INTELLIGENCE FOR ROBOTICS LAB	PCC	0	0	3	1.5	30	70	100
MANDATORY COURSE									
AS20-00MC01	ENVIRONMENTAL SCIENCES	MC	3	0	0	0	-	100	100
VALUE ADDED COURSE									
AS20-13PW02	INNOVATIVE PROJECT DEVELOPMENT	PW	0	0	2	1		100	100
AS20-13PW03	VIRTUAL REALITY	PW	0	0	2	1		100	100
AS20-05PW04	ANDROID APP DEVELOPMENT	PW	0	0	2	1		100	100
AS20-04PW05	INTRODUCTION TO MATLABAND ITS APPLICATIONS	PW	0	0	2	1		100	100
AS20-04PW07	EMBEDDED SYSTEM DESIGN USING ADVANCED PROCESSORS	PW	0	0	2	1		100	100
					TOTAL	20.5			

COURSE CODE	COURSE TITLE	COURSE AREA	HOURS/WEEK			CREDIT	Internal Marks	External marks	Total Marks
			L	T	P				
AS20-13PC06	PROGRAMMING FOR ROBOTICS	PCC	3	1	0	3	30	70	100
AS20-13PC07	INTRODUCTION TO CRYPTOGRAPHIC FUNDAMENTALS	PCC	3	1	0	3	30	70	100
AS20-12ES02	EMBEDDED SYSTEMS	ESC	3	1	0	3	30	70	100
AS20-13OE1X	OPEN ELECTIVE -1	OE	3	0	0	3	30	70	100
AS20-13PE1X	PROFESSIONAL ELECTIVE –I	PE	3	1	0	3	30	70	100
PRACTICAL COURSES									
AS20-13PC08	PROGRAMMING FOR ROBOTICS LAB	PCC	0	0	3	1.5	30	70	100
AS20-13PC09	INTRODUCTION TO CRYPTOGRAPHIC FUNDAMENTALS LAB	PCC	0	0	3	1.5	30	70	100
AS20-00HS05	ADVANCED ENGLISH COMMUNICATION SKILLS LAB	HSMC	0	0	3	1.5	30	70	100
MANDATORY COURSES									
AS20-00MC03	CONSTITUTION OF INDIA	MC	3	0	0	0	100		100
AS20-00MC05	ARTIFICIAL INTELLIGENCE	MC	3	0	0	0	100		100
VALUE ADDED COURSES									
AS20-00HS10	APTITUDE SKILLS	HSMC	0	0	2	1		100	
AS20-00HS11	START-UP MANAGEMENT	HSMC	0	0	2	1		100	
AS20-00HS12	ERP TOOLS	HSMC	0	0	2	1		100	
					TOTAL	20.5			

III BTECH I SEM

Department of Artificial Intelligence & Machine Learning

COURSE CODE	COURSE TITLE	COURSE AREA	HOURS/WEEK L	HOURS/WEEK T	HOURS/WEEK P	CREDIT	Internal Marks	External marks	Total Marks
	III BTECH II SEM								
AS20-00HS06	BUSINESS ECONOMICS AND FINANCIAL ANALYSIS	HSMC	3	1	0	3	30	70	100
AS20-13PC10	CLOUD COMPUTING	PCC	3	1	0	3	30	70	100
AS20-13PC11	BIG DATA ANALYTICS	PCC	3	1	0	3	30	70	100
AS20-13PE2X	PROFESSIONAL ELECTIVE –II	PE	3	1	0	3	30	70	100
AS20-13OE2X	OPEN ELECTIVE –II	OE	3	0	0	3	30	70	100
PRACTICAL COURSES									
AS20-13PC12	CLOUD COMPUTING LAB	PCC	0	0	3	1.5	30	70	100
AS20-13PC13	BIG DATA ANALYTICS LAB	PCC	0	0	3	1.5	30	70	100
AS20-13PC14	ARTIFICIAL NEURAL NETWORKS LAB	PCC	0	0	3	1.5	30	70	100
MANDATORY COURSES									
AS20-00MC04	PROFESSIONAL ETHICS	MC	3	0	0	0	100		100
AS20-00MC06	CYBER SECURITY	MC	3	0	0	0	100		100
VALUE ADDED COURSES									
AS20-05PW04	WEB PRODUCT DEVELOPMENT	PW	0	0	2	1		100	100
AS20-12PW04	3D PRINTING DESIGN	PW	0	0	2	1		100	100
AS20-13PW04	DRONE APPLICATIONS	PW	0	0	2	1		100	100
AS20-13PW05	AI APPLICATION IN HEALTH CARE	PW	0	0	2	1		100	100
AS20-05PW05	ETHICAL HACKING	PW	0	0	2	1		100	100
					TOTAL	20.5			

COURSE CODE	COURSE TITLE	COURSE AREA	L	T	P	CREDIT	Internal Marks	External marks	Total Marks
**IV BTECH I SEM**									
AS20-13PC15	FOUNDATIONS OF DATA SCIENCE	PCC	3	1	0	3	30	70	100
AS20-05PC19	MACHINE LEARNING	PCC	3	1	0	3	30	70	100
AS20-13PC16	COMPUTER AIDED MANUFACTURING	HSMC	3	0	0	3	30	70	100
AS20-13PE3X	PROFESSIONAL ELECTIVE-III	PE	3	1	0	3	30	70	100
AS20-13OE3X	OPEN ELECTIVE -III	OE	3	0	0	3	30	70	100
PRACTICAL COURSES									
AS20-05PC22	MACHINE LEARNING LAB	PCC	0	0	3	1.5	30	70	100
AS20-13PC17	COMPUTER AIDED MANUFACTURING LAB	PCC	0	0	3	1.5	30	70	100
AS20-13PW06	MINI PROJECT	PW	0	0	4	2	30	70	100
VALUE ADDED COURSE									
AS20-00HS13	INTERVIEW SKILLS	HSMC	0	0	2	1		100	100
TOTAL 21									

COURSE CODE	COURSE TITLE	COURSE AREA	L	T	P	CREDIT	Internal Marks	External marks	Total Marks
**IV BTECH II SEM**									
AS20-13OE4X	OPEN ELECTIVE – IV	OE	3	0	0	3	30	70	100
AS20-13PE4X	PROFESSIONAL ELECTIVE -IV	PE	3	1	0	3	30	70	100
AS20-13PE5X	PROFESSIONAL ELECTIVE –V	PE	3	1	0	3	30	70	100
AS20-13PW07	PROJECT WORK	PW	0	0	24	10	30	70	100
TOTAL						19			

LIST OF PROFESSIONAL ELECTIVES						
COURSE CODE	**COURSE TITLE**	**COURSE AREA**	**HOURS/WEEK**			**CREDIT**
			L	**T**	**P**	
PROFESSIONAL ELECTIVE - I						
AS20-13PE11	MOBILE COMPUTING	PE	3	1	0	3
AS20-13PE12	NETWORK PROGRAMMING	PE	3	1	0	3
AS20-13PE13	COMPUTER GRAPHICS	PE	3	1	0	3
AS20-13PE14	WEB TECHNOLOGIES	PE	3	1	0	3
PROFESSIONAL ELECTIVE –II						
AS20-13PE21	R PROGRAMMING	PE	3	1	0	3
AS20-12PE22	PARALLEL PROGRAMMING	PE	3	1	0	3
AS20-12PE23	COGNITIVE SCIENCE	PE	3	1	0	3
AS20-13PE24	BLOCKCHAIN TECHNOLOGY	PE	3	1	0	3
PROFESSIONAL ELECTIVE –III						
AS20-13PE31	COMPUTER FORENSICS	PE	3	1	0	3
AS20-13PE32	QUANTUM COMPUTING	PE	3	1	0	3
AS20-13PE22	SOFTWARE ENGINEERING AND TESTING METHODOLOGIES	PE	3	1	0	3
AS20-13PE33	BIO INFORMATICS	PE	3	1	0	3
PROFESSIONAL ELECTIVE –IV						
AS20-13PE41	NEURAL NETWORKS	PE	3	1	0	3
AS20-13PE42	DISTRIBUTED SYSTEMS	PE	3	1	0	3
AS20-05PE43	HIGH PERFORMANCE COMPUTING	PE	3	1	0	3
AS20-13PE43	DESIGN PATTERN	PE	3	1	0	3
PROFESSIONAL ELECTIVE –V						
AS20-12PE51	HUMAN COMPUTER INTERACTION	PE	3	1	0	3
AS20-13PE51	SOFT COMPUTING	PE	3	1	0	3
AS20-05PE53	SOFTWARE PROCESS AND PROJECT MANAGEMET	PE	3	1	0	3
AS20-13PE52	IMAGE PROCESSING	PE	3	1	0	3

LIST OF OPEN ELECTIVES						
COURSE CODE	**COURSE TITLE**	**COURSE AREA**	**HOURS/WEEK**			**CREDIT**
			L	**T**	**P**	
OPEN ELECTIVE I						
AS20-13OE11	INTRODUCTION TO DRONES	OE	3	0	0	3
AS20-13OE12	NEURAL NETWORKS	OE	3	0	0	3
AS20-13OE13	APPLICATIONS OF AI IN HEALTH CARE	OE	3	0	0	3
AS20-13OE14	DEEP LEARNING USING PYTHON	OE	3	0	0	3
OPEN ELECTIVE II						
AS20-13OE21	ADVANCED DATABASE	OE	3	0	0	3
AS20-13OE22	INTRODUCTION TO CRYPTOGRAPHIC FUNDAMENTALS	OE	3	0	0	3
AS20-13OE23	QUANTUM COMPUTING	OE	3	0	0	3
AS20-13OE24	ARTIFICIAL INTELLIGENCE	OE	3	0	0	3
OPEN ELECTIVE III						
AS20-13OE31	MOBILE COMPUTING	OE	3	0	0	3
AS20-13OE32	ALGORITHMS FOR BIG DATA	OE	3	0	0	3
AS20-13OE33	INTRODUCTION TO CRYPTOLOGY	OE	3	0	0	3
AS20-13OE34	NUMERICAL OPTIMIZATION	OE	3	0	0	3
OPEN ELECTIVE IV						
AS20-13OE41	COMPUTER INTEGRATED MANUFACTURING	OE	3	0	0	3
AS20-13OE42	ALGORITHMS FOR ADVANCED ANALYTICS	OE	3	0	0	3
AS20-13OE43	BIO INFORMATICS	OE	3	0	0	3
AS20-13OE44	SOFTWARE ENGINEERING AND TESTING METHODOLOGIES	OE	3	0	0	3

B.TECH
FIRST YEAR
FIRST SEMESTER
SYLLABUS

LINEAR ALGEBRA AND ADVANCED CALCULUS
I B.Tech., I SEM

Course Title: LINEAR ALGEBRA AND ADVANCED CALCULUS	Course Code: AS20-00BS06
Teaching Scheme (L:T:P):3:1:0	Credits:3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs + 16 Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: 1.Basic definitions of Matrices 2.Knowledge of Calculus 3.Differentiation and Integration rules	

Course Overview: Course include

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
- Concept of Sequence.
- Concept of nature of the series.
- Geometrical approach to the mean value theorems and their application to the mathematical problems .
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.

Course Objective To learn

- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations?

- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.

- Concept of nature of the series.

- Geometrical approach to the mean value theorems Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative. Finding maxima and minima of function of two and three variables

Course Outcomes:

CO#	Course Outcomes
C111.1	Convert the set of linear equations in to matrix notation and analyse its solution
C111.2	Apply the concept of orthogonal transformation and reduce quadratic form to canonical form
C111.3	Analyze the nature of series.
C111.4	Describe the applications of the mean value theorems
C111.5	Evaluate the improper integrals using Beta and Gamma functions.
C111.6	Categorize the extreme values of functions of two variables with constraints and without constraints.

COURSE CONTENT (SYLLABUS)

UNIT I:MATRICES

Matrices: Types of Matrices(only definitions);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- consistency, Gauss elimination method;Gauss Jacobi Iteration Method. Gauss Seidel Iteration Method.

UNIT-II: EIGEN VALUES AND EIGEN VECTORS

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

UNIT-III: SEQUENCES & SERIES

Sequence: Definition of a Sequence, Convergence of a sequence (definitions and examples only).

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

UNIT-IV: SINGLE VARIABLE CALCULUS

Mean value theorems(all the theorems without proof): Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V: MULTIVARIABLE CALCULUS

Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence independence, Maxima and minima of functions of two variables and three variables with constraints; without constraints; method of Lagrange's Multipliers.

Text Books:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43nd Edition, 2014.
2. R.K.Jain, S.R.K. Iyengar Advanced Engineering Mathematics, Narosa Publishing House Pvt.Ltd.,5 thEdition,2016

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

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):
1. https://www.khanacademy.org/math/linear-algebra
2. https://onlinecourses.nptel.ac.in/noc20_ma27
3. https://www.mooc-list.com/course/calculus-two-sequences-and-series-coursera

Web Reference/E-Books:
1. www.ee.ic.ac.uk
2. http://en.m.wikipedia.org
3. www.math.odu.edu

APPLIED PHYSICS
I B.Tech., I SEM

Course Title: Applied Physics	Course Code: AS20-00BS08
Teaching Scheme (L:T:P): 3:1:0	Credits:3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs : 16 Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks

Prerequisites:

- The student must have basic knowledge of units and dimension of physical quantities, principles of mechanics and laws of optics.
- The student must be aware of basics of waves and oscillations, fundamental principles of electromagnetic theory.
- The student must have fundamental knowledge of mathematical concepts like vector algebra, integration and differentiation.

Course Overview:

This course deals with quantum principles and explores their applications in studying the behavior of fundamental entities of atom. It deals with semiconductor devices which are employed in designing electronic systems and in communication field. It deals with the fundamental properties of dielectric and magnetic materials and explore their application in all engineering streams.

Course Objective

- To explore the dual nature of the particle and applications of Schrodinger Equation.
- To identify the Concept of Energy band formation and analyze classification of solids.
- To distinguish the differences between Intrinsic and Extrinsic Semiconductors
- To explore the different applications of semiconductor devices.

- To identify the behaviour of solids under electric and magnetic field and Understand the concept of superconductivity
- To interpret the characteristics of Lasers, types of Lasers, Optical fiber principle and their applications.

Course Outcomes (s)

CO#	Course Outcomes
C112.1	Interprets the dual nature of matter waves using quantum principles.
C112.2	Differentiates the physical properties of conductors, insulators and semiconductors using energy band.
C112.3	Identifies the different types of semiconductors using Hall Effect
C112.4	Analyzes the different properties of semiconductor devices and their applications.
C112.5	Explores the different types of Dielectric and Magnetic materials and their applications in different fields.
C112.6	Identifies the different characteristics and applications of lasers and fiber optics

COURSE CONTENT (SYLLABUS)

Unit - I: QUANTUM MECHANICS

Introduction to Quantum Mechanics (Origin of QM), Dual nature of particles, De Broglie's hypothesis, Matter waves, Heisenberg's uncertainty principle, Photo-electric effect(qualitative), Davisson and Germer's experiment, G.P Thomson experiment, Schrodinger time-independent wave equation-significance of wave function, particle in one dimensional square well potential.

Unit – II: INTRODUCTION TO SOLIDS

Classical Statistics – Maxwell-Boltzmann Distribution (qualitative) Quantum Statistics – Bose-Einstein statistics (qualitative), Fermi – Dirac statistics(qualitative), Density of Energy states, Electrons in a periodic potential – Bloch theorem, Kronig – Penny Model (qualitative), Brillouin Zones (E-K curve), Concept of effective mass of electron, Energy band

formation in solids, Classification of solids into Metals, Semiconductors and insulators.

Unit - III:SEMICONDUCTOR PHYSICS AND DEVICES

Semiconductor Physics: Intrinsic and Extrinsic semiconductors, Carrier concentration in intrinsic and extrinsic semiconductors. Dependence of Fermi level on carrier concentration and temperature, carrier transport: diffusion and drift, Hall Effect.

Semiconductor Devices: PN Junction Diode – Junction Formation, Energy Band Diagram, V-I characteristics of PN junction diode, Direct and Indirect band gap semiconductors, LED & Solar cell.

Unit - IV: DIELCTRICS AND MAGNETIC PROPERTIES OF MATERIALS

Dielectric properties: Introduction, Types of Polarizations (Electronic and Ionic) and Calculation of their polarizabilities, Internal fields in solids: (Lorentz Method), Clausius-Mossotti relation, Piezo-electricity, Ferroelectricity, Pyro-electricity and their applications.

Magnetic Properties: Introduction, Bohr magneton, classification of magnetic materials on the basis of magnetic moment, Hysteresis curve based on domain theory, Soft and hard magnetic materials, Applications.

Superconductors: Introduction, type – I and type – II Superconductors, Applications of Superconductors

Unit-V LASERS AND FIBER OPTICS

Lasers: Introduction, Characteristics of lasers, Absorption, Spontaneous and Stimulated emissions, Relation between Einstein's Coefficients, Population inversion, Metastable state, Pumping, Block Diagram of laser, Construction and working of Ruby Laser, Helium-Neon Laser, Applications of lasers in Defense, Medical field.

Fiber Optics: Introduction to optical fiber, Construction and working of an Optical Fiber, Acceptance angle, Numerical aperture, Types of Optical fibers –Mode & Propagation through Step and Graded index fibers, Attenuation, Applications of optical fibers in Communication System and Sensors**.**

Text Books:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learning.

2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

3. Halliday and Resnick, Physics - Wiley

References Books:

1. Engineering physics 2nd edition –H.K.Malik and A.K. Singh Richard.

2. Introduction to Solid State Physics - Charles Kittel

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://onlinecourses.nptel.ac.in/noc20_ph24/preview

2. https://onlinecourses.nptel.ac.in/noc20_ph16/preview

3. https://www.coursera.org/learn/semiconductor-physics

4. https://www.coursera.org/lecture/leds-semiconductor-lasers/active-optical-devices-specialization-introduction-0jner

Web Reference/E-Books:

1. Physics for Engineers by N. K. Verma

2. Essentials of Applied Physics by Royal M. Frye

PROGRAMMING FOR PROBLEM SOLVING
I B.Tech., I SEM

Course Title: Programming for Problem Solving	Course Code: AS20-05ES01
Teaching Scheme (L:T:P): (3:1:0)	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs + 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: Mathematics knowledge, Analytical and Logical skills	

Course Overview:

It introduces students to the field of computer science as a discipline for solving problems through computation and provides the foundation for more advanced courses on programming and software development.

Course Objective

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes(s)

CO#	Course Outcomes
C113.1	Designs algorithms and draws flowcharts for solving problems.
C113.2	Converts the algorithms/flowcharts to C programs.
C113.3	Develops the code and tests a given logic in C programming language.
C113.4	Dissects a problem into functions and develops modular reusable code.
C113.5	Demonstrates arrays, pointers, strings and structures in C.
C113.6	Explains Searching and sorting problems.

COURSE CONTENT (SYLLABUS)

UNIT - I

Problem Solving Using Computers : Computer Overview, Introduction to components of a computer system, Algorithms ,Flowchart, Pseudo code with examples, Number systems(Decimal & Binary Conversion).

Overview of C: History of C, Basic structure of C- program, Creating and Running C-Program, Input and output statements.

UNIT - II

Fundamentals ofC: C-Tokens, Data types, Operators, Expressions, Type conversions, Types of Errors, Input and output statements.

Control Statements in C Decision making and branching, Decision making and Looping statements.

UNIT – III

Structured Programming : Functions: Syntax, Steps ,Types and Category of Functions, parameter passing mechanism. Recursion and Storage Classes

Dynamic memory allocation: malloc(), calloc(), realloc(), free() with example

UNIT - IV

Arrays & Strings: Declaration , Initialization and Accessing Elements, String handling functions, Array of Strings.

Structures and Unions: Defining structures, initializing structures, unions, Array of structures, self referential structures.

Pointers: Types of Pointers Use of Pointers, Dereferencing operations, Examples

UNIT - V

Numerical methods: Roots, Integration and Differentiation Methods, Examples

Linked List: Definition, Types, Implementation Using Self referential Structures:

Files:(only if time is available, otherwise should be done as part of the lab)

Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

3. Ashok N. Kamthane, Programming in C, 2/e, Pearson Education

4. Programming with C, by K.R. Venugopal, Tata Mcgraw Hill Publishing Co Ltd

References Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.

2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression).

3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.

4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://www.coursera.org/learn/computational-thinking-problem-solving

2. nptel.ac.in/courses/106105085/4

3. nptel.ac.in/courses/106105085/2

Web Reference/E-Books:

1. https://onlinecourses.nptel.ac.in/noc18_cs33/ preview

2. http://www.thenewboston.com/

3. https://www.codesdope.com/

BASIC ELECTRICAL ENGINEERING
I B.Tech., I SEM

Course Title: Basic Electrical Engineering	Course Code: AS20-02ES01
Teaching Scheme (L:T:P): (3:1:0)	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs + 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: Nil	

Course Overview:

Electrical engineering principles are taught in this course. Topics include circuit theory, alternating current theory, DC Machines, induction, motors, Synchronous Machine, cabling, batteries and Switches.

Course Objective

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

Course Outcomes(s)

CO#	Course Outcomes
C114.1	Understand the basic concepts of Electrical Circuits.
C114.2	Study various concepts in AC circuits
C114.3	Discuss the concepts of transformer and Induction motor.
C114.4	Discuss the concepts of DC Machines and synchronous machines.
C114.5	Describe the operation of different types of cables, wires and batteries.
C114.6	Understand the Performance of different protecting equipment's like MCB, FUSE.

COURSE CONTENT (SYLLABUS)

UNIT-I: D.C. CIRCUITS

Electrical circuit elements R, L and C, voltage and current sources, Kirchoff's laws, Network reduction techniques, Series –parallel, Y-" transformation, analysis of simple circuits with dc excitation. Superposition theorem, Thevenin's theorem and Norton's Theorem.

UNIT-II: A.C. CIRCUITS

Representation of sinusoidal waveform, phasor representation, peak and RMS values, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations, series resonance in series R-L-C circuit. Three-phase balanced circuits. Voltage and current relations in star and delta connections.

UNIT-III: TRANSFORMERS AND INDUCTION MOTORS

Transformers: Principle of operation of transformer, Equivalent circuit, losses and efficiency, voltage regulation. Auto-transformer. Three phase transformer connections.

Induction motors: **W**orking principle and operation of three phase induction motor, Losses and efficiency-Brake test. Single-phase induction motor-working principle, operation and applications.

UNIT-IV: DC MACHINES AND SYNCHRONOUS MACHINES

DC machines: Constructional details and working of DC Generator, Methods of excitation, Applications of DC generators. DC Motor - principle of operation, speed control of separately excited DC motor. Applications of DC motors.

Synchronous machines: Construction and working of synchronous generator and its applications.

UNIT-V: ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption and battery backup.

Text Books:
1. "Basic Electrical Engineering", D.C. Kulshreshtha, McGraw Hill, 2019.
2. "Basic Electrical Engineering", A. Chakrabarti, S. Debnath, Tata McGraw Hill, 2012.
3. "Basic Electrical Engineering" - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
4. "Principle of Electrical Engineering", V.K Mehta, R. Mehta, S. Chand Limited, 2011.
5. "Basic Electrical Engineering", V. Mittle & Arvind Mittal, TMH, Second Edition.

References Books:
1. L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011
2. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
3. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):
1. NPTEL Videos on Course "*Basic Electrical* Technology" Co-ordinated by IISc Bangalore
   Link:https://nptel.ac.in/courses/108/108/108108 076/
2. NPTEL Videos on Course "*Basic Electrical* Technology" Co-ordinated by IIT Kharagpur
   Link:https://nptel.ac.in/courses/108/105/1081050 53/

Web Reference/E-Books:
1) Basic Electrical Engineering By U.A.Bakshi, V.U.Bakshi · 2009 Link: https://www.google.co.in/books/edition/ Basic _ Electrical_Engineering/Pp47n-VEYC?hl=en& gbpv= 1&dq=basic+ electrical+ engineering+ books& printsec= frontcover
2) Basic Electrical Engineering By Chakrabarti · 2009 https://www.google.co.in/books/edition/Basic_Elect rical_ Engineering/KuJ44LVAAK4C?hl= en &gbpv =1 &dq = basic+electrical+ engineering+books &printsec= frontcover
3) Basic Electrical Engineering By R. K. Rajput · 2009 https://www.google.co.in/books/edition/Basic_ Elect rical_Engineering/NamQz0aZMukC?hl= en& gbpv =1& dq= basic+electrical+ engineering+books &printsec= frontcover
4) Basic Electrical Engineering By SK Sahdev · 2015 https://www.google.co.in/books/edition/Basic_Elect rical _Engineering/8xTLCgAAQBAJ?hl= en&gbpv=1& dq= basic+electrical+ engineering+books &printsec=frontcover

ENGINEERING GRAPHICS AND DESIGN
I B.Tech., I SEM

Course Title: Engineering Graphics and Design	Course Code: AS20-03ES02
Teaching Scheme (L:T:P): 2:0:3	Credits:3.5
Type of Course: Lecture + Tutorial	Total Contact Periods: 32 Hrs +48 Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70Marks
Prerequisites: None	

Course Overview:

Engineering graphics & Design has a well-defined set of standards by which technical drawings are produced. This course teaches the language of engineering graphics from basic sketching through 3-D solid modeling using computer aided design (CAD) software AutoCAD.

Course Objective:

The objectives of this course are to

- To know the conventions used in Engineering Drawing and comprehend the tools to be used in AutoCAD software.
- To understand the importance of engineering curves.
- To learn to use the orthographic projections for points, lines, planes and solids in different positions.
- To make the students draw the projections of the planes.
- To understand the isometric projections.
- To create simple solid models of various domain applications.

Course Outcomes(s)

CO#	Course Outcomes
C115.1	Apply the concepts of engineering curves in construction using AutoCAD.
C115.2	Solve the problem of projections of points and lines, in different positions using AutoCAD.
C115.3	Solve the problem of projections of planes and solids in different positions using AutoCAD.
C115.4	Solve the problems of Projections of solids and its positions using AutoCAD.
C115.5	Solve the problems on Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions using AutoCAD.
C115.6	Solve the problems on Orthographic Projections and its conversions using AutoCAD.

COURSE CONTENT (SYLLABUS)

Introduction to AutoCAD Software: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

UNIT I:

Introduction to Engineering Drawing: Principles of Engineering drawing and their significance, Conventions, Drawing Instruments.

Engineering Curves: Construction of Ellipse, Parabola and Hyperbola – General and Special methods; Cycloidal curves-Epicycloids and Hypocycloids.

UNIT II:

Orthographic Projections, Projections of Points & Straight Lines: Principles of Orthographic Projections – Conventions; Projections of Points in all positions; Projections of lines inclined to both the planes.

Projections of Planes: Projections of Planes- Surface Inclined to both the Planes.

UNIT III:

Projections of Regular Solids: Projections of Regular Solids inclined to both the Planes – Prisms, Pyramids, Cylinder and Cone.

Sections and Sectional Views: Right regular solids - prism, cylinder, pyramid, cone – use of Auxiliary views.

UNIT IV:

Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and Compound Solids.

UNIT V:

Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Introduction to Solid Modelling: Creation of simple solid models relevant to the domain.

Text Books:

1. Engineering Drawing, N. D. Bhatt, 53rd Edition, Charotar Publishing House, 2016.
2. Textbook on Engineering Drawing, K. L. Narayana & P. Kannaiah, SciTech Publishers, 2010.
3. Engineering Drawing and Computer Graphics, M. B. Shah & B. C. Rana, Pearson Education, 2010.
4. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education.
5. Engineering graphics and design, Pradeep Jain, A.P Gautam and Ankitha Maheshwari.

References Books:

1. Mastering AutoCAD 2019 and AutoCAD LT 2019, George Omura and Brian C. Benton (Auto CAD 2019), 1st Edition, John Wiley & Sons, Indianapolis, Indiana.
2. AutoCAD Software Theory and User Manuals.
3. Engineering Design, George E. Dieter, Linda C. Schmidt/ third edition.
4. Engineering Drawing and design, Cencell Jonson,Jay D.Helsel,Dennis R.Short.
5. Engineering Drawing, Jolhe/fourth edition.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://nptel.ac.in/courses/112/103/112103019/
2. https://nptel.ac.in/courses/112/104/112104172/

Web Reference/E-Books:

1. http://nptel.ac.in/courses/112103019
2. http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html
3. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_health_science_students/engineeringdrawing.pdf

APPLIED PHYSICS LAB
I B.Tech., I SEM

Course Title: Applied Physics Lab	Course Code: AS20-00BS09
Teaching Scheme (L:T:P): (0:0:3)	Credits: 1.5
Type of Course: Practical Total	Contact Periods: 45 Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks

Prerequisites:
1. The student must know the usage of basic tools for measurement of physical quantities.
2. The students must have knowledge of error analyses, types of errors, principles of optics, mechanics, waves and Oscillations.

Course Overview:

The course deals with experiments in various fields of physics such as Electronics, Optics, Opto-Electronics, Communication, Electricity and Magnetism.

Course Objective

1. To identify the active and passive elements and gain ability to build electronic circuits for solving complex engineering problems.
2. To classify the semiconductor materials into p-type or n-type semiconductor and estimate the energy gap of semiconductor diode
3. To explore the characteristics of optoelectronic devices
4. To determine the work function of given material.
5. To estimate magnetic field intensity and explores the generation of magnetic field.
6. To determines the properties of optical fibers using lasers

Course Outcomes(s)

CO#	Course Outcomes
C116.1	Compute time constant of RC circuit and resonant frequency of LCR circuit.
C116.2	Identify the type of semiconductor using Hall Effect and determine the Energy gap of a semiconductor diode.
C116.3	Analyze the V-I characteristics of Solar cell and LED.
C116.4	Evaluate work Function of a photo metal using photo electric effect.
C116.5	Summarize the variation of Magnetic Field along the current carrying coils.
C116.6	Estimate the light gathering ability and bending losses of Optical fibers.

LIST OF EXPERIMENTS/DEMONSTRATIONS:

The Students has to perform any eight of the following experiments

1. LCR Circuit: To study the frequency response of LCR series and parallel resonance circuit.

2. R-C Circuit: To study the time response of RC circuit.

3. Hall Effect: To determine Hall voltage and Hall Coefficient of given semiconductor material.

4. Energy Gap: To determine the energy gap of a given Semiconductor.

5. Solar Cell: To study V-I Characteristics of Solar Cell.

6. LED: To study the V-I characteristics of LED.

7. Photoelectric effect: To determine the work function of given material.

8. Stewart- Gee apparatus – To study the variation of magnetic field along the axis of circular current carrying loop.

9. Optical fibre: To determine the Numerical aperture and Acceptance angle of a given fibre.

10. Optical fibre: To study the bending losses in Optical fibres.

References Books:

1. Practical physics by Dr. Aparna, V.G.S.publications.
2. Physics practical lab manual –SPEC

Online Resources

1. https://www.futurelearn.com/courses/teaching-practical-science-physics
2. https://www.vlab.co.in/broad-area-physical-sciences

PROGRAMMING FOR PROBLEM SOLVING LAB

I B.Tech., I SEM

Course Title: Programming for Problem Solving Lab	Course Code: AS20-05ES02
Teaching Scheme (L:T:P): 0:0:3	Credits:1.5
Type of Course : Practical	Total Contact Periods: 48 Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70Marks
Prerequisites: None	

Course Overview:

This course provides the fundamental concepts of programming using C language, apply the control structures, iterations statements, arrays, functions, strings, pointers, structures, unions and files. This course also explains the concepts of searching and sorting techniques in C language.

Course Objective: The course will help to

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes(s)

CO#	Course Outcomes
C117.1	Develops algorithms for simple problems.
C117.2	Translate given algorithms to a working and correct program.
C117.3	Identifies and correct syntax errors as reported by the compilers.
C117.4	Identifies and correct logical errors encountered during execution.
C117.5	Demonstrates data operations using arrays, strings, structures and pointers of different types.
C117.6	Creates, reads and writes to and from simple text and binary files.

LIST OF EXPERIMENTS/DEMONSTRATIONS

Week 1:

Tutorial 1: Problem solving using computers(Creating, Compiling & Running Steps , Basic Structure of C Program):

Lab1: Familiarization with programming environment

Week 2:

Tutorial 2: Variable types and Rules, Formatted I/O statements

Lab 2: Reading and Displaying Different Values Using scanf() & Printf()

Week 3:

Tutorial 3: Types of Operators

Lab 3: Simple Computational problems using operators

Week 4:

Tutorial 4: Branching and logical expressions:

Lab 4: Problems involving if-then-else structures

Week 5:

Tutorial 5: Loops, while, do-while and for loops:

Lab 5: Iterative problems e.g., sum of series, sum of n-natural numbers

Week 6:

Tutorial 6: 1D Arrays: searching, sorting:

Lab 6: 1D Array manipulation : insertion, selection and bubble sort

Week 7:

Tutorial 7: 2D arrays and Strings

Lab 7: Matrix problems, String operations, string sorting, palindrome string

Week 8:

Tutorial 8: Functions, call by value:

Lab 8: Simple functions: factorial ,sum of individual digits, Fibonacci series etc.,

Week 9:

Tutorial 9: Recursion, structure of recursive calls

Lab 9: Recursive functions: factorial, Fibonacci, GCD and towers of Hanoi

Week 10:

    Tutorial 10: Pointers, structures and dynamic memory allocation

    Lab 10: Problem solving using Pointers and structures

Week 11:

    Tutorial 11: Numerical methods (Root finding, numerical differentiation, numerical integration):

    Lab 11: Programming for solving Numerical methods problems

Week 12

    Tutorial 12: Single Linked List using self referential structures

    Lab 12: Implementation of Single liked list using self referential structures

Week 13:

    Tutorial 13: File data type , File pointer, modes of operations, file handling functions

    Lab 13: Programs using file handling functions: File copy, Merging of Files

Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C,McGraw-Hill.
2. B.A.Forouzanand R.F.Gilberg C Programmingand DataStructures,Cengage Learning, (3rdEdition).
3. Brian W.Kernighan and Dennis M.Ritchie, The C Programming Language,Prentice Hall of India.

References Books:

1. R.G. Dromey, How to solve it by Computer, Pearson (16thImpression).
2. Programming in C, Stephen G. Kochan, Fourth Edition, PearsonEducation.
3. Herbert Schildt, C: The Complete Reference, Mc Graw Hill,4th Edition.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. http://nptel.ac.in/courses/106105085/
2. http://nptel.ac.in/courses/106106127/

Web Reference/E-Books:

1. www.leetcode.com
2. www.thenewboston.com

ENGINEERING PRACTICES
I B.Tech., I SEM

Course Title: Engineering Practices	Course Code: AS20-03ES02
Teaching Scheme (L:T:P): 0:0:4	Credits:2
Type of Course: Practical Total	Contact Periods:48 Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: None	

Course Overview:

Mechanical Engineering Practices is a place where students acquire knowledge on the operation of various processes involved in manufacturing and production. The Workshop Practice course makes students competent in handling practical work in engineering environment.

COURSE OBJECTIVES:

The objectives of this course are to

- To Study of different hand operated power tools, uses and their demonstration.

- To gain a good basic working knowledge required for the production of various engineering products.

- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.

- To develop a right attitude, team working, precision and safety at work place.

- It explains the construction, function, use and application of different working tools, equipment and machines.

- To study commonly used carpentry joints.

- To have practical exposure to various welding and joining processes.

- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

Course Outcomes(s)

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

CO#	Course Outcomes
C118.1	Study and practice on machine tools and their operations.
C118.2	Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
C118.3	Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
C118.4	Apply basic electrical engineering knowledge for house wiring practice.
C118.5	Fabricate the given material to desired product in a particular pattern by tin smithy.
C118.6	Mould the component to desire pattern and shape by black smithy.

LIST OF EXPERIMENTS/DEMONSTRATIONS

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint).

II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit).

III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel).

IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern).

V. Welding Practice – (Arc Welding & Gas Welding).

VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light).

VII. Black Smithy – (Round to Square, Fan Hook and S-Hook).

2. 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.

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

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):
1. https://nptel.ac.in/courses/112/107/112107145/
2. https://nptel.ac.in/courses/112/107/112107144/

Web Reference/E-Books:
1. https://books.google.co.in/books/about/ MECHANICAL_WORKSHOP_PRACTICE.html?id= rHhJlb-_ye4C
2. https://www.youtube.com/watch?reload= 9&v=4gpjof 5ESKQ

SOFT SKILLS 1
I B.Tech., -I SEM

Course Title: Soft Skills 1Course	Code: AS20-00HS03
Teaching Scheme (L:T:P): 2:0:0	Credits: Nil
Type of Course: Lecture	Total Contact Periods:32 Hrs
Continuous Internal Evaluation: No	Semester End Exams : 100 Marks
Prerequisites:	

Course Overview:

The students will enhance their communication skills. The course will enable them to become responsible towards their lives and will be able to faces challenges , the course will also enable to develop work culture, orientation and will enable them with problem solving abilities.

Course Objective:-

1. To develop Communicative Methodology.
2. To lead the life with utmost responsibility.
3. To accept challenges.
4. To develop work orientation in the mindset of the students.
5. To have problem solving ability.

Course Outcomes(s)

CO#	Course Outcomes
C119.1	Facilitates better interaction among students.
C119.2	Enhance and improve documentation.
C119.3	Demonstrate leadership qualities.
C119.4	Demonstrate effective presentation skills.
C119.5	Express benevolence.
C119.6	Enhance their communication skills

COURSE CONTENT (SYLLABUS)

UNIT I: Importance of Soft Skills

Successful Career - Communication - Body Language - Written Communication - Presentation

Team Work - Professionalism - Interpersonal Skills - Time and Stress Management - Leadership Qualities

UNIT II: Self Introduction

Introductory Speech - General Speech - Academic Speech - Evaluation of Speech - Steps of Self Introduction - Basic Questions and Answers -Deliver Self Introduction - Tips of Self Introduction - Body Gestures- Good Eye Contact - Never be Nervous - Do's and Don'ts' of Self Introduction- Examples on Self Introduction

UNIT III: Body Language

Introduction – Communicating Body – Studying of body language – 17 concepts of learning body language.

UNIT IV: Communication Skills

Sounds of English – English as a World Language – Speech formation – Pronunciation – Oral Communication – Written Communication – Face to Face Communication Effective Communication – Presentation – Information Transfer.

UNIT V: Positive Attitude and Positive Thinking

Introduction – Possible Reactions – Dual Attitude – Indifference Attitude – Negative Attitude – Think Positively – Depend on Positive Thinking – Know – What we are – Benefits of Behaviour – Myths of negative thinking – Tips to become a positive thinker – Moving towards success

Text Books:

1. Body Language in the work place – Allan and Barbara Pease 2011.
2. Students Handbook: Skill Genie – Higher education department, Government of Andhra Pradesh.
3. Soft Skills – Odhisha State Open University.

Web References:

1. Extraordinary Communication Skills - By Sandeep Maheshwari I Hindi & English SpeakingPracticeTips https://www.youtube.com/watch?v=VczVqHJW0gg
2. Effective Communication Skills Training Video in Hindi https://www.youtube.com/watch?v=kxAXOh5RmwU
3. A guide to effective communication https://www.youtube.com/watch?v=JwjAAgGi-90
4. A Failure to Communicate https://www.youtube.com/watch?v=8Ox5LhIJSBE
5. Non Verbal Communication https://www.youtube.com/watch?v=SKhsavlvuao

B.TECH FIRST YEAR SECOND SEMESTER SYLLABUS

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
I B.Tech., II SEM

Course Title: Differential Equations And Vector Calculus	Course Code: AS20-00BS01
Teaching Scheme (L:T:P):3:1:0	Credits:3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16 Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: 1. Student should have knowledge of Derivatives 2. Student should have knowledge of Integrations 3. Student should have knowledge of Functions	

Course Overview:

- Concept of first order ,first degree O.D. E. along with their real life applications.
- Concept of Higher order O.D.E. and corresponding cases of getting solution
- Concept of Double and Triple Integrals.
- Concept of Vector Differentiation including Gradient, Divergent, Curl and Vector Identities.
- Concept of Vector integration including Line, Surface and Volume Integrals and Vector Integral Theorems.

Course Objective: To learn the

- Concepts of the differential equations of first order.
- Procedures to solve differential equations of higher order.
- Multiple integrals classification and their applications.
- Quantities involved in engineering field related to vector and scalar point functions.
- Basic properties of vector and scalar point functions and their applications to line, surface and volume integrals.

Course Outcomes(s)

CO#	Course Outcomes
C121.1	Determine whether the given differential equation of first order is exact or not.
C121.2	Apply the concept of higher order ODE to real world problems.
C121.3	Analyze and apply the concept of multiple integrals to find areas, volumes.
C121.4	Define Directional Derivative and Scalar Potential Function
C121.5	Evaluate the line, surface and volume integrals and convert them from one to another.
C121.6	Acquire various skills pertaining to differential and vector calculus

COURSE CONTENT (SYLLABUS)

UNIT I: FIRST ORDER ODE

Exact equations; Non-Exact equations; Linear equations; Bernoulli's equations; Newton's Law of Cooling; Law of Natural Growth and Decay; Orthogonal Trajectories.

UNIT II: HIGHER ORDER LDE

Higher Order Linear Differential Equations with Constant Coefficients; Non-Homogeneous Differential Equations with RHS of the type: e^{ax}, sinax, cosax, x^k, $e^{ax}v$, xv, Method of Variation of Parameters.

UNIT III: MULTIPLE INTEGRALS

Evaluation of Double Integrals (Cartesian and Polar);Change of Variables(Cartesian to Polar);Change of Order of Integration(Cartesian form);Areas and Volumes by Double Integrals. Triple Integrals(Cartesian form).

UNIT IV: VECTOR DIFFERENTIATION

Vector Point Function; Scalar Pointfunction; Gradient; Divergent; Solenoidal;Curl;Irrotational;Directional Derivative; Scalar Potential Function; Vector Identities.

UNIT V: VECTOR INTEGRATION

Line Integral; Surface Integral; Volume Integral; Green's Theorem in a plane; Gauss's Divergence Theorem;Stoke's Theorem (without proofs) and Applications.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2010.

2. S.R.K. Iyengarand R.K.Jain,Advanced Engineering Mathematics, Narosa Publishing House,5th Edition, 2016.

References Books:

1. Dr. M.D. Rai Singhania ,Ordinary and Partial Differential Equations, S.Chand and Company Ltd., 18 th Edition,2008.

2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.

3. Murray R.Spiegel, Seymour Lipschutz, Dennis Spellman,Vector Analysis:Schaum's Outlines Series,Tata McGrawHill,2 nd Edition,2009.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://www.coursera.org/learn/ordinary-differential-equations

2. https://onlinecourses.nptel.ac.in/noc20_ma15/preview

Web Reference/E-Books:

1. ENGINEERIMG MATHEMATICS-II BY Dr.M.SURYA NARAYANA REDDY

2. MATHEMATICS-I BY P. SHIVARAMAKRISHNA DAS, C. VIJAYA KUMARI

3. ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS BY Dr.M.D.RAISINGHANIA

ENGINEERING CHEMISTRY
I B.Tech., CIVIL-II SEM

Course Title: Engineering Chemistry	Course Code: AS20-00BS02
Teaching Scheme (L:T:P): 3:1:0	Credits: 3
Type of Course: Lecture + Tutorial	Total Contact Periods: 48Hrs +16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks

Prerequisites:

1. The student must have basic knowledge of units and dimension of physical quantities, principles of mechanics and laws of optics.
2. The student must be aware of basics of waves and oscillations, fundamental principles of electromagnetic theory.
3. The student must have fundamental knowledge of mathematical concepts like vector algebra, integration and differentiation

Course Overview:

The primary objective of an Engineering Chemistry course is to introduce the students to the concepts and applications of chemistry in Engineering. It should cultivate in them an ability to identify chemistry in each piece of finely engineered products used in households and industry. This course aims to strengthen the fundamental concepts of chemistry and then builds an interface with their industrial applications. It deals with applied and industrially useful topics, such as Water Technology, Molecular Orbital Concepts, Electrode Potential, Electrodes, types of batteries and their industrial applications, Fuels, UV-VIS, IR and NMR concepts.

Course Objective

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.

- To know the modern technology and interpret different problems involved in industrial utilization of water.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of Electrochemistry and Corrosion which are essential for engineers in Industry.
- Ability to impart the knowledge of fuels to apply the role of chemistry in energy production.
- To acquire the skills pertaining to spectroscopy and to apply them for medical and other fields.

Course Outcomes(s)

CO#	Course Outcomes
C122.1	Acquire the Scientific Attitude by means of distinguishing, analyzing and solving various Engineering problems.
C122.2	To know the modern technology and interpret different problems involved in industrial utilization of water.
C122.3	Interpret the knowledge of atomic, molecular and electronic changes, band theory related to conductivity.
C122.4	Summarize the principles and concepts of electrochemistry, corrosion to predict the behaviour of a system under different variables.
C122.5	Define and classify the fuels, distinguishing the quality of fuels based on calorific values as well as understand the concepts of petroleum refining.
C122.6	Apply the concepts on basic spectroscopy and application to medical and other fields.

COURSE CONTENT (SYLLABUS)

UNIT I:

Water and its Treatment: Introduction – hardness of water – Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness, Numerical problems on Hardness of Water – Estimation of hardness of water by complexometric method. Boiler troubles: Scales and

Sludge's and its treatment. Potable water and its specifications - Steps involved in treatment of Potable water – Disinfection of water by ozonization and chlorination – Breakpoint of Chlorination. Boiler feed water and its treatment – Internal Treatment of water: Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange Process. Desalination of Brackish water – Reverse Osmosis.

UNIT II:

Molecular Structure and Theories of Bonding: Introduction - Atomic and Molecular Orbital's. Linear Combination of Atomic Orbital's (LCAO), Molecular orbital's of diatomic molecules, molecular orbital energy level diagrams of N_2, O_2 and F_2 molecules. Đ-molecular orbital's of butadiene.

Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbital's in Tetrahedral, Octahedral and Square planar geometries. Band Structure of solids and effect of doping on conductance.

UNIT III:

Electrochemistry and Corrosion: Electro chemical cells – electrode potential, standard electrode potential, Nernst equation, Types of electrodes – Calomel, Quinhydrone and Glass electrode. Determination of P^H of a solution by using quinhydrone and glass electrode. Electrochemical series

and its applications. Batteries – Primary: Lithium cell, secondary batteries: Lead – Acid storage battery and Lithium ion battery.

Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, Differential Aeration Corrosion - 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: Galvanizing , Tinning, Metal Cladding.

UNIT IV:

Fuels and Combustion: Introduction-Classification of Fuels – Calorific value, Characteristics of a good fuel - Solid fuels: coal –Classification of a coal by Rank – Analysis of coal – Proximate and Ultimate analysis and their significance. Liquid fuels – Petroleum and its refining, Cracking –types – Fixed bed Catalytic Cracking - Moving bed catalytic cracking. Synthetic Petrol – Fischer-Tropsch's process- Knocking – Octane and Cetane rating, Flash Point, Fire point, Cloud point & Pour Point; Gaseous fuels – Composition and uses of Natural Gas, LPG and CNG.

Combustion: Definition, Calorific value of fuel – HCV, LCV; Calculation of air quantity required for combustion of a fuel.

UNIT V:

Spectroscopic Techniques and applications: Introduction, Principles of Electronic Spectroscopy: Beer-Lamberts law, Types of electronic transitions, applications of UV–Visible spectroscopy.

IR Spectroscopy: Introduction, Principle, Modes of Molecular vibrations, selection rules, Force Constant, Wave number regions of Some common organic functional groups (C-H, NH_2, OH, -COOH, C=O, $C\equiv N$, C=C, C C, C-O-C), Applications of IR Spectroscopy.^{1}H-NMR Spectroscopy, Principles of NMR spectroscopy, Chemical shift - Shielding and Deshielding effects, Chemical shifts of some organic protons, Interpretation of NMR Spectra (Alkanes, Alcohol, carbonyl compounds, Alkyl halides) Applications of NMR: 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. University Chemistry, by B.M. Mahan, Pearson IV Edition.
5. R.V. Gadag & A. Nityananda Shetty., "Engineering Chemistry", I K International Publishing House Private Ltd. New Delhi (2015-Edition).

References Books:

1. O.G. Palanna, "Engineering Chemistry", Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint (2015-Edition).

2. "Wiley Engineering Chemistry", Wiley India Pvt. Ltd. New Delhi. SecondEdition 2013.

3. B. Jaiprakash, R. Venugopal, Sivakumaraiah and Pushpa Iyengar, Chemistry for Engineering Students, Subhash Publications, Bengaluru, (2015-Edition).

4. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://nptel.ac.in/courses/105/104/105104102/
2. https://nptel.ac.in/courses/105/106/105106119/
3. https://nptel.ac.in/courses/103/103/103103163/
4. https://nptel.ac.in/courses/104/106/104106096/

DATA STRUCTURES THROUGH C++

I B.Tech., II SEM

Course Title: Data Structures Through C++	Course Code: AS20-05ES03
Teaching Scheme (L:T:P):3:1:0	Credits:3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: Programming for Problem Solving	

Course Overview:

This course will deliver the knowledge in introducing the concepts of various data structures such as linked lists, stacks, queues, trees and graphs along with the applications.

Course Objective

- To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.

- To understand the notations used to analyze the Performance of algorithms.

- To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graphs and their representations.

- To choose an appropriate data structure for a specified application.

- To understand and analyze various searching and sorting algorithms.

- To learn to implement ADTs such as lists, stacks, queues, trees, graphs, search trees in C++ to solve problems.

Course Outcomes(s)

CO#	Course Outcomes
C123.1	Explain basic concepts of OOP's and Asymptotic Notations
C123.2	Explain basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.
C123.3	Explain Non Linear Data structures like trees and graphs.
C123.4	Implements and know the application of algorithms for sorting.
C123.5	Understands the importance of hashing and different hashing techniques
C123.6	Design programs using a variety of data structures, including binary and general tree structures, search trees, heaps, graphs, and AVL-trees.

COURSE CONTENT (SYLLABUS)

UNIT - I

C++ Programming Concepts: Review of C, input and output in C++, functions in C++- value parameters, reference parameters, Parameter passing, function overloading, function templates, Exceptions-throwing an exception and handling an exception, arrays, pointers, new and delete operators, class and object, access specifiers , friend functions, constructors and destructor, Operator overloading, class templates, Inheritance and Polymorphism.

Basic Concepts - Data objects and Structures, Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations, Complexity Analysis Examples, Introduction to Linear and Non Linear data structures.

UNIT - II

Representation of single, two dimensional arrays, sparse matrices-array and linked representations.

Linear list ADT-array representation and linked representation, Singly Linked Lists- Operations- Insertion,

Deletion, Circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations- Insertion, Deletion.

Stack ADT, definition, array and linked implementations, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation, Queue ADT, definition, array and linked Implementations, Circular queues-Insertion and deletion operations.

UNIT – III

Trees – definition, terminology, Binary trees-definition, Properties of Binary Trees, Binary Tree ADT, representation of Binary Trees-array and linked representations, Binary Tree traversals, threaded binary trees.

Priority Queues –Definition and applications, Max Priority Queue ADT-implementation-Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap.

UNIT - IV

Searching - Linear Search, Binary Search, Hashing-Introduction, hash tables, hash functions, Overflow Handling, Comparison of Searching methods.

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

UNIT - V

Graphs–Definitions, Terminology, Applications and more definitions, Properties, Graph ADT, Graph Representations-Adjacency matrix, Adjacency lists, Graph Search methods - DFS and BFS, Complexity analysis.

Search Trees-Binary Search Tree ADT, Definition, Operations- Searching, Insertion and Deletion, Balanced search trees-AVL Trees-Definition and Examples only, B-Trees- Definition and Examples only, Red-Black Trees-Definitions and Examples only, Comparison of Search Trees.

Text Books:

1. Data structures, Algorithms and Applications in C++, 2nd Edition, Sartaj Sahni, Universities Press.
2. Data structures and Algorithms in C++,AdamDrozdek,4thedition,Cengage

References Books:

1. Data structures with C++, J. Hubbard, Schaum's outlines,TMH.
2. Data structures and Algorithms in C++, M.T. Goodrich, R. Tamassia and D. Mount, Wiley India.
3. Data structures and Algorithm Analysis in C++, 3rd edition, M. A. Weiss,Pearson.
4. Classic Data Structures, D. Samanta, 2nd edition,PHI.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://www.coursera.org/learn/data-structures
2. https://www.coursera.org/specializations/data-structures- algorithms
3. http://nptel.ac.in/courses//data-structures

Web Reference/E-Books:

1. http://gvpcse.azurewebsites.net/pdf/data.pdf
2. http://www.sncwgs.ac.in/wp-content/uploads/2015/11/Fundamental-Data-Structures.pdf
3. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv247-Page1.htm
4. http://ndl.iitkgp.ac.in/document/yVCWqd6u 7wgye 1qwH9xY7- 3lcmoM ApVUMmjl ExpIb1zste 4YXX1 pSpX8a2mLgDzZ-E41CJ6PVmY4S0MqVbxsFQ
5. http://nptel.ac.in/courses/106102064/1

ELECTRONIC DEVICES AND CIRCUITS
I B.Tech., II SEM

Course Title: Electronic Devices And Circuits	Course Code: AS20-04ES01
Teaching Scheme (L:T:P): 1:3:0	Credits: 3
Type of Course: Lecture + Tutorial	Total Contact Periods: 48Hrs+ 16 Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: Physics	

Course Overview:

The creation of electronic circuits requires knowledge of the physics and device technology for the emission and flow control of electrons in vacuum and matter. It uses active devices to control electron flow by amplification and rectification. Electronics has had a major effect on the development of modern society.

Course Objective

The objectives of this course are to

- To introduce components such as diodes, BJTs and FETs.

- To know the applications of components.

- To know the switching characteristics of components

- To know the need of biasing in Transistors

- To understand of various types of transistor's with its principle of operation

Course Outcomes(s)

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

CO#	Course Outcomes
C124.1	Understand the modifications in its characteristics of 2 and 3 terminal semiconductor devices
C124.2	Gain the practical knowledge of JFET, BJT and some special purpose electronic devices.
C124.3	Design the amplifier circuits under given requirements
C124.4	Analyze the parameters of BJT amplifiers with its frequency response
C124.5	Know the importance of h-parameters in Bipolar Junction Transistor characteristics and its importance in application areas.
C124.6	Design different types of clippers and clampers and identifying its applications

COURSE CONTENT (SYLLABUS)

UNIT I:

JUNCTION DIODE CHARACTERISTICS AND SOME SPECIAL DIODES:

Diode and its characteristics, Static and Dynamic resistances, Diode current equation, Temperature dependence of VI characteristic, Transition and Diffusion capacitances, Zener diode and its characteristics ,Breakdown Mechanisms in Semi-Conductor (Avalanche and Zener breakdown) Diodes, Varactor Diode, LED, LCD and photo diode characteristics.

UNIT II:

DIODE APPLICATIONS:

Half wave and Full wave rectifiers and its comparisons. Inductor filter, Capacitor filter, L- section filter, Pi- section filter and comparison of various filter circuits, Clipping Circuits, Clamper circuits, Application of a zener diode as a voltage regulator. Applications of LED and LCD's. Hall Effect and its applications.

UNIT III:

BIPOLAR JUNCTION TRANSISTOR:

Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Volt-ampere characteristics of CB,CE and CC. Transistor current components, Transistor as a switch, switching times. BJT acts

as an amplifier, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations, Relation between Alpha , Beta and Gamma, Comparison of CE,CB,CC configurations.

UNIT IV:

BIASING AND STABILISATION: Transistor Biasing and Stabilization - criteria for fixing operating point, DC & AC load lines, Need for Biasing –Types of biasing's-Fixed Bias, collector to base bias, Self-Bias and voltage divider bias techniques for stabilization, Stabilization factors, (S, S', S"), Compensation techniques, (Compensation against variation in V_{BE}, I_{co}, â) Thermal run away, Thermal stability, Bias Stability, Bias Compensation using Diodes and thermistors.

UNIT V:

Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

 Introduction to Solid Modelling**:** Creation of simple solid models relevant to the domain.

Text Books:

1. Engineering Drawing, N. D. Bhatt, 53rd Edition, Charotar Publishing House, 2016.

2. Textbook on Engineering Drawing, K. L. Narayana & P. Kannaiah, SciTech Publishers, 2010.

3. Engineering Drawing and Computer Graphics, M. B. Shah & B. C. Rana, Pearson Education, 2010.

4. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education.

5. Engineering graphics and design, Pradeep Jain, A.P Gautam and Ankitha Maheshwari.

References Books:

1. Mastering AutoCAD 2019 and AutoCAD LT 2019, George Omura and Brian C. Benton (Auto CAD 2019), 1st Edition, John Wiley & Sons, Indianapolis, Indiana.

2. AutoCAD Software Theory and User Manuals.

3. Engineering Design, George E. Dieter, Linda C. Schmidt/third edition.

4. Engineering Drawing and design, Cencell Jonson,Jay D.Helsel,Dennis R.Short.

5. Engineering Drawing, Jolhe/fourth edition.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://nptel.ac.in/courses/115/102/115102014/

2. https://nptel.ac.in/courses/117/101/117101106/

3. https://www.coursera.org/learn/electronics

Web Reference/E-Books:

1. https://www.springer.com/gp/book/9789811502668

2. https://www.pdfdrive.com/basic-electronics-for-scientists-and-engineers-e28939124.html

ENGLISH

I B.Tech., II SEM

Course Title: English	Course Code: AS20-00HS01
Teaching Scheme (L:T:P): 2:0:0	Credits: 2
Type of Course: Lecture	Total Contact Periods: 32 Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks

Prerequisites:

1. The students should have a basic knowledge of English language
2. Must obtain Grammar, and basic reading skills
3. Should able to communicate in English language with basic writing skills
4. Able to use different types of vocabulary in different types of situations

Course Overview:

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

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.

Course Objective: The objective of this Course is to provide:

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.

- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.
- Train the students to use language appropriately for Interviews, Group discussions and Public speaking
- Enhance and empower the students in communication skills by concentrating on LSRW skills .

Course Outcomes(s)

CO#	Course Outcomes
C125.1	Apply English language effectively in spoken and written forms
C125.2	Analyze the given texts and respond appropriately
C125.3	Apply various grammatical structures in personal and academic fronts.
C125.4	Develop appropriate vocabulary for professional communication
C125.5	Improve competency in various forms of academic and professional writing.
C125.6	Perceive the importance of language skill for the enhancement of employability opportunities.

COURSE CONTENT (SYLLABUS)

UNIT I:

'Of Parents and Children' from the Essays of Francis Bacon

Vocabulary: The Concept of Word Formation–The Use of Prefixes and Suffixes.

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

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:

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary Building: Homonyms, Homophones and Homographs

Grammar: Misplaced Modifiers

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT III:

'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: Comprehension- Intensive Reading and Extensive Reading

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 and Acronyms in English

Grammar: Sequence of Tenses

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Information Transfer- Flow Chart- Pie Chart– Essay Writing-Précis Writing.

UNIT V:

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage

Grammar: Collocations, Commonly Confused Words-Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction - Structure of Reports-Types of Reports - Manuscript Format.

Text Books:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.
2. The Essays of Frances Bacon,Edited,with introduction and notes by Mary Augusta Scott.Charales Scribner's Sons,New york,1908.

References Books:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.
7. English Grammar Usage for Technical Students. DPS Publications, G Victor Emmanuel Raju, G Shailaja Reddy and M Sanjay Saahul.

1. Practice English Your Own-https://www.immigratemanitoba.com/alt/practise-english-on-your-own.pdf

2. Longman English Grammar Practice- file:///C:/Users/user/Downloads/Longman_English_Grammar_Practice_intermediate_Self_Study_Edition%20 (learnenglishteam.com).pdf

3. English Grammar through stories by Alan Townend-

    file:///C:/Users/user/Downloads/English-Grammar-Through-Stories%20(learnenglishteam.com).pdf

DATA STRUCTURES THROUGH C++ LAB
I B.Tech.,   II SEM

Course Title: Data Structures Through C++ Lab	Course Code: AS20-05ES04
Teaching Scheme (L:T:P): (0:0:3)	Credits: 1.5
Type of Course: Practical	Total Contact Periods: 48Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: Programming For Problem Solving	

Course Overview:

This course will deliver the knowledge in introducing the concepts of various data structures such as linked lists, stacks, queues, trees and graphs along with the applications.

Course Objective

- To write and execute programs in C++ to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.

- To learn to write C++programs to implement various sorting and searching algorithms.

Course Outcomes(s)

After completion of course the student is able to

CO#	Course Outcomes
C126.1	Develop C++ programs for real time applications using basic elements like control statements, arrays, functions pointers and string.
C126.2	Understands the importance of Linear data structures like stacks and queues.
C126.3	Explain the Non Linear Data Structures like trees and graphs.
C126.4	Implements and know the application of algorithms for sorting.
C126.5	Explain various search techniques.
C126.6	Explain the applications of various data structures.

Department of Artificial Intelligence & Machine Learning

LIST OF EXPERIMENTS/DEMONSTRATIONS

1. 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.

2. Write a template based C++ program that uses functions to perform the following:

   a. Create a doubly linked list of elements.

   b. Delete a given element from the above doubly linked list.

   c. Display the contents of the above list after deletion.

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

4. Write a C++program to implement a double ended queue ADT using an array, using a doubly linked list.

5. Write a C++ program that uses functions to perform the following:
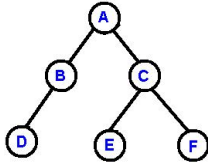
   a. Create a binary search tree of characters.

   b. Traverse the above Binary search tree recursively in preorder, inorder and post order.

6. Write a C++ program that uses function templates to perform the following:

   a. Search for a key element in a list of elements using linear search.

   b. Search for a key element in a list of sorted elements using binary search.

7. Write a C++ program to perform the following operations:
   a. Insertion into an AVL-tree
   b. Deletion from an AVL-tree.

8. Write a template based C++ program that implements selection sort algorithm to arrange a list of elements in descending order.

9. Write a template based C++ program that implements Quick sort algorithm to arrange a list of elements in ascending order.

10. Write a C++ program that implements Heap sort algorithm for sorting a list of integers in ascending order.

11. Write a C++ program that implements Merge sort algorithm for sorting a list of integers in ascending order.

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

13. Write a C++ program that implements Radix sort algorithm for sorting a list of integers in ascending order.

14. Write a C++ program that uses functions to perform the following:
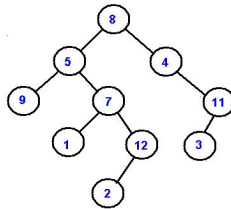
   a. Create a binary search tree of integers.
   b. Traverse the above Binary search tree non recursively in inorder.

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

   a. Create a binary search tree of integers.
   b. Search for an integer key in the above binary search tree non recursively.
   c. Search for an integer key in the above binary search tree recursively.

Text Books:

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.

2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.

3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

References Books:

1. Data Structures using C++, D. S. Malik, 2nd edition, Cengage learning.

2. Data Structures using C++, V. Patil, Oxford University Press.

3. C++Plus Data Structures, 4th edition, Nell Dale, Jones and Bartlett student edition.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://www.coursera.org/learn/data-structures

2. https://www.coursera.org/specializations/data-structures- algorithms

Web Reference/E-Books:

1. http://gvpcse.azurewebsites.net/pdf/data.pdf

2. http://www.sncwgs.ac.in/wp-content/uploads/2015/11/Fundamental-Data-Structures.pdf

3. http://www.learnerstv.com/Free-Computer-Science-Video-lectures-ltv247-Page1.htm

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB
I B.Tech., II SEM

Course Title: English Language Communication Skills Lab	Course Code: AS20-00HS02
Teaching Scheme (L:T:P)0:0:3	Credits:1.5
Type of Course: Practical	Total Contact Periods: 48Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks

Prerequisites:-
1. The students should have a basic knowledge of English language
2. Must obtain Grammar, and basic Speaking skills
3. Should able to communicate in English language
4. Able to use different types of vocabulary in different of situation

Course Overview:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English Language Communication Skills Lab has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In ELCS Lab the focus should be on the skills development in the areas of vocabulary, grammar, reading and speaking. For this, the teachers should use the prescribed Lab manual for detailed study. The students should be encouraged in improving communication skills in the lab. The time should be utilized for activity based learning. The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.

Course Objective

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning

- To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm

- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- To train students to use language appropriately for public speaking and interviews
- To improve the fluency of students in spoken English and neutralize their mother tongue influence

Course Outcomes(s)

CO#	Course Outcomes
C127.1	Develops better understanding of nuances of English language through audio-visual experience.
C127.2	Learn how to pronounce words using phonetic transcription.
C127.3	Improves communication skills for employability
C127.4	Develops Neutralization of accent for intelligibility
C127.5	Improves collaborative skills and maximizes speaking skills
C127.6	Develops linguistic, communicative and critical thinking.

LIST OF EXPERIMENTS/DEMONSTRATIONS

Listening Skills Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

- Computer Assisted Language Learning (CALL) Lab
- Interactive Communication Skills (ICS) Lab

Practice Sessions:

Exercise – I : (12hrs)

- **CALL Lab:** Introduction to Pronunciation – Speech Sounds – Vowels and Consonants.

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

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

Exercise – II : (9hrs)

- **CALL Lab:** Understand: Structure of Syllables – Word Stress .

- Practice: Basic Rules of Word Accent.

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

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

Exercise – III(9hrs)

- **CALL Lab:** Understand: Intonation- Rhythm-The Influence of Mother Tongue (MTI).

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

- **ICS Lab:** Oral Presentations- Introduction to Formal Presentations

- Practice: Formal Presentations- Poster Presentations and PPT's.

Exercise – IV (9hrs)

- **CALL Lab:** Understand: Listening for General Details.

- Practice: Listening Comprehension Tests.

- **ICS Lab:** Public Speaking – Exposure to Structured Talks- Group Discussion

- Practice: Group Discussion.

Exercise – V(9hrs)

- **CALL Lab:** Understand: Listening for Specific Details.

- **Practice: Listening Comprehension Tests.**

- **ICS Lab: Interview Skills** – concept and process, pre-interview planning, opening strategies, answering strategies, mock interviews.

- **Practice: Mock Interviews**

References Books:

1. ELCS LAB MANUAL
2. Practice English Your Own
3. Longman English Grammar Practice-
4. English Grammar through stories by Alan Townend-

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

MOOCS:

- https://nptel.ac.in/courses/109/107/109107154/
- https://nptel.ac.in/courses/109/107/109107155/
- https://nptel.ac.in/courses/109/104/109104115/
- https://nptel.ac.in/courses/109/104/109104030/

COURSERA:

- https://www.coursera.org/specializations/improve-english
- https://www.coursera.org/learn/careerdevelopment
- https://www.coursera.org/learn/tesol-writing
- https://www.coursera.org/learn/tesol-speaking

Web Reference/E-Books:

- https://www.pdfdrive.com/cambridge-english-phonetics-and-phonology-d4251196.html
- https://www.pdfdrive.com/the-persuasion-skills-black-book-for-job-hunters-covert-hypnotic-persuasion-secrets-for-gaining-an-unfair-advantage-for-your-cv-r%C3%A9sum%C3%A9-and-interview-d162202398.html
- https://www.pdfdrive.com/effective-group-discussion-theory-and-practice-e187409223.html
- https://www.pdfdrive.com/collins-english-for-business-speaking-e187281074.html
- https://www.pdfdrive.com/mastering-the-american-accent-e158174248.html
- https://www.pdfdrive.com/spoken-english-flourish-your-language-e1509842.html

ENGINEERING CHEMISTRY LAB
I B.Tech.   II SEM

Course Title: Engineering Chemistry Lab	Course Code: AS20-00BS03
Teaching Scheme (L:T:P): 0:0:3	Credits: 1.5
Type of Course: Practical	Total Contact Periods: 48 Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: Students must have studied two years of intermediate chemistry	

Course Overview:

The course emphasizes active resolution of experimental problems involving volumetric, analytical and instrumental usage; their design and optimization. Analytical, oral presentation, written report, and cooperative problem-solving skills are stressed in the context of chemical sciences practices. Safety awareness is integrated throughout the course.

Course Objective

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

1. Estimation of hardness 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.

Course Outcomes(s)

CO#	Course Outcomes
C128.1	Analyze the need, design and perform a set of experiments.
C128.2	Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life.
C128.3	Understand the kinetics of a reaction from a change in concentration of reactants or products as a function of time.
C128.4	Employ the basic techniques used in chemistry laboratory for analysis such as Thin Layer Chromatography, volumetric titrations, Conductometric Measurements, Ostwlad's viscometer and stalagmometer.
C128.5	Demonstrate the technique of thin Layer Chromatography (TLC) and synthesize drug molecules widely used in industry.
C128.6	Learn safety rules in the practice of laboratory investigations.

LIST OF EXPERIMENTS/DEMONSTRATIONS

1. Determination of total hardness of water by Complexometric method using EDTA
2. Estimation of Iron using Standard $KMnO_4$.
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^{2+} by Dichrometry
7. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate
8. Determination of acid value of coconut oil
9. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
10. Determination of surface tension of a give liquid using Stalagmometer
11. Synthesis of Aspirin and Paracetamol
12. Thin layer chromatography calculation of Rf values. eg ortho and para nitro phenols

References 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.

Online Resources

(SWAYAM/NPTEL/MOOCS/COURSERA):

1. http://www.cdeep.iitb.ac.in/webpage_data/nptel/Core%20Science/Engineering%20Chemistry%201/Course_home_Lec38.html

2. http://vlabs.iitb.ac.in/vlab/labscs.html

3. https://www.vlab.co.in/broad-area-chemical-engineering

Department of Artificial Intelligence & Machine Learning

SOFT SKILLS 2
I B.Tech.   Civil-II SEM

Course Title: Soft Skills 2	Course Code: AS20-00HS04
Teaching Scheme (L:T:P):2:0:0	Credits: Nil
Type of Course: Lecture	Total Contact Periods:32Hrs
Continuous Internal Evaluation: Nil	Semester End Exams: 100 Marks
Prerequisites:	

Course Objective:-

1. To develop Optimistic Nature.
2. To enhance the skills related to Group Discussion.
3. To make the students to have commitment.
4. To enhance dedication and determination.
5. To develop confidence.
6. To enhance soft skills and life skills.

Course Outcomes:

CO#	Course Outcomes
C129.1	Analyze excellent behavioral attitude.
C129.2	Apply amicable solutions to problematic issues in life.
C129.3	Understand the importance of functional and practical work.
C129.4	Create goal oriented personality.
C129.5	Understand soft skills and life skills.
C129.6	Remember to be committed and determined.

COURSE CONTENT (SYLLABUS)

UNIT I: Linguistic Ability

Writing Skills - Reading Skills - Listening Skills - Speaking Skills - Just a Minute Program – JAM – Improving Vocabulary.

UNIT II: Effective Communication

Introduction – Communicative Methodology – Way to Communicate perfectly – Communicative series – Descriptive Communication – Process of Communication – Barriers of Communication – Essentials of Communication – Improving

existing Communication – Strategies to improve Communication – Corporate Communication – Assess the Communication – How to be a successful Communicator.

UNIT III: Ethical Values

Meaning of Ethics- Importance of Education – Moral Values – Eradication of problems – Influence of the society – Developing self-motivational skills – Source of Ethics – Develop Ethics – Ethics related to Life.

UNIT IV: Confidence

Self Confidence – Self Esteem – Importance of Confidence – Right decision Making – Turn towards Productivity – Things can be had with Confidence – Self Identity – Building good career – Self Reliance – Quotes of Confidence.

UNIT V: Introduction – Initiation – Verbal Oriented – Purpose of Group Discussion –Importance of Group Discussion – Involvement in Group Discussion - Learning Attitude – Skill Development Platform – Primary Level Topics and Discussion – Able Participation – Practice Group Discussion.

Text Books:

1. Body Language in the work place – Allan and Barbara Pease 2011.
2. Students Handbook: Skill Genie – Higher education department, Government of Andhra Pradesh.
3. Soft Skills – Odhisha State Open University.

Web References:

1. Extraordinary Communication Skills - By Sandeep Maheshwari I Hindi & English SpeakingPracticeTips https://www.youtube.com/watch?v=VczVqHJW0gg
2. Effective Communication Skills Training Video in Hindi https://www.youtube.com/watch?v=kxAXOh5RmwU
3. A guide to effective communication https://www.youtube.com/watch?v=JwjAAgGi-90
4. A Failure to Communicate https://www.youtube.com/watch?v=8Ox5LhIJSBE
5. Non Verbal Communication https://www.you tube.com/watch?v=SKhsavlvuao

B.TECH SECOND YEAR FIRST SEMESTER SYLLABUS

PROBABILITY & RANDOM PROCESSES
II B.Tech., I SEM

Course Title: Probability & Random Processes	Course Code: AS20-00BS10
Teaching Scheme (L:T:P): 3:1:0	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: 1. Students should have knowledge of Basic concepts of probability 2. Students should have knowledge of Addition, Multiplication and Baye's theorems	

Course Overview:

- Basic concepts of probability and Random Variables
- Discrete probability distributions like Binomial, Poisson and their properties etc.
- Continuous Probability distributions like Normal, Gamma, and Exponential distributions.
- Concept of fitting of straight line, parabola and other curves
- The testing of hypothesis and large sample procedures

Course Objective:

- The ideas of probability and random variables
- The various discrete probability distributions and their properties.
- The various continuous probability distributions and their properties.
- The basic ideas of statistics including measures of central tendency, correlation and regression.
- The statistical methods of studying data samples and identify the Samples to make decisions for samples given.

Course Outcomes(s)

CO#	Course Outcomes
C211.1	Formulate and solve problems involving random variables
C211.2	Apply statistical methods for analysing experimental data by probability distributions
C211.3	Identify Various discrete and continuous probability distributions and their properties
C211.4	Evaluation of regression and correlation
C211.5	Analyze the statistical methods of studying data samples
C211.6	Analyze to make important decisions for few samples which are taken from a larger data.

COURSE CONTENT (SYLLABUS)

UNIT I: RANDOM VARIABLES

Introduction to Basic Probability; Random variables: Discrete Random Variable; Continuous Random variables; Expectation of Random Variables: Variance of Random variables; Moments.

UNIT II: DISCRETE PROBABILITY DISTRIBUTIONS

Binomial Distributions, Poisson Distributions, Evaluation of statistical parameters for these distributions; Poisson approximation to the binomial distribution.

UNIT III: CONTINUOUS RANDOM VARIABLE & DISTRIBUTIONS

Continuous random variables and their properties; Distribution functions and densities; Normal Distributions; Exponential Distributions; Gamma Distributions; Evaluation of statistical parameters for these distributions.

UNIT IV: APPLIED STATISTICS

Curve fitting by the method of least squares: fitting of straight line; Second degree parabola and more general curves; Correlation and regression: Rank correlation.

UNIT V: TESTING OF HYPOTHESIS

Test of significance**:** Null Hypothesis; Alternative Hypothesis-Type I Error –Type II Error; Large sample test for single

proportion; Difference of proportions; Single mean: Difference of means;

Test for single mean; Difference of means for small samples; Test for ratio of variances for small samples.

Text Books:

1. S C Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Khanna Publications

2. S.R.K. Iyengar, R.K Jain Advanced engineering Mathematics, Narosa publishing house, Fifth Edition,2016.

References Books:

1. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations

2. Sheldon Ross, A First Course in Probability, 9th Edition, Pearson Education India.

Online Resources

(SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://www.my-mooc.com/en/categorie/statistics-and-probability

2. https://www.khanacademy.org/math/statistics-probability

Web Reference/E-Books:

1. FUNDAMENTALS OF MATHEMATICAL STATISTICS BY S.C.GUPTHA, V.K KAPOOR

2. PROBABILITY AND STATISTICS FOR ENGINEERS BY MILLER & FREUND'S

COMPUTER ARCHITECTURE
II B.Tech., I SEM

Course Title: Computer Architecture	Course Code: AS20-05ES05
Teaching Scheme (L:T:P): 3:1:0	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: Data Structures	

Course Overview:

This course will discuss the basic concepts of computer architecture and organization that can help the participants to have a clear view as to how a computer system works. Examples and illustrations will be mostly based on a popular Reduced Instruction Set Computer (RISC) platform. Illustrative examples and illustrations will be provided to convey the concepts and challenges to the participants. Starting from the basics, the participants will be introduced to the state-of-the-art in this field.

Course Objective:

The objectives of the course are to:

- The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
- It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
- Topics include computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors.

Course Outcomes(s)

CO#	Course Outcomes
C212.1	Understand the basics of processor design and their impact on instructions sets.
C212.2	Demonstrate an understanding of the design of the functional units of a digital computer system.
C212.3	Infer and manipulate representations of numbers stored in digital computers.
C212.4	Understand the design and working of Interfaces and memory devices
C212.5	Design a pipeline for consistent execution of instructions with minimum hazards.
C212.6	Demonstrate an understanding of the design of the basic computer and its instruction sets

COURSE CONTENT (SYLLABUS)

UNIT I:

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture. Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT - II

Microprogrammed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT - III

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point

Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT - IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

UNIT - V

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics. Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

Text Books:
1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

References Books:
1. Computer Organization – Car Hamacher, Zvonks Vranesic, Safea Zaky, Vth Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.

Online Resources
(SWAYAM/NPTEL/MOOCS/COURSERA):
1. https://www.coursera.org/learn/making-architecture
2. https://www.coursera.org/learn/comparch
3. http://nptel.ac.in/video.php?subjectId=106102062
4. http://nptel.ac.in/courses/106102062/

Web Reference/E-Books:
1. http://www.hp.com/hpinfo/newsroom/press_kits/2013/hpmoonshot2013/DS_Mo onshot_System.pdf
2. https://www.hpe.com/h20195/v2/getpdf.aspx/c04168328.pdf?ver=11
3. http://documents.opto22.com/casestudies/2183_Case_Study_San_Diego_Supercom puter_Center.pdf

DIGITAL ELECTRONICS
II B.Tech., I SEM

Course Title: Digital Electronics	Course Code: AS20-04ES06
Teaching Scheme (L:T:P): 3:1:0	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: Electronic Devices and Circuits	

Course Overview:

To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.

Course Objective:

- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.

Course Outcomes(s)

CO#	Course Outcomes
C213.1	Explain working of different logic families and logic gates.
C213.2	Solve Boolean expressions to minimize various combinational functions.
C213.3	Design and implement various Combinational logic circuits.
C213.4	Analyze and design various sequential circuits.
C213.5	Explain the process of Analog to Digital conversion and Digital to Analog conversion.
C213.6	Develop the given logical problem using PLD's

COURSE CONTENT (SYLLABUS)

UNIT I:

Fundamentals of Digital Systems and Logic Families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT II

Combinational Digital Circuits: Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial ladder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT III

Sequential Circuits and Systems: A 1-bit memory, the circuit properties of Bi-stable latch, the clocked SR flip flop, J, K, T and D types flip-flops, applications of flip-flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT IV

A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs.

UNIT V

Semiconductor Memories and Programmable Logic Devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

Text Books:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

References Books:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. http://nptel.ac.in/noc2. NPTEL
2. https://youtu.be/oNh6V91zdPY

Web Reference/E-Books:

1. https://doi.org/10.1515/9783110263787.73
2. http://cupola.gettysburg.edu/cgi/viewcontent. cgi? article=1000&context=oer
3. https://web.archive.org/web/20121127110933/http://openbookproject.net/electricCircuits/Digital/index.html
4. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-004-computation-structures-spring- 2009/
5. https://www.google.com/search?lei=49LMX5z_ON K5r QGXuIWgCA &q=advan tages%20of% 20 ele ctronics& ved= 2ahUKE wjc_Lnnsbn tAhXSXCs KHRdc AYQQsKwBKAN6BAgmEAQ
6. https://www.google.com/search?lei=49LMX 5z_ O N K 5 r QGX uIWgCA& q=application% 20of%20digital% 20electro nics&ved=2ahU KEwjc_Lnnsbn tAhXSXCsKHR dcAYQQsKwBKAF6BAgmEAI

COMPUTER NETWORKS
II B.Tech.,   I SEM

Course Title: Computer Networks	Course Code: AS20-05PC12
Teaching Scheme (L:T:P): 3:1:0	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: None	

Course Overview:

The growing importance of Internetworking in recent years and their use in every field has made Computer Networks a central issue for modern systems. The course introduces the basic concepts of networks. The main objective of the course is to enable students to know the functions of various layers of a network model. Topics covered in the course include Introduction to networks, Physical layer, Data link layer, Medium access sub layer, Network layer, Transport layer and Application layer.

Course Objective:

- To understand the protocol layering and physical level communication.
- To analyze the performance of a network.
- To understand the various components required to build different networks.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer.

Course Outcomes(s)

CO#	Course Outcomes
C214.1	Understand the basic layers and its functions in computer networks.
C214.2	Evaluate the performance of a network.
C214.3	Understand the basics of how data flows from one node to another.
C214.4	Analyze and design routing algorithms.
C214.5	Design protocols for various functions in the network.
C214.6	Understand the working of various application layer protocols.

COURSE CONTENT (SYLLABUS)

UNIT – I INTRODUCTION AND PHYSICAL LAYER

Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuit-switched Networks – Packet Switching.

UNIT – II DATA-LINK LAYER & MEDIA ACCESS

Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols – HDLC – PPP – Media Access Control – Wired LANs: Ethernet – Wireless LANs – Introduction – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT – III NETWORK LAYER

Network Layer Services – Packet switching – Performance – IPV4 Addresses – Forwarding of IP Packets – Network Layer Protocols: IP, ICMP v4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6 Protocol.

UNIT - IV TRANSPORT LAYER

Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol – Transmission Control Protocol – SCTP.

UNIT – V   APPLICATION LAYER

WWW and HTTP – FTP – Email –Telnet –SSH – DNS – SNMP.

Text Books:

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.

References Books:

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.

2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.

3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.

4. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.

5. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://nptel.ac.in/courses/106105081

Web Reference/E-Books:

1. http://www.nptelvideos.in/2012/11/computer-networks.html

INTRODUCTION TO UAV SYSTEMS & DRONES
II B.Tech., I SEM

Course Title: Introduction To Uav Systems & Drones	Course Code: AS20-13PC01
Teaching Scheme (L:T:P): 3:1:0	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: None	

Course Overview:

This course provides hands on experience on design, fabrication and flying of UAV category aircraft. Students will get in-depth skill set on design and fabrication techniques of UAV & Drones.

Course Objective:

- To make the students to understand the basic concepts of UAV systems design.
- To Learn the safety measures to be taken during flight.

Course Outcomes(s)

CO#	Course Outcomes
C215.1	Ability to design UAV system.
C215.2	Ability to identify different hardware for UAV
C215.3	Understand the basic working principal behind the electronic components used and its specification to build a drone from scratch.
C215.4	Identify and understand various functional modules of the controller using a preprogrammed controller used in the UAV.
C215.5	Describe the working principle and components of UAV
C215.6	Demonstrate design, fabrication and Flying of UAV

COURSE CONTENT (SYLLABUS)

UNIT - I INTRODUCTION TO UAV

History of UAV –classification – Introduction to Unmanned Aircraft Systems- models and prototypes – System Composition- applications.

UNIT - II THE DESIGN OF UAV SYSTEMS

Introduction to Design and Selection of the System- Aerodynamics and Airframe Configurations- Characteristics of Aircraft Types- Design Standards and Regulatory Aspects- UK,USA and Europe- Design for Stealth–control surfaces specifications.

UNIT - III AVIONICS HARDWARE

Autopilot – AGL-pressure sensors-servos-accelerometer –gyros- actuators- power supply-processor, integration, installation, configuration, and testing.

UNIT - IV SENSOR-PROCESSOR-ACTUATOR

Intro to Drones I (Sensor-Processor-Actuator), Intro to Drones II (How to Build a Drone), Intro to Drones III (Communication Links).

UNIT - V HOW TO FLY A DRONE

Intro to Drones IV (How to Fly a Drone) Drone part design using 3D Printer, Flying Projects

Text Books:

1. Syed Omar FarukTowaha, Building Smart Drones with ESP8266 and Arduino: Build exciting drones by leveraging the capabilities of Arduino and ESP8266, Packt Publishing, 2018.

References Books:

1. Reg Austin "Unmanned Aircraft Systems UAV design, development and deployment", Wiley, 2010.

2. Robert C. Nelson, Flight Stability and Automatic Control, McGraw-Hill, Inc, 1998.

3. Kimon P. Valavanis, "Advances in Unmanned Aerial Vehicles: State of the Art and the Road to Autonomy", Springer, 2007

4. Paul G Fahlstrom, Thomas J Gleason, "Introduction to UAV Systems", UAV Systems, Inc, 1998.

5. Dr. Armand J. Chaput, "Design of Unmanned Air Vehicle Systems", Lockheed Martin Aeronautics Company, 2001

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://oscarliang.com/build-a-quadcopter-beginners-tutorial-1/

2. https://blog.owenson.me/build-your-own-quadcopter-flight-controller/

3. http://www.starlino.com/imu_guide.html

Web Reference/E-Books:

1. https://nptel.ac.in/noc/courses/noc20/SEM2/noc20-ae04/

Department of Artificial Intelligence & Machine Learning

IT Workshop LAB
II B.Tech., I SEM

Course Title: IT Workshop Lab	Course Code: AS20-05ES06
Teaching Scheme (L:T:P): 0:0:3	Credits: 1.5
Type of Course: Practical Experiments	Total Contact Periods: 48Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: None	

Course Overview:

IT workshop works in a learning-by-doing mode. It concentrates more on hands-on experience for the participants rather theoretical classes. It enables the participant to make the best use of Microsoft Office Suite in their day-to-day requirements and make use of it to improve the standards in the educational environment. The IT Workshop prepares the participant to have a hands-on experience in maintaining and troubleshooting a PC by themselves.

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

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.

Course Outcomes(s)

CO#	Course Outcomes
C217.1	Gain knowledge on computer system such as system unit, input devices, output devices connected to the computer.
C217.2	Understand the booting process that includes switching on the system, execution of POST routine, the bootstrap loader, and loading of the operating system, and getting it ready for use.
C217.3	Analyze with parts of Word window, to create and save a document, to set page settings, create header and footers, to use various formatting features such as bold face ,italic size, underline, subscript, line spacing changing Text direction, etc.
C217.4	Understand with parts of Excel window, To create and save a workbook with single and/or multiple worksheets to apply operation son range of cells using built –in formulae.
C217.5	Apply with parts of PowerPoint win, to create and save a new presentation, apply design templates to a presentation to insert, edit and delete a slide.
C217.6	Create different PPTs software application

LIST OF EXPERIMENTS/DEMONSTRATIONS

PC Hardware

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 andWord.

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.

References 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.

DIGITAL ELECTRONICS LAB	
II B.Tech., I SEM	
Course Title: Digital Electronics Lab	Course Code: AS20-04ES07
Teaching Scheme (L:T:P): 0:0:3	Credits: 1.5
Type of Course: Practical Experiments	Total Contact Periods: 48Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: Digital Electronics, Analog Electronics and EDC	

Course Overview:

To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.

Course Objective:

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

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.

- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.

- To implement simple logical operations using combinational logic circuits

- To design combinational logic circuits, sequential logic circuits.

- To impart to student the concepts of sequential circuits, enabling them to analyses sequential systems in terms of state machines.

- To implement synchronous state machines using flip-flops.

Course Outcomes(s)

CO#	Course Outcomes
C218.1	Identify the various digital ICs and understand their operation.
C218.2	Understand the basic logic gates and to verify their operation
C218.3	Construct basic combinational circuits and verify their functionalities
C218.4	Apply the design procedures to design basic sequential circuits
C218.5	Verify truth tables and excitation tables of various flip flops
C218.6	Understand working of Logic families

LIST OF EXPERIMENTS

1. Realization of Boolean Expressions using Gates

2. Design and realization logic gates using universal gates

3. Generation of clock using NAND / NOR gates

4. Design a 4 – bit Adder / Subtractor

5. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter

6. Design and realization of a 4 bit pseudo random sequence generator using logic gates.

7. Design and realization of an 8 bit parallel load and serial out shift register using flip-flops. 8. Design and realization a Synchronous and Asynchronous counters using flip-flops

9. Design and realization of Asynchronous counters using flip-flops

10. Design and realization 8x1 using 2x1 mux

11. Design and realization 2 bit comparator

12. Verification of truth tables and excitation tables

13. Realization of logic gates using DTL, TTL, ECL, etc.,

14. State machines

Text Books:
1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

References Books:
1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):
1. http://nptel.ac.in/noc2. NPTEL
2. https://youtu.be/oNh6V91zdPY

Web Reference/E-Books:
1. https://doi.org/10.1515/9783110263787.73
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/digital-electronics/experiments/verification-and-interpretation-truth-table-gates-iitr/
3. http://vlabs.iitb.ac.in/vlabs-dev/labs/digital-electronics/experiments/construction-half-full-adder-verification-of-operation-iitr/
4. http://vlabs.iitb.ac.in/vlabs-dev/labs/digital-electronics/experiments/half-full-subtractor-iitr/ (Half adder)
5. http://vlabs.iitb.ac.in/vlabs-dev/labs/digital-electronics/experiments/realization-of-logic-functions-iitr/ (logic gates realization using Universal Gates)
6. http://vlabs.iitb.ac.in/vlabs-dev/labs/digital-electronics/experiments/verify-truth-table-of-flipflops-iitr/ (flip-flops)
7. http://vlabs.iitb.ac.in/vlabs-dev/labs/digital-electronics/experiments/verification-decoder-demultiplexer-encoder-iitr/ (decoder and de-multiplexer)
8. http://vlabs.iitb.ac.in/vlabs-dev/labs/digital-electronics/experiments/implementation-of-multiplexer-demultiplexer-iitr/ (multiplexer and de-multiplexer)
9. http://vlabs.iitb.ac.in/vlabs-dev/labs/digital-electronics/experiments/verify-four-bit-synchronous-asynchronous-counter-iitr/ (4-Bit synchronous and Asynchronous counters)
10. http://vlabs.iitb.ac.in/vlabs-dev/labs/digital-electronics/experiments/verify-binary-to-gray-and-gray-to-binary-conversion-iitr/ Gray to Binary and Binary to Gray converters.
11. http://vlabs.iitb.ac.in/vlabs-dev/labs/digital-electronics/experiments/verify-truth-table-of-one-bit-and-two-bit-comparator-iitr/ Two Bit comparator using logic gates.

COMPUTER NETWORKS LAB
II B.Tech., I SEM

Course Title: Computer Networks Lab	Course Code: AS20-05PC14
Teaching Scheme (L:T:P): 0:0:3	Credits: 1.5
Type of Course: Practical Experiments	Total Contact Periods: 48Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: C Programming Lab	

Course Overview:

Students are able to learn the basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP. This provides a practical approach to Ethernet/Internet networking: networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work

Course Objective

- To learn and use network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To learn and use simulation tools.
- To use simulation tools to analyze the performance of various network protocols.

Course Outcomes(s)

CO#	Course Outcomes
C218.1	Outline the basic concept of networking, types, networking topologies and layered architecture.
C218.2	Understand data link layer and MAC sub-layer'
C218.3	Demonstrate the network Layer functioning
C218.4	Identify the different types of network devices and their functions within a network
C218.5	Understand the transport layer and application layer operation
C218.6	Design and maintenance of individual networks

LIST OF EXPERIMENTS

1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like:
   a) Echo client and echo server
   b) Chat
   c) File Transfer
4. Simulation of DNS using UDP sockets.
5. Write a code simulating ARP /RARP protocols.
6. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
7. Study of TCP/UDP performance using Simulation tool.
8. Simulation of Distance Vector/ Link State Routing algorithm.
9. Performance evaluation of Routing protocols using Simulation tool.
10. Simulation of error correction code (like CRC).

Text Books:
1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.

References Books:
1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):
1. https://nptel.ac.in/courses/106105081

Web Reference/E-Books:
1. WWW.acm.org/sigcomm/sos.html.
2. WWW.ietf.org/
3. WWW.osi.org/

GENDER SENSITIZATION

Course Title: Gender Sensitization	Course Code: AS20-00MC02
Teaching Scheme (L:T:P): 3:0:0	Credits: 0
Type of Course: Lecture	Total Contact Periods: 48Hrs
Continuous Internal Evaluation- Nil	Semester End Exams-70 Marks
Prerequisites: Nil	

Course Objective:

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To expose the students to debates on the politics and economics of work.
4. To help students reflect critically on gender violence.

Course Outcomes(s)

CO#	Course Outcomes
C219.1	Develop a better understanding of important issues related to what gender is in contemporary India.
C219.2	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.
C219.3	Attain a finer grasp of how gender discrimination works in our society and how to counter it. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
C219.4	Understand what constitutes sexual harassment and domestic violence and be made aware of new forums of Justice.
C219.5	Draw solutions as to how men and women, students and professionals can be better equipped to work and live together as equals.
C219.6	Develop a sense of appreciation women in all walks of life

COURSE CONTENT (SYLLABUS)

UNIT I: Understanding Gender:
Introduction
What is Gender and why does it matter
Gender Relations and Status in the Household
Masculinities
Gender Analysis and mainstreaming
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.
Teacher's Role in Promoting/Advancing Gender Sensitization
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.
Sexual Harassment—Women at all levels of employment and all levels of workplace are affected.

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.

Promoting gender equality to prevent violence against women

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 text book on Gender written by A. Suneetha. Telugu Academy, Hyderabad in 2015.
2. Seeing like a feminist: Menon Nivedita. Zubaan Penguin books. New Delhi in 2012.
3. Gender Sensitization by C. Rajya Lakshmi, D. S. Vittal, by Himalaya Publishing House.

e- books:
1. https://fybblog.com/ignou-book-bgdg-172-hindi-english
2. http://saha.ac.in/web/images/administration/pdf/Gender%20Sensitization%20New-10-4-2017_545c7.pdf
3. https://www.researchgate.net/publication/329541569_EMPOWERING_WOMEN_THROUGH_GENDER_SENSITIZATION

Web References:
1. https://nptel.ac.in/courses/110/105/110105080/
2. https://onlinecourses.nptel.ac.in/noc19_hs57/preview
3. https://nptel.ac.in/content/storage2/courses/109103023/download/Lecture%2027.pdf

B.TECH SECOND YEAR SECOND SEMESTER SYLLABUS

UNIVERSAL HUMAN VALUES II

II B.TECH I SEM

Course Title: Universal Human Values II	Course Code: AS20 – 00HS07
Teaching Scheme (L:T:P): 3:1:0	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks

Prerequisites:
1. The student must have basic knowledge of Need, Basic Guidelines, Content and Process for Value Education
2. Understanding Harmony in the Human Being - Harmony in Myself
3. The student must have fundamental knowledge Understanding Harmony in the Family and Society-Harmony in Human-Human Relationship
4. The student can able to Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

Course Overview:

This course is designed for transferring the right understanding and definite human conduct in the students. The conduct of every human differs from human to human. Through this course an attempt is being made to introduce the definite human conduct in students. The conduct of a human being can be definite only if knowledge of right understanding and right human conduct is taught to them.

Course Objective The objective of the course is four fold:
1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

After completion of the course the student is able to,

CO#	Course Outcomes
C211.1	Basic guideline of human values universally.
C211.2	Understanding the harmony in the human being
C211.3	Learn the rights and responsibilities as an employee, team member and a global citizen
C211.4	To know about society – Harmony @ human relation
C211.5	The student can study the professional ethics and values.
C211.6	Understand the importance of Values and Ethics in their personal lives and Professional careers

COURSE CONTENT (SYLLABUS)

UNIT – I

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Purpose and motivation for the course, recapitulation from Universal Human Values-I- Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario,Method to fulfil the above human aspirations: understanding and living in harmony at various levels. (Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking)

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' - happiness and physical facility. 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 Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT- III

Understanding Harmony in the Family and Society- Harmony in Human-Human

Relationship

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship, Understanding the meaning of Trust; Difference between intention and competence, Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

UNIT - IV

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self regulation in nature, Understanding

Existence as Co-existence of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

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, c. Ability to identify and develop appropriate, technologies and management patterns for above production systems, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: 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, Sum up, Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Text Books

- Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books

- Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
- Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- The Story of Stuff (Book).
- The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

E-Resources

- https://www.yourmorals.org/schwartz.2006. basic% 20human%20values.pdf
- https://web.archive.org/web/20080311200942/ https://kroc.nd.edu/ocpapers/op_16_1.pdf
- https://kroc.nd.edu/ocpapers/op_16_1.pdf
- https://www.google.com/search?sa=X&bi w=1366&bih =657&sxsrf=ALeKk032tvNCeLhiX_fL4ciefTh ZdeN_ vQ:1607766793377&q
- https://www.researchgate.net/publication/ 270388493_Variations_in_Value_Orientation

Web References

- https://furhhdl.org/our-programmes/education-and-ethics/universal-human-values-ethics/
- https://www.google.com/search?sa=X&biw=1 366 &bih =657&sxsrf= ALeKk032tvNCeLhiX_ fL4ciefThZdeN_ vQ: 1607766793377&qWEB RESOURSES
- https://www.un.org/press/en/2003/sgsm 9076.doc.htm
- https://www.kobo.com/ebook/the-psychology-of-conservatism-routledge-revivals

DATABASE MANGEMENT SYSTEMS
II B.Tech., II SEM

Course Title: DATABASE MANGEMENT SYSTEMS	Course Code: AS20-05PC04
Teaching Scheme (L:T:P): 3:1:0	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: Object oriented Programming , Mathematical Foundations of Computer Science	

Course Overview:

This course introduces the core principles and techniques required in the design and implementation of database systems. This course focus on relational database management systems, including database design theory: E-R modeling, data definition and manipulation languages, database security and administration. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery and various types of databases like distributed database, and intelligent database, Client/Server. Students undertake a semester project to design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.

Course Objective: The objective of this Course is:

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- To understand the relational database design principles.

- To become familiar with the basic issues of transaction processing and concurrency control.
- To become familiar with database storage structures and access techniques.

Course Outcomes(s)

CO#	Course Outcomes
C222.1	Demonstrates the basic elements of a relational database management system.
C222.2	Identifies the data models for relevant problems.
C222.3	Designs entity relationship model and converts entity relationship diagrams into RDBMS and formulates SQL queries on the data.
C222.4	Applies normalization for the development of application software.
C222.5	Describes various transactional properties and lock based protocols.
C222.6	Describes storage and indexing like tree structured and Hash based indexing.

COURSE CONTENT (SYLLABUS)

UNIT - I

Introduction to Database System Concepts: Database-System Applications, Purpose of Database Systems, View of Data, Database Language, Database Design, Database Architecture, Database Users and Administrators.

Introduction to the Relation Models and Database Design using ER Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations Overview of the Design Process,TheEntity-RelationshipModel,Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-RFeatures.

UNIT-II

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions Nested Sub queries, Modification of the Database.

Intermediate and Advanced SQL: Join Expressions, Views, Integrity Constraints, SQL Data Types, Authorization. Functions and Procedures, Triggers, Advanced Aggregation Features.

UNIT-III

Formal Relational Query Languages: The Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus.

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies - Reasoning about FDs, Normal Forms, Properties of Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies.

UNIT-IV

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

Transactions: Transaction Concept, a Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels.

UNIT-V

Concurrency Control: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multi version schemes.

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, ARIES, Remote Backup Systems.

Text Books:

1. AbrahamSil berschatz, HenryF.Korth, S.Sudarshan, Database System Concepts , 6th Edition, TataMcGraw-Hill.

2. Raghu Rama Kirshna, Johannes Gehrk, ‾Database Management System Tata McGraw Hill 3rdEdition.

References Books:

1. Database Systems, 6th edition,R Elmasri, Shamkant B.Navathe, Pearson Education.

2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning.

3. Introduction to Database Management, M. L. Gillenson and others, Wiley Student Edition.

4. Database Development and Management, Lee Chao, Auerbach publications, Taylor & FrancisGroup.

Online Resources

(SWAYAM/NPTEL/MOOCS/COURSERA):

1. http://nptel.ac.in/video.php?subjectId=106106093

2. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-830- database-systems-fall-2010/

3. www.tutorialspoint.com/dbms/

4. https://www.coursera.org/learn/database-management

Web Reference/E-Books:

1. https://www.udemy.com/database-management-system/

2. https://alison.com/courses/IT-Management-Software-and-Databases

3. https://mva.microsoft.com/en-us/training-courses/database-fundamentals- 8243?l=TEBiexJy_5904984

4. http://www.sqlcourse.com/

PRINCIPLES OF OPERATING SYSTEMS
II B.Tech., II SEM

Course Title: Principles of Operating Systems	Course Code: AS20-12PC03
Teaching Scheme (L:T:P): 3:1:0	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: Computer Architecture	

Course Overview:

This course enable the students to interpret main components of operating system and their working, identify the role of Operating System in process scheduling and synchronization, analyze the way of addressing deadlock, understand memory management techniques and I/O systems, describes the way of handling files and security.

Course Objective: The objective of this Course is:

- To understand the basic concepts and functions of operating systems.
- To understand Processes and Threads.
- To analyze Scheduling algorithms.
- To understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To understand I/O management and File systems.
- To be familiar with the basics of Linux system and Mobile OS like iOS and Android.

Course Outcomes(s)

CO#	Course Outcomes
C223.1	Analyze various scheduling algorithms..
C223.2	Understand deadlock, prevention and avoidance algorithms.
C223.3	Compare and contrast various memory management schemes.
C223.4	Understand the functionality of file systems.
C223.5	Perform tasks on Linux Servers.
C223.6	Compare iOS and Android Operating Systems.

COURSE CONTENT (SYLLABUS)

UNIT I-OPERATING SYSTEM OVERVIEW

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions.

Evolution of Operating System.- Computer System Organization Operating System Structure and Operations-System Calls, System Programs, OS Generation and System Boot.

UNIT II-PROCESS MANAGEMENT

Processes - Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple- processor scheduling, Real time scheduling.

Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors;

Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT III-STORAGE MANAGEMENT

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples.

Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT IV-FILE SYSTEMS AND I/O SYSTEMS

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface - File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection.

File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.

UNIT V-CASE STUDIES

Linux System - Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication;

Mobile OS - iOS and Android - Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, ‾Operating System Concepts , 9th Edition, John Wiley and Sons Inc., 2012.

References Books:

1. Ramaz Elmasri, A. Gil Carrick, David Levine, ‾Operating Systems – A Spiral Approach , Tata McGraw Hill Edition, 2010.

2. Achyut S.Godbole, Atul Kahate, ‾Operating Systems, Mc Graw Hill Education, 2016.

3. Andrew S. Tanenbaum, ‾Modern Operating Systems, Second Edition, Pearson Education, 2004.

4. Gary Nutt, ‾Operating Systems , Third Edition, Pearson Education, 2004.

5. Harvey M. Deitel, ‾Operating Systems , Third Edition, Pearson Education, 2004.

6. Daniel P Bovet and Marco Cesati, ‾Understanding the Linux kernel , 3rd edition, O'Reilly, 2005.

7. Neil Smyth, ‾iPhone iOS 4 Development Essentials – Xcode , Fourth Edition, Payload media, 2011.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://www.coursera.org/learn/embedded-operating-system

2. nptel.ac.in/courses/Webcourse.../Operating% 20 Systems

Web Reference/E-Books:

1. http://geeksforgeeks.org/Operating Systems/

INTRODUCTION TO IOT
II B.Tech., II SEM

Course Title: Introduction To IOT	Course Code: AS20-13PC02
Teaching Scheme (L:T:P): 3:1:0	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: None	

Course Overview:

This course will describe the market around the Internet of Things (IoT), the technology used to build these kinds of devices, how they communicate, how they store data, and the kinds of distributed systems needed to support them. Divided into four modules, we will learn by doing. We will start with simple examples and integrate the techniques we learn into a class project in which we design and build an actual IoT system. The client will run in an emulated ARM environment, communicating using common IoT protocols with a cloud enabled backend system.

Course Objective

- To understand the basics of Internet of things and protocols.
- Introduces some of the application areas where Internet of Things can be applied.
- To learn about the middleware for Internet of Things.
- To understand the concepts of Web of Things.

Course Outcomes(s)

CO#	Course Outcomes
C224.1	Understand the basic concepts of Internet of Things and its architecture.
C224.2	Analyze and understand the basic applications of IoT.
C224.3	Apply the concepts of IOT
C224.4	Analysis and evaluate protocols used in IOT.
C224.5	Evaluate and analyze different solution for the real life problems of Internet of Things.
C224.6	Apply IOT to different applications

COURSE CONTENT (SYLLABUS)

UNIT-I IOT

What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.

UNIT-II IOT PROTOCOLS

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFIDProtocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4–BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security.

UNIT-III IOT ARCHITECTURE

IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models-IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction.

UNIT-IV WEB OF THINGS

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence.

UNIT-V IOT APPLICATIONS

IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc.

Text Books:

1. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press,2012.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
3. David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a Highly Connected World", Cambridge University Press, 2010.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012.

References Books:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014.

2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, A press Publications, 2013.

3. CunoPfister, Getting Started with the Internet of Things, O Reilly Media, 2011, ISBN: 978-1-4493-9357-1

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://nptel.ac.in/courses/106105166
2. https://nptel.ac.in/courses/108108098/

Web Reference/E-Books:

1. https://www.udemy.com/internet-of-things-iot-for-beginners-getting-started/
2. http://playground.arduino.cc/Projects/Ideas
3. http://runtimeprojects.com
4. http://www.megunolink.com/articles/arduino-garage-door-opener

ARTIFICIAL INTELLIGENCE FOR ROBOTICS
II B.Tech.,   II SEM

Course Title: Artificial Intelligence For Robotics	Course Code: AS20-13PC03
Teaching Scheme (L:T:P): 3:1:0	Credits: 3
Type of Course: Lecture +Tutorial	Total Contact Periods: 48Hrs+ 16Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: None	

Course Overview:
This course introduces the problem of how a robot can learn to perceive its world well enough to act in it, to make reliable plans, and to learn from its own experience. The focus will be on algorithms and machine learning techniques for autonomous operation of robots.

Course Objective: This course will enable students to
- To present a problem oriented in depth knowledge of Artificial Intelligence and Robotics.
- To address the underlying concepts, methods and application of different Artificial Intelligence and Robotics.

Course Outcomes(s)

CO#	Course Outcomes
C225.1	Understand problem solving methods, state space problems and search methods.
C225.2	Understand knowledge acquisition and representation methods.
C225.3	Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing
C225.4	Apply knowledge base system for assembly, process planning and scheduling.
C225.5	Apply concept Natural Language processing to problems leading to understanding of cognitive computing
C225.6	Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.

COURSE CONTENT (SYLLABUS)

UNIT-I

Scope of AI Games theorem, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.

UNIT-II

Problem solving State space search; Production systems, search space control: depth first, breadth-first search, heuristic search - hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis.

UNIT-III

Knowledge Representation Predicate Logic: unification, modus pones, resolution, dependency directed backtracking. Rule based Systems: forward reasoning, conflict resolution, backward reasoning, use of no backtracks. Structured Knowledge Representation: semantic net slots, exceptions and default frames, conceptual dependency, scripts.

UNIT-IV

Handling uncertainty and learning: Non-monotonic reasoning, probabilistic reasoning, use of certainty factors, fuzzy logic, Concept of learning, learning automation, genetic algorithm, learning by inductions, neural network.

UNIT-V

Robotics: Robot Classification, Robot Specification, notation Direct and Inverse Kinematics: Co-ordinates Frames, Rotations, Homogeneous Coordinates

Text Books:

1. E. Rich and K. Knight, "Artificial intelligence", MH, 2nd ed., 1992.
2. N.J. Nilsson, "Principles of AI", Narosa Publ. House, 2000.
3. Robin R Murphy, Introduction to AI Robotics PHI Publication, 2000

References Books:

1. D. W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.

2. R. J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.

3. George Lugar, .Al-Structures and Strategies for and Strategies for Complex Problem solving, 4/e, 2002, Pearson Educations.

Online Resources

(SWAYAM/NPTEL/MOOCS/COURSERA):

1. http://www.nptelvideos.in/2012/11/artificial-intelligence-prof-p-dasgupta.html

2. https://www.coursera.org/learn/introduction-to-ai

Web Reference/E-Books:

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_robotics.htm

2. https://www.geeksforgeeks.org/artificial-intelligence-in-robotics/

3. https://data-flair.training/blogs/ai-robot/

DATABASE MANAGEMENT SYSTEM LAB

II B.Tech., II SEM

Course Title: Database Management System Lab	Course Code: AS20-05PC08
Teaching Scheme (L:T:P): 0:0:3	Credits: 1.5
Type of Course: Practical Experiments	Total Contact Periods: 48Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: None	

Course Overview:

This course introduces the core principles and techniques required in the design and implementation of database systems. This course focus on relational database management systems including data definition language, data manipulating languages. SQL is used to share and manage data, particularly the data that is found in relational database management systems - where the data is organized in tables, and where multiple files, each containing tables of data, may be related together by a common field. This course will cover the Oracle 10g PL/SQL programming language. Student will learn to control data sharing and learn to develop triggers, procedures, functions, cursors.

Course Objective:

This course will enable students to

- Foundation knowledge in database concepts, technology and practice to groom students into well-informed database application developers.
- Strong practice in SQL programming through a variety of database problems.
- Develop database applications using front-end tools and back-end DBMS.

Course Outcomes(s)

CO#	Course Outcomes
C226.1	Designs and implements a database schema for given problem.
C226.2	Builds a GUI application.
C226.3	Applies the normalization techniques for development of application software to realistic problems.
C226.4	Formulates queries using SQL DML/DDL/DCL commands.
C226.5	Develop solutions for database applications using procedures, cursors and triggers.
C226.6	Declare and enforce integrity constraints on a database using RDBMS.

LIST OF EXPERIMENTS

1. Practicing Basic SQL Commands through: DDL,DML,DCL,TCL.

SQL clause :SELECT FROM WHERE GROUPBY, HAVING, ORDERBY Example of College database.

2. SQL Programming : Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.

- Create Schema and insert at least 5 records for each table for the following DB.
- Add appropriate database constraints.
- Design an entity-relationship (ER) data model for each of the databasesystem.
- Convert above ER model to relational model.
- List functional dependencies.
- Normalize these relations up to3NF/BCNF.

i) Consider the following schema for a Library Database: BOOK(Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS(Book_id, Author_Name) PUBLISHER(Name, Address, Phone) BOOK_COPIES(Book_id, Branch_id,No-of_Copies)

BOOK_LENDING (Book_id, Branch_id, Card_No, Date_Out, Due_Date)

LIBRARY_BRANCH(Branch_id, Branch_Name, Address)

Write SQL queries to

a) Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.

b) Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2020 to Jun 2020.

c) Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.

d) Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.

e) Create a view of all books and its number of copies that are currently available in the Library.

ii) Consider the following schema for Order Database:

SALESMAN(Salesman_id,Name,City,Commission)

CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id) ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)

Write SQL queries to

a) Count the customers with grades above Bangalore's average.

b) Find the name and numbers of all salesman who had more than one customer.

c) List all the salesman and indicate those who have and don't have customers in their cities (Use UNION operation).

d) Create a view that finds the salesman who has the customer with the highest order of a day.

e) Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

iii) Consider the schema for Company Database:

EMPLOYEE(SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DEPARTMENT(DNo, DName, MgrSSN, MgrStartDate) DLOCATION(DNo,DLoc) PROJECT(PNo, PName, PLocation, DNo) WORKS_ON(SSN, PNo, Hours)

Write SQL queries to

a) Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.

b) Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.

c) Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.

d) Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).

e) For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000.

3. Consider a different database system. List functional dependencies [Include complex business logic.] Apply bottom - up approach using Relational Synthesis Algorithm for design of relational model for the chosen system. Verify decomposition properties.

4. Create tables with appropriate constraints for the relational schema. Create views, indices, and sequence. Alter the schema by adding/removing columns and constraints. Write DML queries.

5. Execute 'SELECT' queries using order by, group by, aggregate functions, having clause, and set operators. Use SQL single row functions for date, time, string etc.

6. Write equijoin, non-equijoin, self join and outer join queries. Write queries containing single row / multiple row / correlated sub queries using operators like =, in, any, all, exists etc. Write DML queries containing sub queries. Study a set of query processing strategies.

7. Write meaningful stored procedures in PL/SQL. Make use of cursors and different arguments. Write useful stored functions to perform complex computation. Write row level and statement level triggers in PL/SQL.

8. Implement a small database application for the above system using suitable front end and back end tool. Create a transaction by embedding SQL into an application program. Generate different useful reports.

Text Books:

1. Introduction to SQL, Rick F.Vander Lans, Pearson education.
2. Oracle PL/SQL, B.Rosenzweig and E.Silvestrova, Pearson education.
3. Oracle PL/SQL Programming, Steven Feuerstein, SPD.
4. SQL&PL/SQLforOracle10g, BlackBook, Dr.P.S. Deshpande, DreamTech.
5. Oracle Database 11g PL/SQL Programming, M.McLaughlin, TMH.
6. SQL Fundamentals, J.J.Patrick, Pearson Education.

References Books:

1. Abraham Silberschatz, HenryF.Korth, S.Sudar shan,¯DatabaseSystemConcepts , 6th Edition, Tata Mc Graw-Hill.

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. http://nptel.ac.in/video.php?subjectId=106106 093
2. http://ocw.mit.edu/courses/electrical-enginee ring -and-computer-science/6-830- database-systems-fall-2010/

Web Reference/E-Books:

1. www.tutorialspoint.com/dbms/

INTRODUCTION TO IOT LAB
II B.Tech.,   II SEM

Course Title: Introduction To IOT Lab	Course Code: AS20-13PC04
Teaching Scheme (L:T:P): 0:0:3	Credits: 1.5
Type of Course: Practical	Total Contact Periods: 48Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: None	

Course Overview:

The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. Its becoming the Internet of Things (IoT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the middleware for Internet of Things to understand the concepts of Web of Things.

Course Objective: The objective of this Course is:

- Understand the vision of IoT from a global context.
- Understand the application of IoT.
- Determine the Market perspective of IoT.

Course Outcomes(s)

CO#	Course Outcomes
C227.1	Understand the Uses of Devices, Gateways and Data Management in IoT.
C227.2	Understand the concepts of Internet of Things
C227.3	Design IoT applications in different domain and be able to analyze their performance
C227.4	Analyze basic protocols in wireless sensor network.
C227.5	Analysis and evaluate protocols used in IOT
C227.6	Implement basic IoT applications on embedded platform

LIST OF EXPERIMENTS

1. Define and Explain Eclipse IoT Project.

2. List and summarize few Eclipse IoT Projects.

3. Sketch the architecture of IoT Toolkit and explain each entity in brief.

4. Demonstrate a smart object API gateway service reference implementation in IoT toolkit.

5. Write and explain working of an HTTP- to-CoAP semantic mapping proxy in IoT toolkit.

6. Describe gateway-as-a-service deployment in IoT toolkit.

7. Explain application framework and embedded software agents for IoT toolkit.

8. Explain working of Raspberry Pi.

9. Connect Raspberry Pi with your existing system components.

10. Give overview of Zetta.

Text Books:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1 st Edition, VPT, 2014.

2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 st Edition, Apress Publications, 2013.

3. Cuno Pfister, Getting Started with the Internet of Things, O Reilly Media, 2011, ISBN: 978-1-4493-9357-1.

References Books:

1. David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a Highly Connected World", Cambridge University Press, 2010.

2. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012

Online Resources (SWAYAM/NPTEL/MOOCS/COURSERA):

1. Contiki (Open source IoT operating system)
2. Arduino (open source IoT project)
3. IoT Toolkit (smart object API gateway service reference implementation)
4. Zetta (Based on Node.js, Zetta can create IoT servers that link to various devices and sensors)
5. https://nptel.ac.in/courses/106/105/106105166/

Web Reference/E-Books:

1. https://github.com/connectIOT/iottoolkit
2. https://www.arduino.cc/
3. http://www.zettajs.org/

ARTIFICIAL INTELLIGENCE FOR ROBOTICS LAB
II B.Tech., II SEM

Course Title: Artificial Intelligence For Robotics Lab	Course Code: AS20-13PC05
Teaching Scheme (L:T:P): 0:0:3	Credits: 1.5
Type of Course: Practical	Total Contact Periods: 48Hrs
Continuous Internal Evaluation-30 Marks	Semester End Exams-70 Marks
Prerequisites: None	

Course Overview:

This Laboratory covers the major methods of inter process communications (IPC), which is the basis of all client / server applications under UNIX, Linux utilities. There will be extensive Programming exercises in shell scripts. It also emphasizes various programming concepts in IPC, multithreaded programming and socket programming.

Course Objective:

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Introduce the concepts of Expert Systems and Machine learning.

Course Outcomes(s)

CO#	Course Outcomes
C228.1	Identify problems that are amenable to solution by AI methods.
C228.2	Identify appropriate AI methods to solve a given problem.
C228.3	Formalize a given problem in the language/ framework of different AI methods.
C228.4	Summarize the learning methods adopted in AI.
C228.5	Design and perform an empirical evaluation of different algorithms on problem formalization.
C228.6	Illustrate the applications of AI in Robotic Applications.

LIST OF EXPERIMENTS

1. Programming in C or Matlab to implement fuzzy logic application for autonomous robot system.

2. Programming in C/Matlab to implement simulated annealing/genetic algorithm for solving inverse kinematic problems

3. Programming in C/Matlab to solve traveling salesman problem using ant colony optimization algorithm

4. Write program using Visual Prolog to create an expert system.

5. Write program for obstacle avoidance in mobile robots using any one algorithm.

6. Implement A* algorithm to Solve 8-puzzle problem using. Assume any initial configuration and define goal configuration clearly.

7. Define the operators for controlling domestic robot; use these operators to plan an activity to be executed by the robot. For example, transferring two/three objects one over the other from one place to another. Use Means-Ends analysis with all the steps revealed.

8. Solving real time planning and scheduling problems using software like Witness/Pro-model.

Text Books:

1. Lentin Joseph, "Robot Operating Systems (ROS) for Absolute Beginners, A press, 2018.

2. Aaron Martinez, Enrique Fernández, "Learning ROS for Robotics Programming", Packt Publishing Ltd, 2013.

References Books:

1. Jason M O'Kane, "A Gentle Introduction to ROS", CreateSpace, 2013.

2. AnisKoubaa, "Robot Operating System (ROS) – The Complete Reference (Vol.3), Springer, 2018.

3. Kumar Bipin, "Robot Operating System Cookbook", Packt Publishing, 2018.

4. Patrick Gabriel, "ROS by Example: A do it yourself guide to Robot Operating System", Lulu, 2012.

Online Resources (SWAYAM / NPTEL / MOOCS / COURSERA):

1. http://www.cairo-lab.com/news/2020/08/15/HRI-RARE-blog/

Web Reference / E-Books:

1. https://sites.google.com/a/korea.ac.kr/intelligent-robot-laboratory/research/manipulation/robotic-application/ai

ENVIRONMENTAL SCIENCES

II B.Tech., I SEM

Course Title: Environmental Sciences	Course Code: AS20-00MC01
Teaching Scheme (L:T:P): 3:0:0	Credits: 0
Type of Course: Lecture	Total Contact Periods: 48Hrs
Continuous Internal Evaluation- Nil	Semester End Exams-70 Marks
Prerequisites: Minimum understanding of biology, geography and natural environment.	

Course Overview:

Environmental science is the study of patterns and processes in the natural world and their modification by human activity. To understand current environmental problems, we need to consider physical, biological and chemical processes that are often the basis of those problems. This course will give students the skills necessary to address the environmental issues we are facing today by examining scientific principles and the application of those principles to natural systems. This course will survey some of the many environmental science topics at an introductory level, ultimately considering the sustainability of human activities on the planet.

Broad objective of the course:

The Environmental Science course is designed in such a way as to study the concept of sustainability in an integrated way, including environmental, economic, and social aspects, exploring both desirable future conditions and the transitions needed to reach them. The basic tenet of the Environmental Science course is that progress toward a sustainable future depends on the creative application of interdisciplinary thinking, spanning disciplines across the traditional college divisions, while striving for both depth and breadth. We seek to inspire creativity and combine passion with critical thinking skills in students who one day will be the citizens working to convert the world to more sustainable systems.

Course Objective: To learn

- The importance of ecological balance for sustainable development.
- The impacts of developmental activities and mitigation measures.
- The environmental policies and regulations.
- New developmental projects for sustainable development of nations.

Course Outcomes (s)

CO#	Course Outcomes
C229.1	Understand the importance of ecological balance and principles
C229.2	Evaluates the impact of developmental activities on ecological balance
C229.3	Understand various environmental acts and policies
C229.4	Gain knowledge about effect of Environment on Human health
C229.5	Understands the importance of environmental regulations helping in sustainable development
C229.6	Develop technologies for the sustainable development based on ecological principles

COURSE CONTENT (SYLLABUS)

UNIT-I

Ecosystem: Definition, scope and importance of ecosystem, classification, structure and function of an ecosystem, food chains, food web, Ecological Pyramids, Flow of energy, biochemical cycles, bio accumulation, bio magnification, Carrying capacity, ecosystem value services.

UNIT-II

Natural resources: Water resources: use and over utilization of surface and ground water, floods and droughts, measures taken to mitigate the intensity of floods and droughts. Dams: benefits and problems. Mineral resources: Use and exploitation, Environmental effects of extracting mineral resources, Land resources: Forest resources, uses of forests, causes of Deforestation. Energy resources: Growing energy needs,

Renewable and non-renewable energy sources. Use of alternative energy sources and case studies. Projects of renewable energy resources in different states of India.

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 megadiversity nation. Hot spots of biodiversity. Threats to biodiversity, conservation of biodiversity: in-situ and ex-situ conservation and 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: characterization and management. e-waste and its management. **Pollution control technologies**: Wastewater treatment methods: primary, secondary and tertiary. Overview of air pollution control technologies. **Global environmental problems and global efforts**: Climate change and impacts on human environment. Ozone depletion and ozone depleting substances (ODS). International conventions/protocols: Earth summit, Kyoto protocol and Montreal protocol.

UNIT-V

Environmental policy, legislation and 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 rule, Hazardous waste management and handling rule. EIA: EIA structure, methods of base line 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, population and its explosion, crazy consumerism, Rain water harvesting, Environmental education, Urban sprawl, Human health, Environmental ethics, Concept of green building, Life cycle assessment(LCA).

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission.

2. Textbook of Environmental Science and Technology- Dr. M. Anji Reddy, BS Publications.

3. Environmental Studies by Anubha Kaushik, New Age International Publishers.

REFERENCE BOOKS:

1. Environmental Studies by R. Rajagopalan, Oxford University press.

2. Introduction to Environmental Science by Y. Anjaneyulu, BS Publications.

3. Environmental Science: Towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd, NewDelhi.

Online Resources

(SWAYAM/NPTEL/MOOCS/COURSERA):

1. https://nptel.ac.in/courses/120/108/120108002/

2. https://onlinecourses.nptel.ac.in/noc20_ge16/preview

3. https://nptel.ac.in/courses/121/106/121106014/

4. https://nptel.ac.in/courses/120/108/120108004/

Web Reference/E-Books:

S.No	Advanced concepts in syllabus	Website Referred
1	Ecosystem	https://youmatter.world/en/definition/ecosystem-definition-example/
2	Natural Resources	https://wwf.panda.org/knowledge_hub/teacher_resources/webfieldtrips/natural_ resources/
3	Biodiversity	https://www.nationalgeographic.org/encyclopedia/biodiversity/https://www.natureserve.org/conservation-tools/biodiversity-indicators-dashboard
4	Pollution	https://www.nationalgeographic.org/encyclopedia/pollution/https://www.livescience.com/22728-pollution-facts.htmlhttps://www.worldwildlife.org/threats/pollutionhttps://www.nrdc.org/stories/air-pollution-everything-you-need-knowhttps://www.who.int/health-topics/air-pollution#tab=tab_1https://www.history.com/news/7-deadly-environmental-disastershttps://www.insider.com/worst-modern-manmade-disasters-world-environment-day-2019-5
5	Environmental policy	https://www.britannica.com/topic/environmental-policyhttps://www.unece.org/fr/env/welcome.html
6	EIA	http://alphace.ac.in/downloads/notes/cv/10cv847.pdf