B.E. Computer and Communication Engineering Regulations & Syllabi - R2019 (Choice Based Credit System)

Sri Eshwar College of Engineering (Autonomous) UG Regulations 2019

REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM (CBCS)

(Common to all B.E. / B.Tech. Programmes)

As per the guidelines given by the University Grants Commission, All India Council for Technical Education and Affiliating University (Anna University - Chennai), Regulations 2019 (R-2019) have been prepared integrating the features of the Choice Based Credit System (CBCS). The Regulation 2019 is applicable to the candidates admitted to the first year Bachelor of Engineering (B.E.) / Bachelor of Technology (B.Tech.) Degree Programmes of the Institution from the academic year 2019 -

2020 onwards and academic year 2020 - 2021 for second year Lateral Entry students.

Note: The regulations, curriculum, syllabus and scheme of examinations are subjected to amendments as may be decided by the Academic Council of the Institution from time to time. Any or all such amendments will be effective from such date and to such batches of students as may be decided by the Academic Council.

1. PRELIMINARY DEFINITIONS AND NOMENCLATURE

In this Regulation,

1.1 **"Programme"** means Degree Programme (i.e) B.E. / B.Tech. Degree Programme.

2.1 **"Discipline"** means Branch or Specialization of B.E. / B.Tech. Degree Programme like Computer Science and Engineering, Mechanical Engineering, Information Technology etc.,

3.1 **"Course"** means a theory or practical subject that is normally studied in a semester like Mathematics, Physics, Engineering Graphics, etc.,

4.1 **"Head of the Institution"** means the Principal of the institution.

5.1 **"Head of the Department"** means the head of the department concerned.

6.1 **"Controller of Examinations"** means the authority of the Institution who is responsible for pertaining to Autonomous Examinations.

7.1 **"University"** means Anna University, Chennai.

8.1 **"Institution"** means Sri Eshwar College of Engineering, Coimbatore unless indicated otherwise by the context. **2.**

ADMISSION PROCEDURE

2.1. Regular Entry Admission

Candidates seeking admission to the first semester of the eight semesters of B.E. / B.Tech. Degree Programme: i) Should have passed the Higher Secondary Examination (Academic stream, 10 + 2) Curriculum as prescribed by Government of Tamil Nadu with Mathematics, Physics and chemistry as three of the four subjects of study under part – III or any equivalent examination accepted by competent authority.

(or)

ii) Should have passed the Higher Secondary Examination of Vocational stream (Vocational groups in Engineering / Technology) as prescribed by the Government of Tamil Nadu.

They should also satisfy other eligibility conditions as prescribed by the Anna University, Chennai and Directorate of Technical Education, Chennai from time to time.

2.2 Lateral entry admission

i) The candidates who hold a Diploma in Engineering / Technology awarded by the State Board of Technical Education, Tamil Nadu or its equivalent are eligible to apply for Lateral entry admission to the third semester of BE / BTech in relevant branches of study, in their Diploma.

(or)

ii) The candidates who possess the Degree in Science (B.Sc.,) (10+2+3 stream) with Mathematics as a subject at the B.Sc. level are eligible to apply for Lateral entry admission to the third semester of B.E./B.Tech. Such candidates shall undergo two additional Engineering subjects in the third and fourth semesters as prescribed by the examination

committee. They should satisfy other eligibility conditions prescribed by the Anna University, Chennai and Directorate of Technical Education, Chennai from time to time.

3. PROGRAMMES OFFERED

The following branches of study approved by the University are offered by the Institution.

Undergraduate Programmes:

- B.E. Computer Science and Engineering
- B.E. Electrical and Electronics Engineering
- B.E. Electronics and Communication Engineering
- B.E. Mechanical Engineering
- B.E. Computer and Communication Engineering
- B.E. Computer Science and Engineering (AI – ML)
- B.Tech. Information Technology
- B.Tech. Artificial Intelligence and Data Science
- B.Tech. Computer Science and Business Systems

4. STRUCTURE OF PROGRAMMES

4.1. Categorization of Courses

Every B.E. / B. Tech. Programme will have a curriculum with syllabi consisting of theory and practical courses that shall be categorized as follows:

Table 4.1 Categorization of Courses at UG Degree Programmes

S. No.	Category	Courses
1.	Humanities and Social Sciences (HS)	Technical English, Foreign Language, Management & Engineering Ethics, Human Values and Engineering Economics
2.	Basic Sciences (BS)	Mathematics, Physics and Chemistry
3.	Engineering Sciences (ES)	Materials, Workshop, Drawing, Basics of Electrical / Electronics / Mechanical / Computer Engineering, etc.,
4.	Professional Core (PC)	Courses relevant to the chosen specialization / branch
5.	Professional Electives (PE)	Courses relevant to the chosen specialization / branch
6.	Open Electives (OE)	Courses from other technical and/or emerging subject areas
7.	Project Work (PW)	Mini Project, Innovative/Multidisciplinary Project, Industry Project, Project Work
8.	Employability Enhancement Courses (EEC)	Personality Development, Verbal & Soft Skills, Communication Skills, Aptitude, Seminar, Industry Oriented Courses and Internship in Industry or elsewhere.
9.	Mandatory Courses (MC)	Environmental Science, Indian Constitution and Tradition

4.2. Personality and Character Development

All students shall enroll in any one of the personality and character development activities (NCC / NSS /NSO/ YRC /UBA) and undergo the training for 40 hours during the first year.

National Cadet Corps (NCC) will have a number of parades/camps as specified by the NCC officer.

National Service Scheme (NSS) will have social service activities in and around the institution.

National Sports Organization (NSO) will have sports, Games, Drills and Physical exercises.

Youth Red Cross (YRC) society activity will include peacetime activities like health and hygiene, yoga, international friendship, awareness camps etc.,

Unnat Bharat Abhiyan (UBA) will have activities related to technical social services in villages around the institution. While the training activities will normally be during weekends, the camp will normally be held during vacation period.

4.3. Number of courses per semester

In each semester, the curriculum will normally have a blend of theory courses not exceeding SEVEN and practical/EEC courses not exceeding FOUR. However, the total number of courses per semester shall not exceed TEN (including EEC)

The courses that a student registers in a particular semester may include

- Courses of the current semester.
- Courses advanced to Semester V, VI and VII from Semester VIII

The maximum number of credits that can be registered in a semester is 36. However, this does not include the number of Re-appearance (RA) and Withdrawal (W) courses registered by the student for the appearance of Examination.

4.4. Credit Assignment

Each course is assigned certain number of credits based on the following:

Contact period per week	Credits
1 Lecture Period	1
1 Tutorial Period	1
2 Practical Periods (Laboratory / Seminar / Project Work / etc.)	1

4.5. Industrial Training / Internship

The students may undergo industrial training / internship at industrial / research organizations / educational institutions for the prescribed period in the curriculum during summer vacation.

4.6. Industry Oriented courses

Students have to undergo Industry Oriented Courses with one credit of 30 hours duration which will be offered by experts from industry / faculty (internal as well as external) on specialized topics. Students have to complete such one credit courses during the semesters III to VII as and when these courses are offered by the department as specified in the Curriculum.

4.7. Online courses

4.7.1. Students can register and earn credits for only one online course of 3 credits during the fifth semester and sixth semester period, relevant to their programme approved by the Head of the Institution from time to time. **4.7.2.** However, a student having “No standing arrears” is only eligible for credit transfer. A student can drop any one 3 credit course from PE or OE category of VII or VIII semester, if he/ she successfully completes online course with 3 credits (which are provided with certificates)

4.7.3. The entire online course offered by SWAYAM, Ministry of Human Resource Development (MHRD) portal and NPTEL Courses are approved. Other online courses are to be approved by the respective Board of Studies. Suitable Online courses relevant to PE/OE to be dropped shall be chosen from approved portal.

4.7.4. Students who undergo 12 weeks of Online courses can earn 3 credits for courses in NPTEL, AICTE - SWAYAM etc. Alternatively, students who undergo 45 hours of any other approved online courses can earn 3 credits. **4.7.5.** Department Advisory Committee (DAC) shall monitor the progress of the student performance in the online course. The student may be exempted from undergoing one PE of OE only after successful completion of the online course

and submission of the certificate. Based on the marks obtained in the online certification exam an equivalent grade will be recommended by DAC.

4.8. Flexibility to Register Courses

4.8.1. In a semester, a student is permitted to add course registration for Two Electives (PE and / or OE) to a maximum of 30 credits from 5th Semester onwards with due approval from Head of the Institution through the Head of the Department and Dean (Academics).

4.8.2. However, a student having “No standing arrears” and a CGPA of 7.5 and above is only eligible. It is mandatory to satisfy the pre-requisites if any. The student shall register for the Project work in the VIII semester only. Total number of credits of such courses cannot exceed 8 per semester. No Fast Track course shall be offered by any department unless a minimum 10 students register for the course. However, if the students admitted in the associated branch and semester is less than 10, this minimum will not be applicable.

4.9. Minimum Credits

The total number of credits that a student earns during the period of study is called the total credits. For the successful completion of the B.E./B.Tech. Programme, a regular student must earn 160-162 credits (varies with the programme) in a minimum of eight Semesters, while a lateral-entry student must earn 114 - 116 credits in a minimum of six semesters.

4.10. Flexibility to Add Credits

4.10.1. A student has to earn the total number of credits specified in the curriculum of the respective Programme of study in order to be eligible to obtain the degree. However, if the student wishes, then the student is permitted to earn more than the total number of credits prescribed in the curriculum of the student’s programme in the Course Category of Professional Elective (PE) and or Open Elective (OE) only.

4.10.2. For calculating the CGPA, the best out of the credits scores earned by the students will be taken in the PE and / or OE Category.

4.10.3. Flexibility to add credits is not permitted in other category of courses.

4.11. Medium of Instruction

The medium of instruction is English for all courses, examinations, seminar presentation / project / thesis / dissertation reports.

5. DURATION OF THE PROGRAMME

5.1. A student is ordinarily expected to complete the B.E. / B.Tech. Programme in 8 semesters (for HSC students) and six semesters (for Lateral Entry students) but in any case, not more than 14 Semesters for HSC (or equivalent) candidates and not more than 12 semesters for Lateral Entry candidates.

5.2. Each semester shall normally consist of 75 working days or 525 periods of 50 minutes each (including examination days). The Head of the Institution shall ensure that every teacher imparts instructions as per the number of periods specified in the syllabus covering the full content of the syllabus for the course being taught.

5.3. The semester end examinations will ordinarily follow immediately after the last working day of the semester as per the academic calendar prescribed from time to time.

5.4. The total period for completion of the programme reckoned from the commencement of the first semester to which the student was admitted shall not exceed the maximum period specified in clause 5.1 irrespective of the period of break of study (vide clause 11.9) in order that he/she may be eligible for the award of the degree (vide clause 11.11).

6. COURSE ENROLLMENT AND REGISTRATION

6.1. Each student, on admission shall be assigned to a Class Advisor (vide clause 7) who shall advice and counsel the student about the details of the academic programme and the choice of courses considering the student's academic background and career objectives.

6.2. Every student has to do course enrollment and registration within the stipulated time. **6.3.** An elective course shall be offered only when a minimum of 20 students enrolls for the same. **6.4.** After registering for a course, a student shall attend the classes, satisfy the attendance requirements, earn Continuous Internal Assessment marks and appear for the Semester End Examinations.

7. SEMESTER ABROAD PROGRAMME (SAP)

7.1.1. Students can travel to International Universities with the approval of Head of the Institution, Dean Academics and CoE for Semester Abroad (courses/ Project/ Research) Programme. University Level Courses (ULC) equivalent to the courses in the institution are permitted for credit transfer. ULC should match the courses in the specific programme of the institution satisfying AICTE/ AU norms.

7.1.2. Following are the eligibility conditions.

a) Two years must be completed with CGPA of 7.5

b) Have a good score in TOEFL, SAT, IELTS etc.

7.1.3. Semester Abroad Programme will be permitted for about 6-12 months duration only.

7.1.4. The medium of instruction under SAP must be in English only.

8. CLASS ADVISOR

Each class of students belonging to different sections of all the three years has a Class Advisor (CA) who is a regular faculty member of the department The Head of the Department (HOD) will appoint CAs for all the sections

of the classes in their department. The CAs will hold the responsibility for three years of the same batch of students until the completion of the programme. The CAs will maintain all records of the class of students assigned to them and generally counsel them on maintaining good attendance, discipline and academic performance.

8.1. Tutor

In order to facilitate the students' progress and welfare, the Head of the Department will allocate a fixed number of students to a teaching faculty of the department who shall function as tutor for them throughout their period of study. Each tutor will have a maximum of 20 students allotted to him/her. The responsibilities of the tutor are:

8.1.1. Advice students in course registration, monitor their attendance and academic performance and counsel them periodically.

8.1.2. If necessary, the tutor may also discuss with, or inform the parents about the progress of the student concerned. **8.1.3.** Tutor shall maintain a record of each of his/her wards, which shall contain information about the students' attendance, grades obtained in the Semester End Examinations, Continuous Internal Assessment Tests, achievements if any in Curricular, Co-curricular and Extra-curricular activities, medical history and disciplinary proceedings if any, taken against the student.

8.1.4. Tutors shall organize meetings with their wards in every semester, to keep track of their academic progress and to solve grievances if any and minute the same in the record.

8.1.5. Tutor shall coordinate with class advisor for close monitoring of their wards and to provide support to prepare academic records.

9. COURSE COMMITTEE FOR COMMON COURSES

Each common theory course offered to more than one discipline or group shall have a "Course Committee" comprising all the faculty members teaching the common course with one of them nominated as Course

Coordinator. The nomination of the Course Coordinator shall be made by the concerned course HoD depending upon whether all the faculty members teaching the common course belong to a single department or to several departments. The 'Course Committee' shall meet as often as necessary and ensure uniform evaluation of the tests through a common evaluation scheme. Wherever it is feasible, the Course Committee may also prepare a common question paper for the continuous internal assessments.

10. CLASS COMMITTEE

Every class shall have a Class Committee constituted by the respective Head of the Department. The class committee comprises of class advisor, tutor, faculty members handling the class concerned, student representatives and a chairperson who is not teaching the respective class. It is formed with the overall goal of improving the teaching-learning process. The functions of the Class Committee include

10.1. Solving problems experienced by students in the class room and in the laboratories.

10.2. Clarifying the regulations of the degree programme and the details of rules therein.

10.3. Informing the student representatives about the academic schedule including the dates of assessments and the syllabus coverage for each assessment.

10.4. Informing the student representatives, the details of regulations regarding weightage used for each assessment. In the case of practical courses (Laboratory experiments / Engineering drawing/project work/seminar/Internship etc.), the breakup of marks for each experiment/exercise/ module of work, should be clearly discussed in the Class Committee meeting and informed to the students.

10.5. Analyzing the performance of the students of the class after each test and finding the ways and means of solving problems, if any.

10.6. Identifying slow learning students, if any, and requesting the faculty members concerned to provide some additional help or guidance or coaching to such students.

10.7. The Class Committee for a class under a particular branch is normally constituted by the concerned Head of the Department.

10.8. The Class Committee shall be constituted within the first week of each semester.

10.9. At least 6 student representatives (usually 3 boys and 3 girls) shall be included in the Class Committee. **10.10.** The Chairperson (a senior faculty member from the department) of the class committee shall invite the class Advisor, tutors and the HoD to the meeting of the Class Committee.

10.11. The Head of the Institution may participate in any class Committee meeting of the institution. **10.12.** The Chairperson is required to prepare the minutes of every meeting, submit the same to Head of the Institution within two days of the meeting and arrange to circulate it among the students and faculty members concerned. If there are any points requiring support and action from the management, the same shall be brought to the notice of the management by the Head of the Institution.

10.13. Two subsequent meetings may be held in a semester at suitable intervals. During these meetings, the student members representing the entire class shall meaningfully express the opinions and suggestions of the other students of their class to improve the effectiveness of the teaching-learning process.

11. DEPARTMENT ADVISORY COMMITTEE (DAC)

All departments shall constitute a Department Advisory Committee (DAC) consisting of the HoD as Chairperson and 10% of senior faculties.

The roles and responsibilities of the DAC is as follows,

i) Study and suggest improvement in all the academic activities of the department.

ii) Suggest initiatives to enhance employability skill sets.

iii) To review and approve industries or other organizations identified for industrial training, internship or project work of students.

iv) Approve online/elective courses selected by students for the content and quality.

v) Introduce best practices for the attainment of POs/PEOs

vi) Suggest the equivalence of courses (addition/deletion of courses) to be studied for the transfer students from different regulations.

12. SYSTEM OF EXAMINATION

12.1. The system of examination is semester pattern.

Performance in each course of study shall be evaluated based on

- Continuous Internal Assessment (CIA) throughout the semester
- Semester End Examination (SEE) at the end of the semester

A student has to compulsorily register for the entire regular courses and all the arrear courses (if any) for appearing in the semester end examinations.

12.2. Each course, both theory and practical (including project work / viva voce examinations) shall be evaluated for a maximum of 100 marks as shown below:

Table 12.1 Evaluation pattern of various courses

S. No	Category of course	Weightage for

		Continuous Internal Assessment	Semester End Examinations
1.	Theory	40 Marks	60 Marks
2.	Laboratory	60 Marks	40 Marks
3.	Project Work	60 Marks	40 Marks

12.3. The semester end examination of 3 hours duration shall be conducted for 100 marks as the maximum. **12.4.** For the semester end examinations in both theory and practical courses including project work, the internal and external examiners shall be appointed by the Controller of Examinations.

13. PROCEDURE FOR AWARDING MARKS FOR CONTINUOUS INTERNAL ASSESSMENT (CIA) 13.1.

Theory Courses

- For theory courses specified in the curriculum, out of 100 marks, the maximum mark for Continuous Internal Assessment is 40 and the Semester End Examinations are 60.
- The continuous internal assessment marks are awarded as per the procedure as follows.
- Continuous Internal Assessments comprises of three internal assessment tests, Assignment, Quizzes / Online Test / Case Study and Presentation / Tutorial. The Corresponding weightage is shown in the following table.

Table 13.1 Evaluation components for Internal Assessment for Theory Courses

Particulars	Syllabus	Duration	Maximum Mark	Weightage (Marks reduced to)
Continuous Internal Assessment 1	1.5 Module	1 hr 45 minutes	60	8
Continuous Internal Assessment 2	1.5 Module	1 hr 45 minutes	60	8
Continuous Internal Assessment 3	2 Module	2hrs 15 minutes	80	8
Assignment	3 assignments covering all COs		50 (15+15+20)	5
Quiz / Online Test			60	6
Presentation / Tutorial / Case studies, etc.,			50	5
			Total Marks	40

13.1.1. In case a student has not appeared for the Continuous Internal Assessment due to medical reasons (hospitalization/

accident / specific illness) or due to participation in State / National/ International level Sports events with prior permission from the HOD / Head of the Institution, a reassessment for any one of the Continuous Internal Assessment shall be given at the end of the semester through the concerned course handling faculty.

13.2. Laboratory Courses

13.2.1. For laboratory courses specified in the curriculum, out of 100 marks, the maximum mark for Continuous Internal Assessments is 60 and the Semester End Examinations is 40.

13.2.2. Every laboratory exercise / experiment shall be evaluated based on the student performance during the laboratory class and the student's laboratory records. The corresponding weightage is shown in the following table. **Table 13.2**

Evaluation components for Internal Assessment for Practical Courses

Parameter	Marks
Pre lab preparation	30
Conduct of experiment	30
Calculations, Result	30
Viva-voce	10
Total	100
Average of all Experiments	To be scaled down to 50 Marks
Model Practical Examination	100 (To be scaled down to 10 Marks)
Continuous Internal Assessment Marks	50+10 = 60 Marks

13.3. Project Work

13.3.1. For Project Work, out of 100 marks, the maximum mark for continuous internal assessments is 60 and the Semester End Examinations is 60.

13.3.2. The Head of the Department shall constitute a review committee for project work for each branch of study. **13.3.3.** Project work may be assigned to a single student or to a group of students not exceeding 4 per group. The student(s) is expected to follow the instructions of the project coordinator and Head of the department. The student(s) is expected to submit the project report on or before the last working day of the semester **13.3.4.** The corresponding weightage for Mini Project / Innovative Project / Project Work Phase I/II shall be distributed as indicated in the following table.

Table 13.3 Continuous Internal Assessment for Project Work

1. Innovative Project Work / Mini Project

Review I (20 Marks)		**Review II (20 Marks)**		**Report Evaluation (20 Marks)**	
Review Committee	Supervisor	Review Committee	Supervisor	Supervisor	Project Coordinator
10	10	10	10	10	10

2. Project Work Phase I

Review I (15 Marks)		Review II (15 Marks)		Review III (15 Marks)		Report Evaluation (15 Marks)	
Committee Review	Supervisor	Committee Review	Supervisor	Committee Review	Supervisor	Supervisor	Coordinator Project
10	5	10	5	10	5	5	10

3. Project Work Phase II

Review I (10 Marks)	Review II (10 Marks)	Review III (10 Marks)	ns in Publi e or Conf eren catio	nals (10 Jour Mark Report Evaluation s) (20 Marks)

Committee Review	Supervisor	Committee Review	Supervisor	Committee Review	Supervisor		Supervisor	Coordinator Project
7	3	7	3	7	3	10	10	10

13.4. Summer Internship / Industrial Training / Technical Seminar / Industry Oriented Courses (one credit) / Employment Enhancement (EEC) Courses (one credit)

13.4.1. Summer Internship

a) After completion of the IV Semester, the student may undergo Summer Internship / Industrial Training after getting prior permission from HoD.

b) Internship and in-plant training in relevant organization / institutions shall be provided to the students in line with the course they go through in the curriculum.

c) Duration of the training will be two weeks during summer vacation.

d) Proof for the participation along with satisfactory completion certificate obtained from the organization concerned is mandatory.

e) Continuous Internal Assessment procedure for the summer internship and industrial training specified in curriculum is described below and reappearance is mandatory, in case of failure.

f) Summer internship and industrial training will be treated as non- credit courses and will be assessed as a qualitative measure of achievement based on Assessment Scale:

1. Evaluation of report given by the student (40%)
2. Student's presentation (40%)
3. Oral Examination (20%)

Assessment Scale: Below 45 % - Not Satisfactory, 45 % to 59 % - Satisfactory, 60 % to 74 % - Good, 75 % to 89 % - Very Good, 90 % to 100 % - Excellent

g) The final evaluation will be made based on the student report and a Viva - Voce Examination, conducted internally by a three-member panel constituted by the Head of the Department, in which at least one member has not less than three years of teaching experience. The final evaluation report of these courses shall be submitted by HoD to Head of the Institution for approval and forwarded to Controller of Examinations for entry in grade sheet.

13.4.2. Technical Seminar

a) Continuous Internal Assessment procedure for the Technical Seminar specified in curriculum is described below and reappearance is mandatory, in case of failure.

b) The Head of the Department will identify a faculty member as a coordinator for the course. A committee consisting of the Head of the Department, faculty handling the course and course coordinator will evaluate the students and assign grades based on their performance. The assessment procedure is given below. **Table 13.4 Continuous Internal Assessment for Technical Seminar**

Seminar Presentation – I (50 Marks)		**Seminar Presentation – II (50 Marks)**		**Total (100 Marks)**
Oral Presentation	Report	Oral Presentation	Report	
30	20	30	20	100

13.4.3. Industry Oriented Course (one credit course)

a) Continuous Internal Assessment procedure for the Industry Oriented Courses specified in curriculum is described below and reappearance is mandatory, in case of failure

b) The Head of the Department may identify a faculty member as a coordinator for the course. A committee consisting of the Head of the Department, faculty handling the course and course coordinator will evaluate the students and assign marks based on their performance. The assessment procedure is given below.

Table 13.5 Evaluation Components for Internal Assessment for Industry Oriented Courses

Internal Assessment – I (Online Test / Quiz / Written Test / Oral Tests /Assignment / Tool test)	**Internal Assessment – II (Online Test / Quiz / Written Test / Oral Tests /Assignment / Tool test)**	**Total**
50	50	100

13.4.4. Employment Enhancement Course (EEC)

Employment Enhancement Courses (EEC) will be continuously assessed internally as per the following assessment procedure.

Table 13.6 Evaluation Components for Internal Assessment for Employment Enhancement Courses EEC (one credit)

Internal Assessment – I (Online Test / Quiz / Written Test / Oral Tests /Assignment / Tool test)	Internal Assessment – II (Online Test / Quiz / Written Test / Oral Tests /Assignment / Tool test)	Total
50	50	100

13.4.5. Non-Credit Courses

a) Mandatory courses include Environmental Science and Engineering / Indian Constitution and Tradition / Technical Report Writing / Life Skills / Awareness on Competitive Examinations etc.,

b) For these courses, comments like Excellent, Very Good, Good, Satisfactory and Not-Satisfactory will be given as qualitative measures of achievement.

Assessment Scale: (fixed by the respective HODs to a maximum of 100 marks). Below 45 %- Not Satisfactory, 45 % to 59 %- Satisfactory, 60 %to 74 %- Good, 75 % to 89 %- Very Good, 90 % to 100 %- Excellent

13.4.6. Design Thinking Laboratory

The End Semester Examination for the Design Thinking Laboratory shall consist of an evaluation of the final report submitted by the student or students of the group (of not exceeding 4 students) by the panel of examiners consisting of faculty coordinator, supervisor and a common examiner from another programme nominated by the Head of the Institution.

10.6 Continuous Internal Assessment Marks and Attendance Record

10.6.1. Continuous Internal Assessment marks approved by the Head of the Department shall be displayed in the respective departments within 5 days from the last working day of the semester.

10.6.2. Every Faculty is required to maintain an “ATTENDANCE AND ASSESSMENT RECORD“ which consists of attendance marked in each lecture or practical or project work class, the test marks and the record of class work (topic covered), separately for each course. This shall be submitted to the Head of the Departments periodically (at least three times in a semester) for checking the syllabus coverage and the records of test marks and attendance. At the end of the semester, after due verification, the HoD will approve this. This record shall be verified by the Head of the Institution and kept in safe custody for 3 years.

10.6.3. The Practical classes for all the Practical /Lab component subjects will be assessed continuously and marks will be entered in the assessment record. If a student is absent for a laboratory class, then the student will be permitted

to perform experiments based on the recommendation of the HoD during repeat classes conducted at the end of completion of all the experiments.

11. External Assessment

11.1 External Assessment for Theory Courses and Laboratory Courses

The Semester End Examinations for theory and laboratory courses will be of 3 hours duration and shall normally be conducted in the month of November/ December during the odd semesters and the month of April/May during the even semesters. Semester End Examination is a mandatory requirement for passing the course and every student should appear for the examination for theory courses and laboratory courses.

11.2 External Assessment for Project Work

11.2.1. Project work may be assigned to a single student or to a group of students not exceeding 4 per group. The student(s) is expected to submit the project report on or before the last working day of the semester. 11.2.2. The Semester End Examination for project work shall consist of evaluation of the final project report submitted by the student or students of the project group by an external examiner followed by a viva-voce examination conducted separately for each student by a committee consisting of the external examiner and an internal examiner.

11.2.3. If the project report is not submitted on or before the specified deadline, an extension of the time up to a maximum limit of 10 days may be given for the submission of project work by paying additional fee to conduct separate viva voce examination with due approval obtained from the Head of the Department. If the project report is not submitted even beyond the extended time, then the student(s) is deemed to have failed in the Project Work. The failed student(s) shall reappear for the same in the subsequent semester.

11.2.4. All answer books shall be preserved for six consecutive semesters in the strong room of CoE office.

11.3 Eligibility for Appearing in Semester End Examination

A student who has fulfilled the following conditions shall be deemed to have satisfied the attendance requirements for appearing for the semester end examination of a particular course.

11.3.1. Ideally every student is expected to attend all periods and earn 100% attendance. However, the student shall secure not less than 75% (after rounding off to the nearest integer) of the overall attendance.

11.3.2. If a student secures attendance between 65% and less than 75% in any course in the current semester, due to medical reasons (hospitalization / accident / specific illness) or due to participation in the College / University / State / National / International level Sports events, with prior permission from the Head of the Institution and Head of the Department concerned, the student shall be given exemption from the prescribed attendance requirement and the student shall be permitted to appear for the semester end examination of that course. In all such cases, the students should submit the required documents on joining after the absence to the Head of the Department through the Class Advisor.

11.3.3. A student shall normally be permitted to appear for the semester end examination of the course if the student has satisfied the attendance requirements (vide Clause 11.3.1 & 11.3.2) and has registered for the examination in those courses of that semester by paying the prescribed fee.

11.3.4. Students who do not satisfy clause 11.3.1 and 11.3.2 and who secure less than 65% attendance will not be permitted to write the Semester End Examination and will not be permitted to move to the next semester. They are required to repeat the incomplete semester in the next academic year, as per the norms prescribed.

11.3.5. The Continuous Internal Assessment marks obtained by the student in the first appearance shall be retained and considered valid only for THREE attempts. For further attempts, the student should secure minimum 50 marks exclusively from the Semester End Examinations conducted for 100 marks for passing the course.

11.3.6. A student who has already appeared for a course in a semester and passed the examination is not entitled to reappear for the same course for improvement of letter grades / marks.

11.4 Passing Requirements

11.4.1. Passing minimum for each theory, practical courses and project work is

a) 50% in the Semester End Examinations

b) Minimum 50% of the grand total of Continuous Assessment marks and Semester End Examinations marks put together.

11.4.2. For students scoring less than the passing minimum marks in the semester end examinations, the term "U" against the concerned course will be indicated in the grade sheet. The student has to reappear in the subsequent examinations for the concerned course as arrears.

11.4.3. For a student who is absent for theory / practical / project viva- voce, the term "AB" will be indicated against the corresponding course. The student should reappear for the semester end examination of that course as arrear in the subsequent semester.

11.4.4. The letter grade "W" will be indicated for the courses for which the student has been granted authorized withdrawal (refer clause 11.9).

11.5 Arrear Examinations

Students who fail in the semester end examinations with RA grade and absentees can appear for the exam in the subsequent semesters. Arrear examinations shall be conducted along with the regular examinations.

11.6 Revaluation

11.6.1. A student when not satisfied with the evaluation can apply for revaluation after consulting with the course faculty and HoD. Revaluation can be applied only for theory courses.

11.6.2. The student should pay the prescribed fee for getting photocopy of the answer script / revaluation. 11.6.3. Candidates who apply for photocopy of answer scripts only will be eligible for applying for revaluation. 11.6.4. Students can get the photocopy of the valued theory answer scripts after the publication of semester examination results (not for practical courses, project work, all one credit courses). It can be revalued and based on the same, the grade can get changed and if there is no change, the status NC grade shall be maintained. The grade that is obtained from the revaluation process is found to be better, then that grade will be retained as the final grade, else the earlier grade shall be retained as the final grade.

11.6.5. The entire revaluation process must be completed within four weeks from the date of publication of results.

11.7 Review Revaluation

Candidates not satisfied with Revaluation can apply for Review of the revaluation within the prescribed date on payment of a prescribed fee through proper application to Controller of Examinations.

11.8 Withdrawal from Examination

11.8.1. A student may, for valid reasons, and on prior application, may be granted permission to withdraw from appearing for one or more consecutive examinations in a semester. Such withdrawal shall be permitted only once during the entire period of study of the degree programme based on the recommendations given by the Head of the Department and Head of the Institution with required documents.

11.8.2. Withdrawal from examination will be permitted only if a student has nil arrear upto the previous semester. 11.8.3. Withdrawal application is valid only if it is submitted within TEN days prior to the commencement of the examinations as recommended by the Head of the Institution and approved by the Dean Academics and Controller of Examinations.

11.8.4. In extraordinary conditions, the TEN days requirement stated above shall be waived at the discretion of the Head of the Institution based on the merit of the case.

11.8.5. Withdrawal essentially requires the student to register for the course/courses. In the case of withdrawal, the same will be appropriately reflected in the Grade Sheets.

11.9 Provision for Authorized Break of Study

11.9.1. A student is permitted to opt for break of study for a maximum period of one year only in a single spell.

11.9.2. Break of Study shall be granted only once for valid reasons during the entire period of study of the degree programme. If a candidate intends to temporarily discontinue the programme in the middle of the semester for valid reasons, and to rejoin the programme in a subsequent year, permission may be granted based on the merits of the case provided he / she applies to the DOTE, Affiliating University, through the Head of the Institution stating the reasons thereof and the probable date of rejoining the programme. However, if the candidate has not completed the first semester of the programme, Break of Study will be considered only on valid medical reasons.

11.9.3. The candidates permitted to rejoin the programme after break of study, shall be governed by the Curriculum and Regulations in force at the time of rejoining. Students rejoining in new Regulations should appear for additional courses if any, as prescribed by Department Advisory Committee so as to bridge the curriculum in-force and the old curriculum.

11.9.4. The authorized break of study would not be counted towards the overall duration for completing the degree.

11.9.5. All the norms are liable to change upon the terms of the affiliated university.

11.10 Eligibility for Awarding Grades

11.10.1. A student who appears for the Semester End Examination and Continuous Internal Assessment Tests in any particular course only will be treated as eligible for the award of the grade in the course.

11.10.2. All assessment of a course will be done on mark basis. The letter grade and the grade point are awarded based on percentage of marks secured by a candidate in individual course as detailed below.

Table 11.1 Grade Point

Range of Percentage of Total Marks	Letter Grade	Grade Point
90 to 100	O (Outstanding)	10
80 to 89	A+ (Excellent)	9
70 to 79	A (Very Good)	8
60 to 69	B+ (Good)	7
50 to 59	B (Above Average)	6
0 to 49	U	0
SA (Shortage of Attendance)	SA	0
Withdrawal from the final examination	W	0

After the completion of the programme, the Cumulative Grade Point Average / Semester Grade Point average is calculated using the formula

$$\text{GPA / CGPA} = \frac{\sum_{i=1}^{n} C_i GP_i}{\sum_{i=1}^{n} C_i}$$

Where C_i = Number of Credits assigned to the course

GP_i = Point corresponding to the grade obtained for each course

n = Number of all courses successfully cleared during the particular semester in the case of SGPA and during all the semesters in the case of CGPA

11.10.3. After the results are declared, grade cards will be issued to each student which contains the list of registered courses with grades obtained.

11.10.4. The Semester Grade Point Average (SGPA) for each semester will be calculated and reflected in the grade sheet.

11.10.5. Similarly, Cumulative Grade Point Average (CGPA) up to current semester will be calculated and reflected in the grade sheet.

11.11 Award of Degree

11.11.1 First Class with Distinction

A student who satisfies the following conditions shall be declared to have passed the examination in First class with Distinction:

a) Should have secured a CGPA of not less than 8.5.

b) Should have passed the examination in all the courses of all the 8 semesters/ 6 semesters in the case of Lateral Entry in the student's First Appearance. Withdrawal from examination will not be considered as an appearance. c) One-year authorized break of study (if availed) is included in the five years/ four years in the case of lateral entry for award of First class with Distinction.

11.11.2 First Class

A student who satisfies the following conditions shall be declared to have passed the examination in First class: a) Should have secured a CGPA of not less than 7.0.

b) Should have passed the examination in all the courses of all the 8 semesters/6 semesters in the case of Lateral Entry. Withdrawal from examination will not be considered as an appearance.

c) One-year authorized break of study (if availed) is included in the five years/ four years in the case of lateral entry for award of First class.

11.11.3 Second Class

Students who have passed in all courses and obtained CGPA below 7.0 and completed the course within the maximum prescribed period will be declared to have passed in second class.

11.12 Consolidated Statement of Grades

At the end of the programme, every successful student will be issued with consolidated statement of grades which contains the following particulars:

a) Grades in the courses of all the semesters (SGPA)

b) Cumulative Grade Point Average (CGPA)

11.13 Degree Classification

First class with Distinction / First class / Second class

11.14 Eligibility for Awarding Degree

A student shall be eligible for the award of the degree only if he/she:

11.14.1. Has undergone the prescribed programme of study by earning the minimum total number of credits specified in the curriculum of the relevant programme of study within the maximum duration prescribed.

11.14.2. Should have no disciplinary action pending against him/her including malpractices in examinations.

11.14.3. Should have successfully completed all Mandatory Courses.

11.15 Malpractice

The Head of the Institution shall refer the cases of malpractices in continuous internal assessment tests and semester-end examinations, to the Malpractice Enquiry Committee, constituted by him/her for the purpose. Such committee shall follow the approved scales of punishment. The Head of the Institution shall take necessary action, against the erring students based on the recommendations of the committee.

Any action on the part of candidate at an examination like possession of incriminating materials, cheat sheets, trying to get undue advantage in the performance or trying to help another, or derive the same through unfair means is punishable according to the provisions of the institution.

11.16 Transitory Regulation

11.16.1. A candidate, who is detained or discontinued the semester, on re- admission shall be required to pass all the courses in the curriculum prescribed for such batch of students in which the student joins subsequently and the academic regulations be applicable to him/her which are in force at the time of his/her re-admission.

11.16.2. However, exemption will be given to those candidates who have already passed in such courses in the earlier semester(s) and additional courses are to be studied as approved by Head of the Department, Dean Academics and Head of the Institution.

11.17 Discipline

Every student is required to observe discipline and decorous behavior both inside and outside the college and not to indulge in any activity which will tend to bring down the reputation of the College. The Head of Institution shall constitute a disciplinary committee consisting of Head of Institution, two Heads of Department of which one should be from the faculty of the student, to enquire into acts of indiscipline and notify about the disciplinary action recommended for approval. In case of any serious disciplinary action which leads to suspension or dismissal, then a committee shall be constituted including one representative from Anna University, Chennai. In this regard, the member will be nominated by the University on getting information from the
Head of the Institution.

11.18 Revision of Regulation, Curriculum and Syllabus

11.18.1. The curriculum and syllabi under this regulation will be for four years. The college may from time-to-time revise,

amend or change the Regulations, Curriculum, Syllabus and Scheme of examinations through the Board of Studies and Academic Council with the approval of the Governing Body of the college.

11.18.2. In the event of any clarification in the interpretation of the above rules and regulations, they shall be referred to the Standing Committee. The Standing Committee will offer suitable interpretations / clarifications/amendments required for the special case on such references and get them ratified in the next meeting of the Academic Council. The decision of the Academic Council will be final.

B.E. COMPUTER AND COMMUNICATION ENGINEERING

Courses of Study and Scheme of Assessment

Sl. No. Course Code Course Title Periods / week Maximum Marks CAT CP L T P C CIA SEE Total

SEMESTER I

THEORY

Induction Program - - - - - - - - - 1 U19HS101 Technical English HS 3 3 0 0 3 40 60 100 2 U19MA101 Matrix Algebra and Calculus BS 4 3 1 0 4 40 60 100 3 U19PH101 Engineering Physics BS 3 3 0 0 3 40 60 100 4 U19CS101 Problem Solving using C ES 3 3 0 0 3 40 60 100 5 U19ME101 Engineering Graphics ES 5 1 0 4 3 40 60 100

PRACTICALS

6 U19PH111 Physics Laboratory BS 2 0 0 2 1 60 40 100 7 U19GE111 Engineering Practices Laboratory ES 4 0 0 4 2 60 40 100 8 U19CS111 Problem Solving using C Laboratory ES 4 0 0 4 2 60 40 100 9 U19EM101 Soft Skills EM 2 0 0 2 1 100 - 100 **Total 30 13 1 16 22 480 420 900**

SEMESTER II

THEORY

1 U19HS11X Language Elective HS 3 3 0 0 3 40 60 100 2 U19MA102 Advanced Calculus and Complex Variables BS 4 3 1 0 4 40 60 100 3 U19CY101 Engineering Chemistry BS 3 3 0 0 3 40 60 100 4 U19PH102 Semiconductor Physics BS 3 3 0 0 3 40 60 100 5 U19CS102 Python Programming ES 3 3 0 0 3 40 60 100 6 U19EE102 Basic Electrical and Instrumentation

Engineering ES 3 3 0 0 3 40 60 100

PRACTICALS

7 U19CY111 Chemistry Laboratory BS 2 0 0 2 1 60 40 100 8 U19CS112 Python Programming Laboratory ES 4 0 0 4 2 60 40 100 **Total 25 18 1 6 22 360 440 800**

CAT Category of Course BS Basic Sciences PW Project Work CP Contact Periods HS Humanities and Social Sciences EM Employability Enhancement Course L Lecture Hours ES Engineering Sciences NC Non-Credit Course T Tutorial Hours PC Professional Core MC Mandatory Course P Practical Hours PE Professional Elective CIA Continuous Internal Assessment C Credits OE Open Elective SEE Semester End Examination

B.E. COMPUTER AND COMMUNICATION ENGINEERING

Courses of Study and Scheme of Assessment

Sl. No. **Course Code** **Course Title** **Periods / week** **Maximum Marks**

CAT CP L T P C CIA SEE Total

SEMESTER III

THEORY

1 U19MA202 Linear Algebra and Partial Differential Equations BS 4 3 1 0 4 40 60 100 2 U19EC201 Signals and Systems PC 4 3 1 0 4 40 60 100 3 U19EC203 Digital Electronics PC 4 3 1 0 4 40 60 100 4 U19CS201 Data Structures PC 3 3 0 0 3 40 60 100 5 U19IT301 Computer Architecture PC 4 3 1 0 4 40 60 100 6 U19MC201 Environmental Science MC 1 1 0 0 NC - - -

PRACTICALS

7 U19CS211 Data Structures Laboratory PC 4 0 0 4 2 60 40 100 8 U19EC212 Digital Electronics Laboratory PC 4 0 0 4 2 60 40 100 9 U19ICXXX Industry Oriented Course I EM 2 0 0 2 1 100 - 100 **Total 30 16 4 10 24 420 380 800**

SEMESTER IV

THEORY

1 U19MA206 Probability and Statistics BS 4 3 1 0 4 40 60 100 2 U19CS202 Database Management Systems PC 4 3 1 0 4 40 60 100 3 U19CS203 Object Oriented Programming PC 3 3 0 0 3 40 60 100 4 U19CS205 Design and Analysis of Algorithms PC 4 3 1 0 4 40 60 100 5 U19XXXXX Open Elective I* OE 3 3 0 0 3 40 60 100 6 U19MC202 Indian Constitution and Tradition MC 1 1 0 0 NC - - -

PRACTICALS

7 U19CS212Database Management Systems

Laboratory PC 2 0 0 2 1 60 40 100 8 U19CS213Object Oriented Programming

Laboratory PC 2 0 0 2 1 60 40 100 9 U19CC281 Mini Project PW 2 0 0 2 1 60 40 100 10 U19EM201 Verbal and Soft Skills EM 2 0 0 2 1 100 - 100 11 U19EM202 Summer Internship EM - - - - NC - - -

Total 27 16 3 8 22 480 420 900

CAT Category of Course BS Basic Sciences PW Project Work CP Contact Periods HS Humanities and Social Sciences EM Employability Enhancement Course L Lecture Hours ES Engineering Sciences NC Non-Credit Course T Tutorial Hours PC Professional Core MC Mandatory Course P Practical Hours PE Professional Elective CIA Continuous Internal Assessment C Credits OE Open Elective SEE Semester End Examination

(Regulations 2019)

B.E. COMPUTER AND COMMUNICATION ENGINEERING
Courses of Study and Scheme of Assessment

SEMESTER V

Sl. No. **Code Course Title** **Course** **Periods / week** **Maximum Marks**

THEORY

CAT CP L T P C CIA SEE Total

1 U19EC206 Microprocessor and Microcontroller PC 3 3 0 0 3 40 60 100 2 U19EC207 Digital Signal Processing PC 4 3 1 0 4 40 60 100 3 U19CC301 Analog and Digital Communication PC 3 3 0 0 3 40 60 100 4 U19IT201 Software Engineering PC 3 3 0 0 3 40 60 100 5 U19XXXXX Professional Elective I PE 3 3 0 0 3 40 60 100

PRACTICALS

6 U19EC213 Digital Signal Processing Laboratory PC 2 0 0 2 1 60 40 100 7 U19EC214 Microprocessors and Microcontrollers Laboratory PC 2 0 0 2 1 60 40 100 8 U19ICXXX Industry Oriented Course II EM 2 0 0 2 1 100 - 100 9 U19EM301 Aptitude I EM 2 0 0 2 1 100 - 100 10 U19EM303 Design Thinking Laboratory EM 2 0 0 2 1 100 - 100

Total 26 15 1 10 21 660 440 1000

SEMESTER VI

THEORY

1 U19CS301 Internet Programming PC 3 3 0 0 3 40 60 100 2 U19IT303 Computer Networks PC 3 3 0 0 3 40 60 100 3 U19EC401 Wireless Communication PC 3 3 0 0 3 40 60 100 4 U19XXXXX Professional Elective II PE 3 3 0 0 3 40 60 100 5 U19XXXXX Open Elective II* OE 3 3 0 0 3 40 60 100 **PRACTICALS**

6 U19CS311 Internet Programming Laboratory PC 2 0 0 2 1 60 40 100 7 U19IT311 Computer Networks Laboratory PC 2 0 0 2 1 60 40 100 8 U19CC381 Innovative / Multi-Disciplinary Project PW 2 0 0 2 1 60 40 100 9 U19EM302 Aptitude II EM 2 0 0 2 1 100 - 100 **Total 23 15 0 8 19 520 380 900**

CAT Category of Course BS Basic Sciences PW Project Work CP Contact Periods HS Humanities and Social Sciences EM Employability Enhancement Course L Lecture Hours ES Engineering Sciences NC Non-Credit Course T Tutorial Hours PC Professional Core MC Mandatory Course P Practical Hours PE Professional Elective CIA Continuous Internal Assessment C Credits OE Open Elective SEE Semester End Examination

B.E. COMPUTER AND COMMUNICATION ENGINEERING

Courses of Study and Scheme of Assessment

Sl. No.	**Course Code**	**Course Title**	**CAT**	**Periods / week CP**	**L**	**T**	**P**	**C**	**Maximum Marks CIA**	**SEE**	**Total**
		SEMESTER VII									
THEORY											
1	U19HS401	Principles of Management and Professional Ethics	HS	3	3	0	0	3	40	60	100
2	U19IT401	Cryptography and Network Security	PC	3	3	0	0	3	40	60	100
3	U19XXXXX	Professional Elective III	PE	3	3	0	0	3	40	60	100
4	U19XXXXX	Open Elective III*	OE	3	3	0	0	3	40	60	100
PRACTICALS											
5	U19CC401	Security Laboratory	PC	2	0	0	2	1	60	40	100
6	U19CC481	Project Work - Phase I	PW	6	0	0	6	3	60	40	100
		Total		**20**	**12**	**0**	**8**	**16**	**280**	**320**	**600**
		SEMESTER VIII									
THEORY											
1	U19XXXXX	Professional Elective IV	PE	3	3	0	0	3	40	60	100
2	U19XXXXX	Open Elective IV*	OE	3	3	0	0	3	40	60	100
PRACTICALS											
3	U19CC482	Project Work - Phase II	PW	16	0	0	16	8	60	40	100
		Total		**22**	**6**	**0**	**16**	**14**	**140**	**160**	**300**

CAT Category of Course BS Basic Sciences EM Employability Enhancement Course CP Contact Periods HS Humanities and Social Sciences NC Non-Credit Course L Lecture Hours ES Engineering Sciences CIA Continuous Internal Assessment T Tutorial Hours PC Professional Core SEE Semester End Examination P Practical Hours PE Professional Elective
C Credits OE Open Elective

Total Number of Credits: 160

SUMMARY

Sl.	**Course**	**Credits per Semester**	**Credits**	**Credit %**

No.	Category	I	II	III	IV	V	VI	VII	VIII		
1	**HS**	3	3	-	-	-	-	3	-	9	5.6
2	**BS**	8	11	4	4	-	-	-	-	27	16.9
3	**ES**	10	8	-	-	-	-	-	-	18	11.3
4	**PC**	-	-	19	13	15	11	4	-	62	38.8
5	**PE**	-	-	-	-	3	3	3	3	12	7.5
6	**OE**	-	-	-	3	-	3	3	3	12	7.5
7	**PW**	-	-	-	1	-	1	3	8	13	8.1
8	**EM**	1	-	1	1	3	1	-	-	7	4.3
9	**NC**	-	-	-	✓	-	-	-	-	-	-
10	**MC**	-	-	✓	✓	-	-	-	-	-	-
Total		**22**	**22**	**24**	**22**	**21**	**19**	**16**	**14**	**160**	**100**

B.E. COMPUTER AND COMMUNICATION ENGINEERING
Courses of Study and Scheme of Assessment (Regulations 2019)

Sl. No. Course Code Course Title Periods / week Maximum Marks

CAT CP L T P C CIA SEE Total

HUMANITIES AND SOCIAL SCIENCES (HS)

1 U19HS101 Technical English HS 3 3 0 0 3 40 60 100 2 U19HS11X Language Elective HS 3 3 0 0 3 40 60 100

3 U19HS401 Principles of Management and Professional Ethics HS 3 3 0 0 3 40 60 100

LANGUAGE ELECTIVES (HS)

1 U19HS111 Business English HS 3 3 0 0 3 40 60 100 2 U19HS112 Basic Japanese HS 3 3 0 0 3 40 60 100 3 U19HS113 Basic German HS 3 3 0 0 3 40 60 100 4 U19HS114 Basic French HS 3 3 0 0 3 40 60 100 **BASIC SCIENCES (BS)**

1 U19MA101 Matrix Algebra and Calculus BS 4 3 1 0 4 40 60 100 2 U19PH101 Engineering Physics BS 3 3 0 0 3 60 40 100 3 U19PH111 Physics Laboratory BS 2 0 0 2 1 60 40 100

4 U19MA102 Advanced Calculus and Complex Variables BS 4 3 1 0 4 40 60 100

5 U19CY101 Engineering Chemistry BS 3 3 0 0 3 40 60 100 6 U19PH102 Semiconductor Physics BS 3 3 0 0 3 40 60 100 7 U19CY111 Chemistry Laboratory BS 2 0 0 2 1 60 40 100

8 U19MA202 Linear Algebra and Partial Differential Equations BS 4 3 1 0 4 40 60 100

9 U19MA206 Probability and Statistics BS 4 3 1 0 4 40 60 100 **ENGINEERING SCIENCES (ES)**

1 U19CS101 Problem Solving using C ES 3 3 0 0 3 40 60 100 2 U19ME101 Engineering Graphics ES 5 1 0 4 3 40 60 100 3 U19GE111 Engineering Practices Laboratory ES 4 0 0 4 2 60 40 100 4 U19CS111 Problem Solving using C Laboratory ES 4 0 0 4 2 60 40 100 5 U19CS102 Python Programming ES 3 3 0 0 3 40 60 100

6 U19EE102 Basic Electrical and Instrumentation Engineering ES 3 3 0 0 3 40 60 100

7 U19CS112 Python Programming Lab ES 4 0 0 4 2 60 40 100 **PROFESSIONAL CORE (PC)**

1 U19CS201 Data Structures PC 3 3 0 0 3 40 60 100 2 U19EC203 Digital Electronics PC 4 3 1 0 4 40 60 100 3 U19IT201 Computer Architecture PC 4 3 1 0 4 40 60 100 4 U19EC201 Signals and Systems PC 4 3 1 0 4 40 60 100 5 U19CS211 Data Structures Laboratory PC 4 0 0 4 2 60 40 100

B.E. COMPUTER AND COMMUNICATION ENGINEERING

Courses of Study and Scheme of Assessment (Regulations 2019)

Sl. No.	**Course Code**	**Course Title**	**Periods / week**				**Maximum Marks**		
			CAT	**CP**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
6	U19EC212	Digital Electronics Laboratory	PC	4	0	0	4	2	60	40	100
7	U19CS205	Design and Analysis ofAlgorithms	PC	4	3	1	0	4	40	60	100
8	U19CS203	Object Oriented Programming	PC	3	3	0	0	3	40	60	100
9	U19CS202	Database Management Systems	PC	4	3	1	0	4	40	60	100
10	U19CS213	Object Oriented Programming Laboratory	PC	2	0	0	2	1	60	40	100
11	U19CS212	Database Management Systems Laboratory	PC	2	0	0	2	1	60	40	100
12	U19EC206	Microprocessors and Microcontrollers	PC	3	3	0	0	3	40	60	100
13	U19EC207	Digital Signal Processing	PC	4	3	1	0	4	40	60	100
14	U19CC301	Analog and Digital Communication	PC	3	3	0	0	3	40	60	100
15	U19IT201	Software Engineering	PC	3	3	0	0	3	40	60	100
16	U19EC214	Microprocessors and Microcontrollers Laboratory	PC	2	0	0	2	1	60	40	100
17	U19EC213	Digital Signal Processing Laboratory	PC	2	0	0	2	1	60	40	100
18	U19CS301	Internet Programming	PC	3	3	0	0	3	40	60	100
19	U19IT303	Computer Networks	PC	3	3	0	0	3	40	60	100
20	U19EC401	Wireless Communication	PC	3	3	0	0	3	40	60	100
21	U19CS311	Internet Programming Laboratory	PC	2	0	0	2	1	60	40	100
22	U19IT311	Networks Laboratory	PC	2	0	0	2	1	60	40	100
23	U19IT401	Cryptography and NetworkSecurity	PC	3	3	0	0	3	40	60	100
24	U19CC401	Security Laboratory	PC	2	0	0	2	1	60	40	100

PROFESSIONAL ELECTIVES (PE)

PROGRAMMING COURSES

1 U19CS512 Advanced Java Programming PE 3 3 0 0 3 40 60 100 2 U19CS515 Open Source Software PE 3 3 0 0 3 40 60 100 3 U19IT511 Information Security PE 3 3 0 0 3 40 60 100 4 U19IT502 Software Testing PE 3 3 0 0 3 40 60 100

5 U19CS513 Advanced Data Structures and algorithms PE 3 3 0 0 3 40 60 100

6 U19CS514 R Programming PE 3 3 0 0 3 40 60 100 7 U19CS516 C# and .Net PE 3 3 0 0 3 40 60 100

B.E. COMPUTER AND COMMUNICATION ENGINEERING
Courses of Study and Scheme of Assessment (Regulations 2019)

Sl. No. Course Code Course Title Periods / week Maximum Marks CAT CP L T P C CIA SEE Total

DATA AND ARTIFICIAL INTELLIGENCE COURSES

8 U19CS509 Virtual and Augmented Reality PE 3 3 0 0 3 40 60 100 9 U19CS503 Data Analytics PE 3 3 0 0 3 40 60 100 10 U19CS504 Computer Vision PE 3 3 0 0 3 40 60 100 11 U19CS501 Information Retrieval PE 3 3 0 0 3 40 60 100 12 U19CS304 Machine Learning PE 3 3 0 0 3 40 60 100 13 U19IT501 Agile Software Development PE 3 3 0 0 3 40 60 100 **EMBEDDED SYSTEM AND IOT COURSES**

14 U19EC519 Real Time Operating Systems PE 3 3 0 0 3 40 60 100 15 U19EC521 Sensors and Instrumentation PE 3 3 0 0 3 40 60 100 16 U19EC524 Internet of Things PE 3 3 0 0 3 40 60 100 17 U19IT305 Cloud Computing PE 3 3 0 0 3 40 60 100 18 U19CC101 Embedded Systems Design PE 3 3 0 0 3 40 60 100 **COMMUNICATION AND NETWORKS COURSES**

19 U19IT510 Ad Hoc Sensor Network PE 3 3 0 0 3 40 60 100 20 U19EC501 Antenna and wave Propagation PE 3 3 0 0 3 40 60 100

21 U19EC507 Microwave and Monolithic Integrated Circuits PE 3 3 0 0 3 40 60 100

22 U19EC508 Optical Communication PE 3 3 0 0 3 40 60 100 23 U19EC518 Photonic Networks PE 3 3 0 0 3 40 60 100 24 U19CC504 Software Defined Networks PE 3 3 0 0 3 40 60 100

25 U19CC102 Telecommunication and Switching Networks PE 3 3 0 0 3 40 60 100

26 U19CC103 RF system Design PE 3 3 0 0 3 40 60 100

27 U19CC104 Satellite Communication System Engineering

28 U19CC105 Mobile Communication and Networking PE 3 3 0 0 3 40 60 100 PE 3 3 0 0 3 40 60 100

B.E. COMPUTER AND COMMUNICATION ENGINEERING
Courses of Study and Scheme of Assessment (Regulations 2019)

Sl. No. Course Code Course Title Periods / week Maximum Marks CAT CP L T P C CIA SEE Total

SEMESTER V

PROFESSIONAL ELECTIVE I

1 U19CS509 Virtual and Augmented Reality PE 3 3 0 0 3 40 60 100 2 U19CS503 Data Analytics PE 3 3 0 0 3 40 60 100 3 U19CS512 Advanced Java Programming PE 3 3 0 0 3 40 60 100 4 U19CS515 Open Source Software PE 3 3 0 0 3 40 60 100 5 U19EC519 Real Time Operating Systems PE 3 3 0 0 3 40 60 100 6 U19EC521 Sensors and Instrumentation PE 3 3 0 0 3 40 60 100 7 U19IT510 Ad Hoc Sensor Network PE 3 3 0 0 3 40 60 100 **SEMESTER VI**

PROFESSIONAL ELECTIVE II

1 U19CS504 Computer Vision PE 3 3 0 0 3 40 60 100 2 U19CS501 Information Retrieval PE 3 3 0 0 3 40 60 100 3 U19EC501 Antenna and wave Propagation PE 3 3 0 0 3 40 60 100

4 U19EC507 Microwave and Monolithic Integrated Circuits PE 3 3 0 0 3 40 60 100

5 U19EC524 Internet of Things PE 3 3 0 0 3 40 60 100 6 U19IT502 Software Testing PE 3 3 0 0 3 40 60 100 7 U19IT511 Information Security PE 3 3 0 0 3 40 60 100 **SEMESTER VII**

PROFESSIONAL ELECTIVE III

1 U19CC101 Embedded Systems Design PE 3 3 0 0 3 40 60 100 2 U19CS304 Machine Learning PE 3 3 0 0 3 40 60 100 3 U19CS514 R Programming PE 3 3 0 0 3 40 60 100

4 U19CS513 Advanced Data Structures and algorithms PE 3 3 0 0 3 40 60 100

5 U19EC508 Optical Communication PE 3 3 0 0 3 40 60 100 6 U19EC518 Photonic Networks PE 3 3 0 0 3 40 60 100 7 U19IT305 Cloud Computing PE 3 3 0 0 3 40 60 100 **SEMESTER VIII**

PROFESSIONAL ELECTIVE IV

1 U19CC102 Telecommunication and Switching Networks PE 3 3 0 0 3 40 60 100

2 U19CC103 RF system Design PE 3 3 0 0 3 40 60 100 3 U19CC504 Software Defined Networks PE 3 3 0 0 3 40 60 100 4 U19CS516 C# and .Net PE 3 3 0 0 3 40 60 100 5 U19IT501 Agile Software Development PE 3 3 0 0 3 40 60 100

6 U19CC104 Satellite Communication System Engineering PE 3 3 0 0 3 40 60 100

7 U19CC105 Mobile Communication and Networking PE 3 3 0 0 3 40 60 100

OPEN ELECTIVES (OE)

Open Electives offered by Department of Mechanical Engineering

1 U19ME601 Product Design and Innovation OE 3 3 0 0 3 40 60 100 2 U19ME602 3D Printing and Tooling OE 3 3 0 0 3 40 60 100 3 U19ME603 Quality Management OE 3 3 0 0 3 40 60 100 4 U19ME604 Enterprise Resource Planning OE 3 3 0 0 3 40 60 100 5 U19ME605 Micro Electro Mechanical Systems OE 3 3 0 0 3 40 60 100

6 U19ME606 Quality Control Tools and Techniques OE 3 3 0 0 3 40 60 100

7 U19ME607 World Class Manufacturing OE 3 3 0 0 3 40 60 100 8 U19ME608 Industrial Safety Engineering OE 3 3 0 0 3 40 60 100 9 U19ME609 Introduction to Industry 4.0 OE 3 3 0 0 3 40 60 100

10 U19ME610 Lean Six Sigma and Supply Chain Management OE 3 3 0 0 3 40 60 100

11 U19ME611 Business Organisation and Development OE 3 3 0 0 3 40 60 100

12 U19ME612 Product Distribution and Promotion Management OE 3 3 0 0 3 40 60 100

13 U19ME613 Business Ethics, Corporate Social Responsibility and Governance OE 3 3 0 0 3 40 60 100

Open Electives offered by Department of Computer Science and Engineering

1 U19CS601 Database Technologies OE 4 3 0 0 3 40 60 100 2 U19CS602 Java Programming OE 4 3 0 0 3 40 60 100 3 U19CS603 Fundamentals of Operating System OE 3 3 0 0 3 40 60 100 4 U19CS604 Introduction to Artificial Intelligence OE 3 3 0 0 3 40 60 100 5 U19CS605 Advanced Data Structures OE 3 3 0 0 3 40 60 100

6 U19CS606 Fundamentals of Python Programming OE 3 3 0 0 3 40 60 100

7 U19CS607 Fundamentals of Data Structures OE 3 3 0 0 3 40 60 100 8 U19CS608 Quantum Computing Technologies OE 3 3 0 0 3 40 60 100 9 U19CS609 Java Full Stack OE 3 3 0 0 3 40 60 100 10 U19CS610 UI Design using Java OE 3 3 0 0 3 40 60 100

Open Electives offered by Department of Electrical and Electronics Engineering

1 U19EE601 Solid State Electronics OE 3 3 0 0 3 40 60 100 2 U19EE602 Non-Conventional Energy Sources OE 3

3 0 0 3 40 60 100 3 U19EE603 Basics of Embedded Systems OE 3 3 0 0 3 40 60 100

4 U19EE604 Basics of Energy Auditing and Management

Systems

OE 3 3 0 0 3 40 60 100 OE 3 3 0 0 3 40 60 100 OE 3 3

5 U19EE605 Introduction to Hybrid and Electric Vehicles

0 0 3 40 60 100

6 U19EE606 Introduction to Energy Storage

7 U19EE607 PLC and Automation OE 3 3 0 0 3 40 60 100 8 U19EE608 Basic Circuit Analysis OE 3 3 0 0 3 40 60 100

Open Electives offered by Department of Electronics and Communication Engineering 1 U19EC601 Discrete Time Signal Processing OE 3 3 0 0 3 40 60 100

2 U19EC602 Principles of Analog and Digital Communication

OE 3 3 0 0 3 40 60 100

3 U19EC603 Digital Systems and VLSI Design OE 3 3 0 0 3 40 60 100 4 U19EC604 Introduction to IoT OE 4 2 0 2 3 40 60 100

5 U19EC605 Basics of Biomedical Instrumentation OE 3 3 0 0 3 40 60 100

6 U19EC606 Introduction to Image processing OE 3 3 0 0 3 40 60 100

7 U19EC607 Microcontroller and Embedded Systems

Automation

OE 4 2 0 2 3 40 60 100 OE 3 3 0 0 3 40 60 100 OE 3

8 U19EC608 Introduction to Wireless Sensor Networks

3 0 0 3 40 60 100

9 U19EC609 Introduction to Robotics and

10 U19EC610 Embedded C OE 3 3 0 0 3 40 60 100 **Open Electives offered by Department of Information Technology**

1 U19IT601 Basics of Software Engineering OE 3 3 0 0 3 40 60 100 2 U19IT602 Web Programming OE 3 3 0 0 3 40 60 100 3 U19IT603 Basics of Software Testing OE 3 3 0 0 3 40 60 100

4 U19IT604 Introduction to Blockchain Technology

OE 3 3 0 0 3 40 60 100

5 U19IT605 Soft Computing Techniques OE 3 3 0 0 3 40 60 100

6 U19IT606 Fundamentals of IT Infrastructure Management

OE 3 3 0 0 3 40 60 100

7 U19IT607 Mobile Application Development OE 3 3 0 0 3 40 60 100 8 U19IT608 Introduction to Computer Networks OE 3 3 0 0 3 40 60 100 **Open Electives offered by Department of Artificial Intelligence and Data Science**

1 U19AD601 Machine Learning Techniques OE 3 3 0 0 3 40 60 100

2 U19AD602 Introduction to Augmented Reality (AR)/Virtual Reality (VR)

OE 3 3 0 0 3 40 60 100

3 U19AD603 Data Science Essentials OE 3 3 0 0 3 40 60 100 4 U19AD604 Artificial Intelligence Essentials OE 3 3 0 0 3 40 60 100 **Open Electives offered by Department of Computer Science and Business Systems** 1 U19CB601 Data Integration & Big data OE 3 3 0 0 3 40 60 100

2 U19CB602 Fundamentals of Software Project Management

Science

OE 3 3 0 0 3 40 60 100 OE 3 3 0 0 3 40 60 100 OE 3

3 U19CB603 Introduction to Agile Software Development

3 0 0 3 40 60 100

4 U19CB604 Business Communication and Value

5 U19CB605 Free and Open Source Software OE 3 3 0 0 3 40 60 100 **Open Electives offered by Department of Humanities and Social Sciences**

1 U19HS601 English for Competitive Examinations

OE 3 3 0 0 3 40 60 100

2 U19HS602 Personality Development and Interpersonal Skills

Employability

OE 3 3 0 0 3 40 60 100 OE 3 3 0 0 3 40 60 100

3 U19HS603 Communication Techniques for

4 U19HS604 Mass Communication OE 3 3 0 0 3 40 60 100 5 U19HS605 Operational Research OE 3 3 0 0 3 40 60 100 **Open Electives offered by Department of Physics**

1 U19PH601 Laser Technology OE 3 3 0 0 3 40 60 100 2 U19PH602 Nano Materials and Applications OE 3 3 0 0 3 40 60 100 3 U19PH603 Physics for Solar PV System OE 3 3 0 0 3 40 60 100 4 U19PH604 Medical Physics OE 3 3 0 0 3 40 60 100 **Open Electives offered by Department of Chemistry**

1 U19CY601 Chemical Sensors and Biosensors OE 3 3 0 0 3 40 60 100 2 U19CY602 Energy Storing Devices OE 3 3 0 0 3 40 60 100 3 U19CY603 Forensic Science OE 3 3 0 0 3 40 60 100 4 U19CY604 Industrial and Material Chemistry OE 3 3 0 0 3 40 60 100 **Open Electives offered by Department of Mathematics**

1 U19MA604 Optimization Techniques BS 3 3 0 0 3 40 60 100 **PROJECT WORK (PW)**

1 U19ME281 Mini Project PW 2 0 0 2 1 60 40 100

2 U19ME381 Innovative / Multi - Disciplinary Project

PW 2 0 0 2 1 60 40 100

3 U19ME481 Project Work - Phase I PW 6 0 0 6 3 60 40 100 4 U19ME482 Project Work - Phase II PW 16 0 0 16 8 60 40 100 **EMPLOYABILITY ENHANCEMENT COURSES (EM)**

1 U19EM101 Soft Skills EM 2 0 0 2 1 100 - 100 2 U19EM201 Verbal and Soft Skills EM 2 0 0 2 1 100 - 100 3 U19EM202 Summer Internship EM - - - - NC - - - 4 U19EMXXX Industry Oriented Course I EM 2 0 0 2 1 100 - 100 5 U19EM301 Aptitude I EM 2 0 0 2 1 100 - 100 6 U19EM303 Design Thinking Laboratory EM 2 0 0 2 1 100 - 100 7 U19EM302 Aptitude II EM 2 0 0 2 1 100 - 100 8 U19EMXXX Industry Oriented Course II EM 1 0 0 1 NC - - - **INDUSTRY ORIENTED COURSES**

1 U19IC201 Introduction to Mobile App Development

MATLAB

EM 2 0 0 2 1 100 - 100 EM 2 0 0 2 1 100 - 100

2 U19IC202 Practical Image processing using

3 U19IC401 Introduction to Networking EM 2 0 0 2 1 100 - 100 4 U19IC402 LabVIEW CLAD Certification EM 2 0 0

2 1 100 - 100

5 U19IC403 Automotive Electronics Applications — Practical Approach EM 2 0 0 2 1 100 - 100 EM 2 0 0 2 1 100 - 100

6 U19IC404 Electronics simplified – A

7 U19IC405 Java for Beginners EM 2 0 0 2 1 100 - 100

8 U19IC407 Trends and Practices in Cloud Computing using AZURE — EM 2 0 0 2 1 100 - 100

9 U19IC408 Ethical Hacking and its Techniques EM 2 0 0 2 1 100 - 100 **MANDATORY COURSES (MC)**

1 U19MC202 Indian Constitution and Tradition MC 1 1 0 0 NC - - - 2 U19MC201 Environmental Science MC 1 1 0 0 NC - - -

CAT Category of Course BS Basic Sciences PW Project Work CP Contact Periods HS Humanities and Social Sciences EM Employability Enhancement Course L Lecture Hours ES Engineering Sciences NC Non-Credit Course T Tutorial Hours PC Professional Core MC Mandatory Course P Practical Hours PE Professional Elective CIA Continuous Internal Assessment C Credits OE Open Elective SEE Semester End Examination

SEMESTER - I

U19HS101 TECHNICAL ENGLISH **L T P C 3 0 0 3**

Outcomes

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

CO1 (Understand) Express their ideas effectively using appropriate vocabulary **K2**

CO2 (Apply) Develop reading skills with the help of

relevant reading strategies **K3 CO3 (Apply)** Apply various interactive techniques for effective communication **K3 CO4** (**Apply**) Write letters, Contents and articles with proper structure **K3 CO5 (Apply)** Make use of writing skills to communicate effectively **K3**

MODULE I INTRODUCTION TO EFFECTIVE SPEAKING 9 Listening -Listening process and practice - Exposure to recorded and short talks , Classroom lectures - **Speaking** - Introducing oneself, one's family / friend; Talk about preferences – Agree and Disagree – Giving opinions – Body language – Eye contact - **Reading** - Introduction of different kinds of reading materials (Technical and Non-technical) - **Writing** - Principles of clear writing – completing sentences – Word formation – Word expansion (root words / etymology) - Hints development , Reading comprehension exercises - **Grammar** - Parts of speech , articles , Questions – WH type , Yes/ No and Tag Questions.

MODULE II DIFFERENT STRATEGIES OF READING 9 Listening - Listening to specific information – Active listening, Listening and responding to video lectures / talks - **Speaking** - Strategies for good conversation - Improving fluency and self-expression – Articulation – Voice quality – Accent and intonation - **Reading** - Different reading strategies , Skimming , Scanning , Predicting , Pre-reading , Post-reading and inductive reading - **Writing** - Biographical writing (place, people), Descriptions, Instructions , Recommendations, Definitions – Single sentence definition - **Grammar** - Types of sentences, Use of imperatives, Prepositions, Modal verbs. **MODULE III GROUP INTERACTION 9 Listening** -Listening to telephonic conversation and conveying the messages - **Speaking** - Group interaction - Speaking in formal situations (teachers, officials, foreigners) - **Reading** - Longer technical texts , Identifying the various transitions in the text - **Writing** - Paragraph writing - Cohesion and Coherence in writing, Jumbled Sentences , Letter writing – Formal - Different forms and uses of words; **Grammar** - Synonym and antonym , Tenses – (present form), Adjectives - Cause and Effect expressions.

MODULE IV INTRODUCTION TO EFFECTIVE WRITING 9 Listening -Listening to Identify topic , Context , function , speakers , opinion , etc - **Speaking**- Responding to questions – Different forms of interviews – Speaking at different types of interviews - **Reading** -Identifying relationship between characters ,facts and ideas, comparing facts and figures - **Writing** - Email-etiquette, summarizing and paragraphing – Single word substitutes - Free writing on any given topic (My favourite place / Hobbies / School life, etc.)**Grammar** – Tenses – (Past form), Adverbs and Phrasal verbs.

MODULE V EFFECTIVE WRITING 9 Listening -Listening to dialogues, conversations and completing exercises based on them – Listening to specific task - focused audio track **Speaking** - Participating in conversation-short/group conversations - Role-play **Reading** - Reading and

understanding specific meaning in a text - note making, Vocabulary Extension, cloze reading - **Writing** – Types of essays, story writing - dialogue writing. Use of abbreviations and acronyms -**Grammar** - Tenses – (Future form), Collocations, fixed and semi fixed expressions.

TOTAL: 45 Hours

TEXTBOOKS

1 Jack C. Richards, "Interchange Student's Book 1", Cambridge University Press; Fourth Edition, 2015. 2 S. N. Mahalakshmi, "Communicative English for Engineers", V. K. Publications, Chennai; 9th Edition, 2019. **REFERENCES**

1 Rizvi M.Ashraf, "Effective Technical Communication", Tata McGraw Hill Publishing; New Delhi, 2007. 2 Andrea J.Rutherfoord, "Pearson Education" Inc. and The Darling Kindersley Publishing Inc., 2006. 3 Raman, Meenakshi and Sharma, Sangeetha "Technical Communication Principles and Practice", Oxford University Press; New Delhi,2014.

4 Richards C. Jack, "Interchange", Fourth edition; Cambridge University Press, 2012.

5 Butterfield, Jeff, "Soft skills for Everyone", Sixth Indian Reprint, 2015.

U19MA101 MATRIX ALGEBRA AND CALCULUS **L T P C** 3 1 0 4

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

Outcomes

CO1 (Apply) Determine inverse, higher integral powers by Cayley Hamilton theorem and convert quadratic form to canonical form by orthogonal transformation. **K3**

CO2 (Analyze) Analyze the convergence or divergence of series of positive terms and alternating series by various techniques. **K4**

CO3 (Analyze) Classify the extreme values of functions of two variables and functional dependence. **K4**

CO4 (Apply) Apply integration concepts to compute area of the given surfaces, integrals in Cartesian and polar coordinates. **K3**

CO5 (Apply) Apply triple integration concepts to compute volume of the given surfaces and solid structure and area, volume of the surface using Gamma and Beta functions. **K3**

MODULE I MATRICES 12 Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors – Cayley Hamilton theorem (excluding proof) - Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

MODULE II SEQUENCES AND SERIES 12 Sequences: Definition and examples. Series: Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D'Alembert's ratio test. Alternating series – Leibnitz's test – Series of positive and negative terms – Absolute and conditional convergence.

MODULE III MULTIVARIABLE CALCULUS 12

Partial derivatives – Total derivative – Differentiation of implicit functions –Jacobian - properties – Taylor's series – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers. **MODULE IV DOUBLE INTEGRATION 12** Double integrals – Change of order of integration – Double integrals in polar coordinates - Area enclosed by plane curves.

MODULE V INTEGRATION AND ITS APPLICATION 12 Evaluation of triple integrals**-**Volume as triple integral- Simple problems- Volume of solid- Gamma and Beta functions. **TOTAL : 60 Hours**

TEXTBOOKS

1 Grewal. B. S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2015. 2 Erwin Kreyszig, "Advanced Modern Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Ltd, Singapore, 2017.

REFERENCES

1H. K. Dass, "Advanced Engineering Mathematics", S.Chand & Company LTD, New Delhi, Reprint 2009.

2 John Bird, “Higher Engineering Mathematics”, An imprint of Elsevier, Burlington, Reprint 2010. 3 Bali. N. P and Manish Goyal, ”A Text book of Engineering Mathematics”, 8th Edition, Laxmi publications Ltd, 2011.

4 Veerarajan. T, “Engineering Mathematics”, 3rd edition, Tata Mc Graw Hill Education Pvt. Ltd, New Delhi, 2011.

U19PH101 ENGINEERING PHYSICS **L T P C** 3 0 0 3

Outcomes

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

CO1 **(Apply)** Learn the basic of properties of matter and its applications K3

CO2 **(Apply)** Acquire knowledge on the concepts of optical devices and their applications in fibre optics K3

CO3 **(Apply)** Have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers. K3

CO4 **(Apply)** Get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes. K3

CO5 **(Understand)** Understand the basics of quantum structures and their applications in spintronics and carbon electronics. K2

MODULE I PROPERTIES OF MATTER 9 Elasticity –Hooke’s law-Stress-strain diagram and its uses – factors affecting elastic modulus– Torsional stress and deformations – Twisting couple – Torsion pendulum: theory and experiment – Bending of beams – bending moment – cantilever: theory and experiment – Applications- I-shaped girders-Viscosity –coefficient of viscosity-Stoke’s theorem Bernoulli’s theorem-Application.

MODULE II LASER AND FIBRE OPTICS 9 Lasers: population of energy levels, Einstein’s A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homo junction and hetero junction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – losses associated with optical fibers - fibre optic sensors: pressure and displacement.

MODULE III THERMAL PHYSICS 9 Transfer of heat energy – thermal expansion of solids and liquids – expansion joints – bimetallic strips - thermal conduction, convection and radiation – heat conduction in solids – thermal conductivity - Lee’s disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators and solar water heaters.

MODULE IV QUANTUM MECHANICS 9 Black body radiation –Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger’s wave equation – time independent and time dependent equations –particle in a one-dimensional rigid box – tunneling (qualitative) - scanning tunneling microscope. **MODULE V INTRODUCTION TO NANOSCIENCE 9** Nano Scale – Quantum Confinement – Quantum dot – Different forms of nano materials Fabrication methods – Top down and bottom up approach - Ball milling - CVD - Properties of nano materials – Dendrimers - Coulomb blockade effects - Single electron phenomena and Single electron transistor –Carbon nano tubes properties and applications. **Total: 45 Hours**

TEXT BOOKS

1. Avathanulu M.N and Kshirsagar P.G, “A text book of Engineering Physics”, S. Chand and company, 11th

Edition, 2014.

2. Bhattacharya D.K and Poonam T, “Engineering Physics”, Oxford University Press, 2017.

REFERENCES

1. Halliday D, Resnick R and Walker J, “Principles of Physics”, Wiley, 9th Edition, 2010. 2. Arthur Beiser, “Concepts of Modern Physics”, Tata McGraw Hill, 9th Edition, 2015. 3. Pillai S.O, “Solid State Physics”, New age International Publishers, 3rd Edition, 2015.

U19CS101 PROBLEM SOLVING USING C **L T P C** 3 0 0 3

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

CO1 (Understand) Understand the problem solving techniques and basic concepts of C K2 **CO2 (Apply)** Apply looping and conditional constructs for given problems K3

Outcomes problems K3

CO3 (Apply) Use arrays and strings to solve complex

CO4 (Understand) Understand the use of functions and pointers in modular K2 programming

CO5 (Understand) Understand Structures, unions and files for problem solving K2 **MODULE I**

PROBLEM SOLVING FUNDAMENTALS 10

Introduction to problem solving - Flow Chart, Algorithm, Pseudo code - Procedural Programming (Modular and Structural)- Program Compilation, Execution, Debugging, Testing –Pre-processors -Basic features of C, Structure of C program - Data types- Storage Classes-Tokens in C- Input and Output Statements in C, Operators- Bitwise, Unary, Binary and Ternary Operators, Precedence and Associativity -Expression Evaluation

MODULE II CONDITIONAL STATEMENTS AND LOOPING CONSTRUCTS 8 Problem solving using Conditional or Selection or Branching Statements: Structure of if, if-else, else-if ladder, nested-if, switch constructs - Looping constructs: Structure of for, while, do-while constructs, usage of break, return, goto and continue keywords **MODULE III ARRAYS AND STRINGS 8** 1D Array –Declaration, Initialization, 2DArray - Declaration, Initialization, Multi-dimensional Arrays Strings: Declaration, Initialization, String operations: length, compare, concatenate, copy

MODULE IV FUNCTIONS AND POINTERS 9 Functions: Built-in Functions, User defined functions – Function Prototypes –Recursion – Command Line Argument -Arrays and Functions – Strings and Functions. Pointers: Declaration – Pointer operators – Pointer arithmetic -Passing Pointers to a Function – Pointers and one dimensional arrays - Dynamic Memory Allocation

MODULE V STRUCTURES, UNION AND FILE HANDLING 10 Structure: Create a Structure-Member initialization - Accessing Structure Members - Nested structures – Pointer and Structures – Array of structures -Self Referential Structures – type def-Unions, Files –Opening and Closing a Data File, Reading and writing a data file.

TOTAL : 45 Hours

TEXTBOOKS

1 Kernighan B. W. and Ritchie D. M., “C Programming Language (ANSI C)”, Prentice Hall of India Private Limited, New Delhi, 2010.

2 Herbert Schildt, “C – The Complete Reference”, Tata McGraw Hill Publishing Company, New Delhi, 2017.

REFERENCES

1 Deitel and Deitel, “C How to Program”, Pearson Education, New Delhi, 2011.

2 Byron S. Gottfried and Jitendar Kumar Chhabra, “Programming with C”, Tata McGraw Hill Publishing

Company,New Delhi,2011

3 Pradip Dey and ManasGhosh, “Programming in C”, Oxford University Press, New Delhi, 2009.

U19ME101 ENGINEERING GRAPHICS **L T P C** 1 0 4 3

Outcomes

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

CO1 (Apply) Perform freehand sketching of basic geometrical constructions and multiple views of objects K3

CO2 (Apply) Project orthographic projections of points, lines and plane surfaces. K3 **CO3 (Apply)** Draw the projection of simple solids using graphic principles K3

CO4 (Apply) Draw the sectional views of simple solids and develop the surfaces of sheet metal components. K3

CO5 (Apply) Draw isometric projection and perspective projection of simple objects K3

MODULE I FREE HAND SKETCHING AND CURVES **15 Introduction**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning. **Visualization concepts and Free Hand sketching:** Visualization principles –Representation of Three Dimensional objects – Layout of views. Application of free hand sketching. **Curves:** Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Application of curves.

MODULE II PROJECTION OF POINTS, LINES AND SURFACES 15 Projection of points. Projection of straight lines located in first quadrant using rotating line method - Traces, Projection of plane surfaces like polygonal lamina and circular lamina. Application of projection of points, lines and surfaces **MODULE III PROJECTION OF SOLIDS 15** Projections of simple solids like prism, pyramid, cylinder and cone - Drawing views when the axis of the solid is inclined to one reference plane by rotating object method. Application of projection of solids.

MODULE IV SECTIONS AND DEVELOPMENT 15 Introduction to 'section of solids'. Section of simple solids in simple vertical position, when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones. Application of sections of solids and development of lateral surfaces.

MODULE V ISOMETRIC AND PERSPECTIVE PROJECTION 15 Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions- Applications of isometric projection. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method. Applications of perspective projection.

Computer Aided Drafting (Demonstration Only)

Introduction to computer aided drafting and dimensioning using appropriate software. 2D drawing commands: Zoom, Picture editing commands, Dimensioning, Isometric drawing, Iso-planes and 3D drafting. Plotting of drawing. Practice includes drawing the projection of lines and solids. Prepare isometric view of simple solids like prisms, pyramids, cylinders and cones.

TOTAL : 75 Hours

TEXTBOOKS

1 Natarajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2019

2 Venugopal K. And Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2019.

REFERENCES

1 Bhatt N.D, “Machine Drawing”, Charotar Publishing House, 1st Edition, 2010.

2 Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, 1st Edition, 2008.

3 Gopalakrishna K.R., “Machine Drawing in first angle projection, Subhas Stores, Bangalore, 1st Edition, 2007.

4 K Leo Dev Wins., “Engineering Drawing”, Pearson (Wins) Publications, Latest Edition, 2019. 5 Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

6 N S Parthasarathy and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets. 2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

U19PH111 PHYSICS LABORATORY **L T P C** 0 0 1 1

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

Outcomes

CO1 Understand the various experiments in the areas of optics, mechanics and thermal physics will nurture the students in all branches of Engineering. K2

CO2 Interpret and formulate experiments in engineering physics. K3

List of Experiments

1. Determination of Young’s modulus – Uniform bending method
2. Determination of Rigidity modulus – Torsion Pendulum
3. Determination of Young’s modulus – Cantilever method.

4. Determination of thickness of a thin wire – Air Wedge
5. Determination of coefficient of viscosity of a given liquid – Poiseuille’s method 6. Determination of wavelength of laser using grating –Semiconductor laser 7. Determination of band gap of a semiconductor
8. Determination of wavelength of Mercury spectrum - Spectrometer
9. Determination of velocity of Ultrasonic waves in Liquids and Compressibility of the liquid - Ultrasonic Interferometer

10. Determination of thermal conductivity of a bad conductor – Lee's Disc Method 11. Determination of hysteresis losses in a ferromagnetic material.

12. Determination of specific resistance – Carey Foster's Bridge.

13. Determination of dispersive power of prism – Spectrometer.

14. Determination of refractive index of the given liquid- Semiconductor laser **Total: 30 Hours**

TEXT BOOK

1. In house laboratory manual "Physics Manual" prepared by the faculty members (Physics) – Sri Eshwar College of Engineering – Coimbatore.

REFERENCES

1. Shukla, R.K. and Anchal Srivastava, "Practical Physics", New Age International, 2011. 2. Arora, C.L., "Practical Physics", S. Chand & Co., 2012.

U19GE111 ENGINEERING PRACTICES LABORATORY **L T P C** 0 0 4 2

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

CO1(Apply) Fabricate and experiment with Mechanical and Carpentry components and pipe connections.K3

CO2 (Apply) Use fabrication tools to join and assembling the structures. K3 **CO3(Apply)** Identify and Illustrate the various parts of pumps, plumbing works, welding and machine tools.K3

CO4(Apply) Apply electrical & electronic fundamentals to understand basic circuit elements and emerging technologiesK3

CO5 (Apply) Use electrical fundamentals to solve domestic / industrial wiring faults. K3 **GROUP A (CIVIL & MECHANICAL)**

MODULEI CIVIL ENGINEERING PRACTICES 10 Plumbing

1. Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.

2. Laying pipe connection to the suction & delivery side of a pump – inlet & outlet
3. Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.

Wood Work

1. Sawing, planning and making common joints: T-Joint, Mortise and Tennon joint, Dovetail joint.

Study

1. Study of joints in door panels, wooden furniture.
2. Study of common industrial trusses using models.

MODULEII MECHANICAL ENGINEERING PRACTICES 13 Welding

1. Arc welding of butt joints, lap joints, tee joints.
2. Gas welding Practice.

Basic Machining

1. Simple turning, drilling and tapping operations.

Sheet Metal Work

1. Forming & Bending.
2. Model making – Trays, funnels, etc.
3. Different type of joints.

Demonstration only

Study and assembling the following:

1. Centrifugal pump.
2. Submersible pump sets.

Demonstration only

1. Basics of Smithy operations.
2. Foundry operation like mould preparation for grooved pulley.

Refrigeration and Air-Conditioning System.

GROUP B (ELECTRICAL & ELECTRONICS)

MODULE III ELECTRICAL ENGINEERING PRACTICES 11 1. Basic household wiring using single phase energy meter, 1/2 way switches, MCB, indicator, lamp-etc., 2. Fluorescent Lamp–wiring and Godown wiring

3. Measurement of electrical quantities like voltage, current, power, power factor and energy using various measuring equipment.
4. Experiment using protective equipment like Fuse, MCB and RCCBs
5. Earthing and Measurement of earth resistance.

MODULE IV ELECTRONICS ENGINEERING PRACTICES 11 1. Study of Electronic components and equipment – Resistor, color coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.

2. Study of logic gates AND, OR, EX-OR and NOT.
3. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
4. Measurement of ripple factor of HWR and FWR.

GROUP C (MULTI-DISCIPLINARY)

MODULE V EMERGING TECHNOLOGIES 15 Laser Cutting Machine Practice

1. Study of Laser Cutting Machine
2. Hands on exercise in Laser Cutting Machine

Demonstration of 3D Printer

1. Briefing of 3D Printing process flow in model creation
2. Model creation of simple 3D objects

Introduction to IoT

1. Briefing of IoT and its applications
2. Hands on exercise - IoT based Switch

Demonstration of AVR

1. Study of Augmented Reality/Virtual Reality

Video Demonstration: Human-Computer Interaction (AVR lab)

TOTAL: 60 hours

U19CS111 PROBLEM SOLVING USING C LABORATORY **L T P C** 0 0 4 2

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

CO1	**(Apply)** Solve problems using data types and operators	K3

Outcomes

CO2 (Apply) Apply appropriate looping and conditional constructs for given C programs K3 **CO3 (Apply)** Use functions to build modular programs K3 **CO4 (Apply)** Use appropriate IDE and tools to write, compile, debug and execute a C Program. K3 **CO5 (Apply)** Implement structures, unions and File Operations K3

MODULEI PROBLEM SOLVING AND BASICS OF C PROGRAMMING 10 • Problem solving design using Scratch tool

• Algorithm/flowchart/Pseudo code

• I/O

• Data types

• Operators

• Pre-processors

• Introduction to C-IDE, Compilers, debugging

MODULEII CONDITIONAL STATEMENTS AND LOOPING CONSTRUCTS 12

• Conditional Statements- if-if else-else if ladder- nested if- switch

• Looping Constructs – for – while- do-while

• break, return, goto, continue keywords in C programs

MODULE III ARRAYS AND STRINGS 13 • One dimensional Arrays

• Two dimensional Arrays

• String functions(without Library Functions)

• String functions(with Library Functions)

MODULE IV FUNCTIONS 13 • Functions- Modular Programming

• Recursions

• Command line arguments

• Pass by value and pass by reference

• Pointers

• Pointers and arrays

• Dynamic Memory Allocation

MODULE V STRUCTURES, UNIONS AND FILE HANDLING 12 • Structures

• Union

• Programs to illustrate File operations

Mini Project –Console based application in C

TOTAL: 60 Hours

TEXTBOOKS

1 Kernighan B. W. and Ritchie D. M., “C Programming Language (ANSI C)”, Prentice Hall of India Private Limited, New Delhi, 2010.

2 Herbert Schildt, “C – The Complete Reference”, Tata McGraw Hill Publishing Company, New Delhi, 2017.

REFERENCES

1 Deitel and Deitel, “C How to Program”, Pearson Education, New Delhi, 2011.

2 Byron S. Gottfried and Jitendar Kumar Chhabra, “Programming with C”, Tata McGraw Hill Publishing Company,New Delhi,2011

3 PradipDey and ManasGhosh, “Programming in C”, Oxford University Press, New Delhi, 2009.

U19EM101 SOFT SKILLS **L T P C** 0 0 2 1

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

Outcomes

CO1 (Apply) Apply the basic personality traits in social activity for future working environment K3 **CO2 (Apply)** Apply receptiveness and get customized to today’s corporate world K3

CO3 (Analyze) Analyze and mingle with different types of people to overcome and eradicate fear K4

CO4 (Apply) Create a team environment in the classroom to measure their individual team player skills K3

CO5 (Apply) Create a vivid vision about their behaviour and discipline in future and through which they can measure themselves in socializing K3

MODULE I BEHAVIOURAL SESSION, GOAL SETTING, POWER DRESSING 6 Behavioral session – Regarding interview and Life Skills a practical session is hosted for the students for how they should carry themselves in today’s society and how to meet up the company’s expectations. Goal Setting – Activities and goal establishment psychology classes are conducted for the students to improve their short term and long term goals (A Goal Sheet is prepared) Power Dressing – Perking up their dressing style.

MODULE II LANGUAGE PROFICIENCY, COMMUNICATION BUILDING 6 Language proficiency – Neutral accent refinement speaking classes for students.

Communication building – Multi tasking activities for communication building.

MODULE III LEXICON BUILDING, BODY LANGUAGE, STORY BUILDING 6 Lexicon Building – (Speaking session)

Body Language – (Demo and practical session)

Story Building – (Activity)

MODULE IV TEAM BUILDING, OUTDOOR SPEECH 6 Team Building – Activity

Outdoor Speech – Basic Topic (Change of environment)

MODULE V OUTDOOR JOURNALISM 6 Outdoor journalism – (Activity)

TOTAL: 30 Hours

REFERENCES

1 Norman Lewis, “Word power made easy”

2 Sylvia Reyes, “Team Building: The Ultimate Guide to Build & Manage Winning Teams”, MC Graw hill, I 3 Dan Clay, How to write the perfect resume.

4 Tyler Hayden**,”** Communication Activities: A Team Building Activity Book**”,**

5 Ian Tuhovsky, “Communication Skills Training: A Practical Guide to Improving Your Social Intelligence, Presentation, Persuasion and Public Speaking (Positive Psychology Coaching Series Book 9)”

SEMESTER - II

U19HS111 BUSINESS ENGLISH L T P C 3 0 0 3

Outcomes

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

CO1 **(Apply)** Apply different conversation techniques in day-to-day communication K3 CO2 **(Apply)** Practice effective listening techniques during conversations. K3 CO3 **(Apply)** Develop good reading practice K3 CO4 (**Apply**) Report ideas and concepts in an effective manner K3 CO5 **(Apply)** Articulate effectively during discussions and presentations K3

MODULE I TYPES OF CONVERSATION 9 Listening - Listening texts, Importance of listening in corporate world - **Speaking** -Types of conversation- Formal and Informal - **Reading** -Reading with purpose-taking notes out of technical writing - Eye reading visual perception, Analytical and Critical reading practice - **Writing** – Checklists - Word formation **Grammar** - Regular and Irregular verbs, Subject Verb Agreement, Sentence Construction, Active and Passive voice.

MODULE II LISTENING COMPREHENSION 9 Listening - Various scientific and technical talks - Completing Information – Gap filling Exercises - **Speaking** - Describing a process - **Reading** - Reading different kinds of texts like Entertaining messages, General messages, Reference materials, Business Documents and Scientific and technical texts - Writing - Summarizing a paragraph, Interpreting charts and graphs – Autobiographical Writing **-** Words often confused **Grammar** - Purpose expressions, If conditionals.

MODULE III READING PRACTICE 9 Listening - Classroom lectures - Note taking practice - **Speaking** - Techniques to develop effective Presentation - Improving responding capacity – Extempore, Speech practice - Facial expression – Gestures - **Reading** - Active and Passive reading , Speed reading , Word meaning recognition - **Writing** - Minutes of Meeting – Format and practice in the preparation of minutes - Writing summary after reading Articles from Journals – **Grammar** - Embedded sentences, Verbal Analogies, Homophones and Homonyms, Sequence of words.

MODULE IV REPORT WRITING 9 Listening - Listening process and practice - Expose to recorded and structure talks - **Speaking** - Presentation at the Business Meeting - Connecting ideas - Collaborative tasks - **Reading** - Use of Extensive Reading, Transcoding verbal and Non-Verbal - **Writing** - Report Writing - Types of report - **Grammar** - Using Idioms in sentences, Simple, Compound and Complex sentences.

MODULE V GROUP DISCUSSION 9 Listening- Listening to TED/Ink Talks - **Speaking** - Group Discussion Practice, Interpersonal conversation - Developing persuasive speaking skill - Reading - Intensive reading, Note-making - **Writing** - Applying for a Job – Cover letter, Resume preparation - **Grammar** - Numerical expressions, reported speech, Error Spotting, Connectives (discourse markers).

Total: 45 Hours

TEXT BOOKS

1. Jack C. Richards, “Interchange Student’s Book 1”, Cambridge University Press; Fourth Edition, 2015. 2. S. N. Mahalakshmi, “Technical English for Engineers”, V. K. Publications; Chennai, Eighth Edition, 2018.

REFERENCES

1. Rizvi M.Ashraf, “Effective Technical Communication”, Tata McGraw Hill Publishing Company; NewDelhi, 2007.
2. Andrea J.Rutherfoord, “Pearson Education” Inc. and The Darling Kindersley Publishing Inc., 2006. 3. Raman, Meenakshi and Sharma, Sangeetha “Technical Communication Principles and Practice”, Oxford University Press; New Delhi,2014.
4. Richards C. Jack, “Interchange”, Fourth edition; Cambridge University Press, 2012. 5. Butterfield, Jeff, “Soft skills for Everyone”, Sixth Indian Reprint, 2015.

U19HS112 BASIC JAPANESE L T P C 3 0 0 3

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

CO1 **(Understand)** Recognize and write Japanese alphabet K2

Outcomes

CO2 **(Remember and Understand)** Speak using basic sounds of the Japanese language K2

CO3 **(Apply)** Apply appropriate vocabulary needed for simple conversation in Japanese language K3

CO4 **(Apply)** Apply appropriate grammar to write and speak in Japanese language K3 CO5 **(Apply)**Comprehend the conversation and give correct meaning K3 **MODULE I INTRODUCTION TO JAPANESE 9** Introduction to Japanese - Japanese script - Pronunciation of Japanese (Hiragana), (Katakana) - Long vowels - Pronunciation of in, tsu, ga - Letters combined with ya, yu, yo - Daily Greetings and Expressions - Numerals. N1 wa N2 desu - N1 wa N2 ja arimasen - S ka - N1mo - N1 no N2 - san

MODULE II POSITIONS GRAMMAR PATTERNS 9 Positions Grammar Patterns - Kore - Sore – Are – Kono N – Sono N – Ano – N – Sou desu – Souja Arimasen – S1 ka – S2 ka – N1 no N2 – Sou desu ka – Koko – Soko – Asoko – Kochira – Sochira – Achira – Ni wa N2 (place) desu – Doko – Dochira – N1 no N2 – Ko – So – A – Do (Demonstrative words) – O kuni – Kanji10 – Technical Japanese Vocabulary (30 Numbers)

MODULE III INTRODUCTION TO TIME 9 Introduction to time – Ji – Fun – Pun – Introduction of verbs – V Masu – V Masu – V Masen – V Mashita – V Masendeshita – N (Time) Ni V – N1 Kara - N2 Made – N1 to N2 - S Ne – N (Place) e Ikimasu – Kimasu – Kaerimasu – Doko (e) Mo Ikimasen – Ikimasendeshita – N (Vechile) de Ikimase – Kimasu – Kaerimasu **MODULE IV VERBAL CONJUGATION 9** Verbal Conjugation - No (Person / Animal) to V – Itsu – S Yo – N o (transitive) – N o Shimasu – Nani o Shimasuka – Nan and Nani – N (place) de V – V Masenka – V Mashou – o – Kanji 50 – Technical Japanese Vocabulary - N

(tool/means) de V – Word/Sentence wa Go de Nani desu ka – N (person) Ni Agemasu, etc – N (person) Ni Moraimasu - Mou V Mashite.

MODULE V INTRODUCTION TO ADJECTIVES 9 Introduction to Adjectives – N wa Na – adj (Na) desu – N wa II adj (II) desu – Na adj Na n – II adj (II) N – Totemo – Amari – N wa Dou desuka – N1 wa Donna N2 desuka – S1 Ga S2 – Dore – N ga Arimasu – Wakarimasu – N Ga Sukidesu – Kiraidesu – Jozu desu – Heta desu – Donna N – Yoku – Daitai – Takusan – Sukoshi – Amari – Zenzen – S1 kara S2 – Doushite – Kanji 50 – Technical Japanese Vocabulary

Total: 45 Hours

TEXT BOOKS

1 “Japanese for Everyone: Minna no Nihongo”,Goyal publishers& Distributers Pvt.Ltd , Second edition,

2017

2. Nihongo challenge for KANJI PART

REFERENCES

1. Nihongo Shoho-1
2. Nihongo Shoho-2

U19HS113 BASIC GERMAN L T P C 3 0 0 3

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

CO1 **(Understand)** Recognize and write German alphabet K2

Outcomes

CO2 **(Remember and Understand)** Speak using basic sounds of the German language K2

CO3 **(Apply)** Apply appropriate vocabulary needed for simple conversation in German language K3

CO4 **(Apply)** Apply appropriate grammar to write and speak in German language K3 CO5 **(Apply)** Comprehend the conversation and give correct meaning K3 **MODULE I BASIC INTRODUCTION TO GERMAN SCRIPTS 9** Theme and Text (Introduction to German - German script, Deutsche Namen, Daily Greetings and Expressions) – Grammar ('wh' questions, das Alphabet)– Speak Action (Buchstabieren, sich und andere vorstellen nach Namen und Herkunft fragen, internationale Wörter auf Deutsch verstehen, jemanden begrüßen)– pronunciation (Buchstabieren J, V, W, Y, - Long vowels A, E, I, O, U - Pronunciation of Ä, Ü, Ö) – To learn (internationale Wörter in Texten finden, Wörter sortieren)

Theme and Text (Gespräche im caf'e, Getränkekarte, Telefon-buch, Namen, Rechnungen) – Grammar (Frägesatze mit wie, woher, wo, was Verben in präsens Singular und Plural, das Verb Sein, Personalpronomen und Verben)– Speak Action (eine Gespräch beginnen sich und andere vorstellen zählen, etwas bestellen und bezhalen Telefonnummern und verstehen)– pronunciation (Wortakzent in Verben und in Zahlen) – To learn (Grammatiktabelle ergänzen, mit einem Redemittelkasten arbeiten)

MODULE II NUMBERS AND NOMINATIVE CASE 9 Theme and Text (Numbers – 1 to 12 (Eins bis Zwolf) – 20, 30, 40, 90 (zwanzig-Neunzig) – All Numbers (1-10000) – German Currency (Euro) – Basic Mathematics (plus, Minus, Malen, Geteilt durch) – Grammar (Introduction of verbs –Have Verb – To Come, To Speak, To Read, To Drive, To Fly, To write, To Eat, To sleep, To take etc.,) Theme and Text (Communication in course) – Grammar (Singular and Plural, Artikel: der,das,die/ ein,eine, verneinung: kein, keine, Komposita: das Kursbuch) – Speak Action (Gegenständen fragen/ Gegenstände benennen im kurs:) – pronunciation (word accent Marking, Umlaute ö ä ü hören und sprechen) – To learn (Lernkarten schreiben, Memotipps, eine Regel selbst finden)
Theme and Text (City, Town, Language: Nachbar, Sprachen, Sehenswürdigkeiten in Europa) – Grammar (Past tense for Sein, W-Frage, Aussagesatz und Satzfrage) – Speak Action (about city and siteseeing) – pronunciation (Satzakzent in Frage- und Aussagesätzen) – To learn (eine Regel ergänzen, eine Grammatiktabelle erarbeiten, Notizen machen)

MODULE III AKKUSATIVE CASE AND PREPOSITIONS 9 Theme and Text (Menschen und Hauser, Furniture catalogue, E-Mail, House information) – Grammar (possesivartikel im Nominativ, Artikel im Akkusativ, Adjektive im satz, Graduierung mit zu)– Speak Action (Whonung bescreiben about perons and things)– pronunciation (consonant - ch) – To learn (wortschatz systematisch) Theme and Text (Termine - Appointment and punctuality in

Germany) – Grammar (questions with wann? Preposition (am, um, von... bis), verneinung mit nicht, trennbare verben, präteritum von haben) – Speak Action (Daily plan making, time commitment, excuse for late coming) – pronunciation (consonants- p,b,t,d / k,g) – To learn (Rollenkarten arbeiten)

Theme and Text (orientation in working area, go for work, floor plan city plan, office and computer) – Grammar (preposition: in,neben, unter, auf, vor, hinter, an, zwischen, bei und mit + Datic)– Speak Action (work place, work, giving appointments)– pronunciation (consonants: f,w und v) – To learn (Making notice in calender)

MODULE IV DATIV CASE AND PREPOSITIONS 9 Theme and Text (Holiday and Party, holiday plan, party plan in Germany) – Grammar (regular and iregular verbs) – Speak Action (holiday speak, accident, Ich-Text schreiben) – pronunciation (lange und kurze vokale markieren) – To learn (Text Order)

Theme and Text (organising an Excursion to Berlin through city orientation, Bus plan, City plan, post card, Excursion programme) – Grammar (preposition: in, durch, über + Akkusativ: zu, an... vorbei + Dativ, Modalverb wollen) – Speak Action (Tourism, culture, postcard preparation, travel description) – pronunciation (r and l)– To learn (plaket making) Theme and Text (Beruf und all Tag, Visiten karten, wörterbuch) – Grammar – Speak Action (profession, statistic speaking) – pronunciation (n,ng and nk)– To learn (wörterbuch , text information in tabel)

MODULE V ADJECTIVES AND PRONUNCIATION 9

Theme and Text (Haushaltstipp, kochrezept, maße und gewichte, Mahlzeiten und Gerichte) – Grammar (jeden Tag, manchmal, nie, Question - welche, Comparison – viel, gut, gern) – Speak Action (about eat, drink question and answers) – pronunciation (e,en,el,er) – To learn (Text auswerten und zusammenfassen) Theme and Text (Clothing, colour, weather) – Grammar (Adjecktive im Akkusativ, unbestimmer Artikel) – Speak Action (weather, dress and colour understanding) – pronunciation (e-o- ö and ie-u- ü) – To learn (wetter and Farben interkulturelle)

Theme and Text (in super market,purchase, House Maintainence, Emotion, Sports, Body parts) – Grammar (Modal Verb) – Speak Action (Body parts) – To learn (Rollenkarten arbeiten)

Total: 45 Hours

TEXT BOOKS

1. Funk, Kuhn, Demme, “Studio D A1 Deutsch als Fremdsprache” GOYAL PUBLISHERS AND DISTRIBUTORS; 2016
2. Hueber, “Fit for Goethe- Zertifikat A1 (Start Deutsch 1)” GOYAL PUBLISHERS AND DISTRIBUTORS; 2016

U19MA102 ADVANCED CALCULUS AND COMPLEX VARIABLES **L T P C** 3 1 0 4

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

Outcomes

CO1(Analyze) Compare the ideas of vector integral theorems for solving given problems and exhibit the relation between them. K4

CO2(Apply) Make use of Milne Thomson method to construct analytic functions related to complex variable. K3

CO3(Apply) Apply the concepts of integration for complex functions in certain regions to determine real integrals. K3

(Apply) Apply Laplace transform and inverse transform of simple functions,

CO4 properties, various related theorems and application to differential equations K3 with constant coefficients.

CO5 (Apply) Apply various techniques in solving differential equations. K3

MODULEI VECTOR CALCULUS 12 Gradient and directional derivative - Divergence and curl - Irrotational and solenoidal vector fields - Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs*)* – Verification of theorem and applications (for cubes and rectangular parallellopipeds).

MODULE II COMPLEX DIFFERENTIATION 12 Analytic functions - Cauchy-Riemann equations (excluding proof) – Properties of analytic function – Harmonic conjugate - Construction of analytic function by Milne Thomson method – Bilinear transformation.

MODULE III COMPLEX INTEGRATION 12 Cauchy's integral theorem- Cauchy's integral formula- Cauchy's integral formula for derivatives- Cauchy residue theorem - Taylor's and Laurent's series – Contour integral in unit circle and semi circle (Excluding poles on real axis). **MODULE IV LAPLACE TRANSFORM 12** Existence conditions - Properties (excluding proofs) - Transform of elementary and special functions - Transforms of derivatives and integrals - Periodic function – Inverse Laplace transform - Applications to solution of linear second order ordinary differential equations with constant coefficients.

MODULE V ORDINARY DIFFERENTIAL EQUATIONS 12 Higher order linear differential equations with constant coefficients – Cauchy's and Legendre's linear differential equations - Method of variation of parameters - Application of ordinary differential equations in simple harmonic motion and basic elements of electrical circuits.

TOTAL :60 Hours

TEXTBOOKS

1 Grewal B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2015. 2

Monty J. Strauss, Gerald J. Bradley and Karl J. Smith, "Calculus", 3rd Edition, 2002.

REFERENCES

1 Erwin Kreyszig, "Advanced Modern Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Ltd, Singapore, 2017.

2 Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", 8th Edition, Laxmi Publications Ltd, 2011.

3 Jain R.K. and Iyengar S.R.K, "Advanced Engineering Mathematics", 3rd Edition, Naros Publications, New Delhi, 2007.

U19CY101 ENGINEERING CHEMISTRY **L T P C** 3 0 0 3

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

CO1 **(Apply)** Apply the principles of electrochemistry and corrosion in engineering. K2

(Understand) Understand the Engineering materials. K3

CO5 (Understand) Understand the science of polymer and polymer reactions. K3

Outcomes

CO2 (Understand) Understand the quality of water, and its treatment methods. K3 **CO3 (Apply)** Apply the concepts relevant to thermodynamics. K2 **CO4**

MODULE I ELECTROCHEMISTRY AND CORROSION 9

45

Basics of electrochemistry - Electrochemical cell-Reversible and irreversible cell-EMF measurements-Standard Weston Cadmium cell-Nernst equation and problems-Electrodes-single electrode potential-Types of electrodes-Calomel electrode Electrochemical series-Significance-Conduct metric titration - Potentiometric titration **Corrosion:** Definition-Classification of corrosion and its mechanism-Factors influencing corrosion –Corrosion control-Sacrificial anode and cathodic protection method-Corrosion inhibitors-Electroplating of Nickel and chromium-Paints-Constituents and their function. **MODULE II WATER TECHNOLOGY 9 Introduction** – Hardness of water-Determination of hardness of water by EDTA method-Alkalinity of water-Types of alkalinity-Estimation of alkalinity-Domestic water treatment-Pre-treatment-Removal of suspended impurities-Disinfection methods-Boiler feed water-Requirement of boiler feed water-Boiler troubles-scales and sludges-Treatment of boiler feed water - External treatment-Zeolite process-ion exchange method-Internal treatment method-Desalination – Reverse Osmosis.

MODULE III CHEMICAL THERMODYNAMICS 9 Introduction to thermodynamics- Terminologies -Laws of Thermodynamics (only definitions)-second law-Entropy as a thermodynamic quantity-Entropy change of an ideal gas-reversible and irreversible process, physical transformations Clausius inequality theorem- Free energy and work function: Helmholtz and Gibbs free energy function – problems- Gibbs Helmholtz equation –problems-Clausius Clapeyron equation-Maxwell relation- Van't Hoff isotherm and its applications **MODULE IV CHEMISTRY OF MATERIALS 9 Refractories**-Classification – criteria of good refractory-properties and its application-Manufacture of Alumina, Magnesite and Silicon carbide. **Glass:** Manufacture of glass by tank furnace method-Types and properties of glass. **Cement:** Portland cement- Comparison and Manufacture by rotary kiln technology-Chemistry of setting and hardening of cement-Role of gypsum. **Nanomaterials:** Carbon nano tubes-shape memory alloys-C60 fullerene-Liquid crystals-properties and its application.

MODULE V POLYMER TECHNOLOGY 9 Introduction-Terminologies-molecular weight of polymers(only definition) -Classification of polymers-natural and synthetic, thermoplastics and thermosetting plastics- Types and mechanism of polymerization: addition (free radical)- condensation and copolymerization- Properties of polymers-some commercial thermosetting resin-Phenol formaldehyde resin, Amino resins, Silicone resins-some thermoplastics-Polyethylene, PVC, polyvinyl acetate. **TOTAL : 45 Hours**

TEXTBOOKS

1 S.Vairam and Subha Ramesh .,"Engineering Chemistry", Wiley India, Delhi, 2015.

2 P.C.Jain and M.Jain. "Engineering Chemistry", Dhanpat Rai Publishing Company, 16/e, New Delhi, 2017.

REFERENCES

1 S.S. Dara and S.S. Umare., "A Text book of Engineering Chemistry", S.Chand Publishing, 12/e, 2014. 2 A.Pahari and B.Chauhan., "Engineering Chemistry", Laxmi Publications, 2nd Edition 2010. 3 Devender Singh, Balraj Deshwal, Sathish Kumar., "Comprehensive Engineering Chemistry", IK Intl, 2007. 4 H.K.Chopra, A.Parmer., "Chemistry for Engineers", Narosa Publishing House, 2016.

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U19PH102 SEMICONDUCTOR PHYSICS **L T P C** 3 0 0 3

After completion of this course, students will be able to

CO1 **(Understand)** Infer the crystal basics, their structures and different crystal growth techniques..K2

Outcomes

CO2 **(Understand)** Illustrate the theory, construction, and operation of diode. K2 CO3 **(Understand)** Illustrate the theory, construction, and operation of special semiconductor devices.K2 CO4 **(Analyze)** Examine the operation and biasing methods of BJT K4 CO5 **(Analyze)** Examine the operation and biasing methods of FET. K4

MODULE I CRYSTAL PHYSICS 9 Single crystalline, polycrystalline and amorphous materials – unit cell, crystal systems, Bravais lattices, Miller indices: ditections and planes in a crystal - interplanar distance for a cubic crystal - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors – Growth of single crystals: Bridgman and Czochralski methods.

MODULE II PN JUNCTION DIODE 9 Energy band theory of crystals: Insulators, semiconductors, and metals – PN Junction as a diode: Unbiased Diode, Forward Bias, Reverse Bias, Volt-Ampere Characteristics – PN diode switching times - Diode current equation – Breakdown diodes - PN Junction diode as a rectifier.

MODULE III SPECIAL SEMICONDUCTOR DEVICES 9 Circuit symbol, construction, operation and V-I characteristics: Schottky barrier diode - Zener diode – LED - SCR – DIAC – TRIAC - Photo diode and photo transistor - Opto Coupler - Zener diode as a voltage regulator. **MODULE IV BIPOLAR JUNCTION TRANSISTOR 9** Unbiased Transistor, NPN Transistor operation, Input and Output characteristics of CE, CB, and CC configurations, h parameter model for CE, CB, and CC configurations - Need for biasing - AC and DC Load lines- Biasing methods for BJT: Fixed bias – Collector to base bias - Voltage divider bias - BJT as a switch.

MODULE V FIELD EFFECT TRANSISTORS 9 Junction Field Effect Transistor: construction, operation, Drain and Transfer characteristics – MOSFET: Enhancement MOSFET, Depletion MOSFET, Drain and Transfer characteristics - Biasing methods for FET: Biasing methods for FET - Fixed bias - Self bias - Voltage divider bias.

TOTAL: 45 HOURS

TEXT BOOKS:

1 Kasap S.O, “Principles of Electronic Materials and Devices”, McGraw-Hill Education, 3rd Edition, 2007. 2 Umesh K Mishra and Jasprit Singh, “Semiconductor Device Physics and Design”, Springer, 2nd Edition, 2008. 3 PillaiS.O, “Solid State Physics”, New age International Publishers, 7th Edition, 2015.

REFERENCE BOOKS:

1 Avathanulu M.N and Kshirsagar P.G, “Engineering Physics”, S. Chand and company, 11th Edition, 2014. 2 Jacob Millman, Christos C, Halkias and Satyabrata Jit, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw-Hill, 2010.

3 Salivahanan S, “Electronic Devices”, Tata McGraw- Hill, 2ndEdition, 2018.

4 Donald A Neaman, “Semiconductor Physics and Devices”, Tata Mc GrawHill Inc., 3rdEdition, 2007. 5 Robert Boylestad and Louis Nashelsky, “Electron Devices and Circuit Theory”, Pearson Prentice Hall, 10th Edition, July 2008.

U19CS102 PYTHON PROGRAMMING L T P C 3 0 0 3

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

CO1 (Understand) Understand the basic concepts of python. K2 **CO2 (Apply)** Solve problems using python datatypes. K3

Outcomes

CO3(Apply) Apply looping, conditional constructs and exception handling concepts to various problemsK3 **CO4 (Apply)** Apply modular programming using file

concepts. K3 **CO5 (Understand)** Understand the object-oriented concepts. K2

MODULEI BASICS OF PYTHON PROGRAMMING 9 Introduction to Python - Python Interpreter - Data types - Identifiers and keywords - Integral Types - Floating Point Types – Strings

MODULE II PYTHON DATA SETS 9 Case Sensitive - Scripts - Sequence Types - Tuples - Named Tuples - Sets - Mapping Types - Dictionaries - Generators – Iterators

MODULE III PROGRAMMING PARADIGMS IN PYTHON 9 Control Structures - Branching - Looping - Exception Handling - Custom Exceptions

MODULE IV MODULES AND RE-USABILITY 9 Modules and Packages - Variable Scope - Recursion - File Handling - Read - Write - Command Line Programming **MODULE V OBJECT ORIENTED PROGRAMMING AND DEBUGGING 9**

Object-Oriented Concepts and Terminology - Custom Classes - Attributes and Methods - Inheritance and Polymorphism Debugging - Debugging Syntax Errors - Debugging Runtime Errors - Scientific Debugging - Testing - Unit Testing - Profiling

TOTAL : 45 Hours

TEXTBOOKS

1 Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second edition, Updated for Python 3, Shroff O'Reilly Publishers, 2016

2 Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

3 Liang Y. Daniel, "Programming Using Python", Pearson Education, 1st Edition, 2017.

REFERENCES

1 Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-Disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016

2 Timothy A. Budd," Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015 3 Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012 Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem Solving Focus", Wiley India Edition, 2013.

Outcomes

U19EE102 BASIC ELECTRICAL AND INSTRUMENTATION ENGINEERING

Upon completion of this course, students will be able to:
L T P C 3 0 0 3

CO1 **(Understand)** Outline the basic concepts in electrical engineering K2

CO2 **(Understand)** Understand the concept of single phase, three phase power circuits and measurement K2

CO3 **(Analyze)** Comprehend the concepts in electrical generators, motors and transformers K3 CO4 **(Analyze)** Identify the appropriate electrical/rotating machine for various applications K3 CO5 **(Apply)**Choose appropriate measuring instruments for various applications K4

MODULE I BASICS OF ELECTRICAL CIRCUITS 9 Introduction - Ohm's Law - Kirchoff's laws – Source transformation -

Resistors in series and parallel – Voltage and current division– Star/delta conversion– Introduction to AC Circuits – RMS value – Average value- peak factor - form factor - Power and Power factor. Single phase and three phase supply - Load Connections – Power Measurement –Generation, Transmission & Distribution of electrical energy

MODULE II DC MACHINES 9 Introduction – Constructional Features– Motoring and generation principle - Emf And Torque equation - Methods of Excitation and magnetisation characteristics – Starting and Speed Control. Special Machines - Stepper Motors – Brushless DC Motors –Applications

MODULE III AC MACHINES 9 Introduction - Construction - Types - Losses- Circuit Model of Transformer –Testing - Voltage Regulation – Efficiency – Introduction to Three Phase Transformer - Principle of operation of single phase and three-phase induction motors – Construction –Types –Alternator working principle – Types - Equation of induced EMF – Voltage regulation, Synchronous motors- starting methods - Universal Motors

MODULE IV MEASUREMENTS 9 Essentials of Measurement systems - Static and Dynamic Characteristics of Measurement –Errors in Measurement – Classification of measuring instruments –Moving coil, moving iron, dynamometer type, induction type meters. DC and AC bridges (Wheatstone bridge, Anderson's bridge and Schering bridge), Digital measurements- voltmeter, Millimeter and Oscilloscope

MODULE V INSTRUMENTATION 9

Principles of Electrical Instruments – Instrument Transformer-CT and PT – Transducers – Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, Hall effect, Mechanical, MEMS and Nano sensors

TOTAL: 45 HOURS

TEXT BOOKS:

1 S.K.Bhattacharya —Basic Electrical and Electronics Engineeringll, Pearson India, 2011. 2 S.Salivahanan - Basic Electrical and Instrumentation Engineering, McGraw Hill Education,2018. **REFERENCES:**

1 D P Kothari and I.J Nagrath, "Basic Electrical and Electronics Engineering", McGraw Hill Education(India) Private Limited, Third Reprint,2016

2 A.K. Sawhney, A Course in Electrical & Electronic Measurements & Instrumentation, Dhanpat Rai and Co, New Delhi, 2010

U19CY111 CHEMISTRY LABORATORY **L T P C** 0 0 2 1

Outcomes

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

CO1 (Analyse) Analyse the role of water quality related parameters. K4 **CO2 (Create)** Design the engineering materials against corrosion. K6

LIST OF EXPERIMENTS

1. Determination of total, permanent and temporary hardness of water by EDTA method. 2. Estimation of copper in brass by EDTA method.

3. Determination of alkalinity and TDS of water sample.

4. Estimation of chloride content in water by Argentometric method. 5. Determination of strength of acid by Conductometric titration (strong acid Vs strong base & strong base Vs mixture of acids)

6. Determination of strength of given hydrochloric acid using ph meter. 7. Estimation of ferrous ion content of the given solution using potentiometer. 8. Determination of do content of water sample by Winkler's method. 9. Determination of chemical oxygen demand of water.

10. Determination of rate of corrosion of mild steel by weight loss method 11. Determination of

efficiency of corrosion inhibitors in mild steel.

12. Estimation of sodium and potassium present in sample using flame photometer. 13. Estimation of iron in water sample using photometer (Thiocyanate method). 14. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

(Any 8 experiments of the above)

Total: 30 Hours

TEXT BOOKS

1 R. Rathinam , “Chemistry Laboratory Manual”, Gems Publishers, 2019

REFERENCES

1 Vogel’s, “Textbook of Quantitative Chemical Analysis”, Pearson publications, 2014 2Daniel C. Harris, “Quantitative Chemical Analysis”, W. H. Freeman and Company, New York, 7th Edison 2007

U19CS112 PYTHON PROGRAMMING LABORATORY **L T P C** 0 0 4 2

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

Outcomes

CO1 (Apply) Use Python shell and IDE to write and debug simple Python programs **K3 (Apply)** Identify appropriate packages and modules for different problems **K3 CO5 (Apply)** Create simple applications with OOP Concept in Python **K3**

CO2 (Apply) Make Use of python lists, tuple, dictionaries for representing compound data. **K3 CO3 (Apply)** Implement the concept of exceptional handling **K3 CO4**

MODULEI BASICS OF PYTHON PROGRAMMING 12 • •Python Data types, identifiers, variables

• • Input and output functions

• • Operators, Operator precedence

• • Python shell and IDE – program execution and debugging

• • Looping and conditional statements-break, return

MODULE II PYTHON DATA SETS 12 • •String

• • List

• • Tuple

• • Dictionary

• • Set

• • Generators

• • Iterators

MODULE III PROGRAMMING PARADIGMS IN PYTHON 12 • • Exception handling mechanisms

• • Try, Except, Else, finally

• • User defined exceptions/Custom class exceptions

MODULE IV MODULES AND RE-USABILITY 12 • • Modules and packages

• • Variables and scope

• • Function

• • File handling

MODULE V OBJECT ORIENTED PROGRAMMING AND DEBUGGING 12 • • Class and Objects Modules and packages

• • Variables and scope

• • Function

• • File handling

• • Inheritance

• • Polymorphism

• • Debugging

• • Testing

TOTAL : 60 Hours

TEXTBOOKS

1Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, Second edition, Updated for Python 3, Shroff O’Reilly Publishers, 2016

2Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES

1Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-Disciplinary Approach”, Pearson India Education Services Pvt. Ltd., 2016

2 Timothy A. Budd,” Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015

3 Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012 4Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem Solving Focus”, Wiley India Edition, 2013

SEMESTER – III

U19MA202LINEAR ALGEBRAAND PARTIAL DIFFERENTIAL EQUATIONS

L T P C 3 1 0 4

After completion of this course, students will be able to

Outcomes

CO1**(Apply)** Apply the fundamental concepts of advanced algebra and their role in modern mathematics

and applied contexts.K3 CO2**(Analyze)**Determine matrix as a linear transformation in a finite dimensional space.K4 CO3**(Apply)**Apply orthonormal bases and Gram-Schmidt orthogonalization process of inner product spaces for a given vector.K3 CO4 **(Apply)** Apply the mathematical principles to solve partial differential equations. K3 CO5 **(Apply)** Solve engineering problems using Fourier series. K3

MODULE-I VECTOR SPACES 12 Vector spaces – Subspaces – Linear combinations and linear system of equations – Linear independence and linear dependence – Bases and dimensions.

MODULE-II LINEAR TRANSFORMATION AND DIAGONALIZATION 12 Linear transformation - Null spaces and ranges - Dimension theorem - Matrix representation of a linear transformations – Eigen values and eigen vectors - Similarity transformation -Diagonalizability.

MODULE-III INNER PRODUCT SPACES 12 Inner product - norms - Gram Schmidt orthogonalization process - Least square approximation - Applications of inner product spaces.

MODULE-IV PARTIAL DIFFERENTIAL EQUATIONS 12 Solutions of first order equations (Excluding Charpit's method) – Lagrange's linear equation – Solution of linear equation of higher order with constant coefficients.

MODULE –V FOURIER SERIES 12 Dirichlet's conditions- General Fourier series – Odd and even functions- Half range Fourier sine series and cosine series – Parseval's identity.

TOTAL : 60 Hours

TEXT BOOKS:

1 Friedberg, A.H., Insel, A.J. and Spence, L., "Linear Algebra", 4th Edition, Prentice Hall of India, New Delhi, 2004.

2 Erwin Kreyszig, "Advanced Modern Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited, Singapore, 2017.

REFERENCES:

1 Kolman, B. Hill, D.R., "Introductory Linear Algebra", 8th Edition, Pearson Education, New Delhi, First reprint, 2005.

2 Lay, D.C., "Linear Algebra and its Applications", 5th Edition, Pearson Education, 2015.

3 Grewal. B. S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2015.

U19EC201 SIGNALS AND SYSTEMS **L T P C 3 1 0 4**

Outcomes

Upon completion of this course, students will be able to

CO1**(Understand)** Understand the fundamental characteristics of signals and systems K2

CO2**(Analyze)**Analyze the spectral characteristics of continuous-time periodic and periodic signals using Fourier transform and Laplace transform.K4 CO3**(Analyze)**Analyze continuous time Linear Time Invariant system using Fourier transform and Laplace Transform.K4 CO4 **(Apply)** Apply the Z-transform to analyze discrete-time signals K3

CO5**(Analyze)**Analyze discrete time Linear Time Invariant system using Discrete time Fourier transform and Z-Transform.K4

MODULE I CONTINUOUS AND DISCRETE TIME SIGNALS AND SYSTEMS 8 Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids – Representation of Signals - basic operations on

signals - Classification of signals – Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals- CT systems and DT systems, Classification of systems.

MODULE II FOURIER AND LAPLACE ANALYSIS OF CONTINUOUS TIME SIGNALS 13 Introduction to Continuous Time Fourier Series (CTFS) - Representation of CT aperiodic signals by Continuous Time Fourier Transform (CTFT) – CTFT of CT periodic signals - Convergence of CTFT - Properties of CTFT - Laplace transforms in Signal Analysis – properties – working with simple Sensors and CT signals Processing. **MODULE III LINEAR TIME INVARIANT –CONTINUOUS TIME SYSTEMS 13** Differential Equation-Block diagram representation- convolution integrals – step response and impulse response of LTI systems - Fourier and Laplace transforms in Analysis of LTI systems.

MODULE IV Z TRANSFORM ANALYSIS OF DISCRETE TIME SIGNALS 13 Baseband Sampling of CT signals–Introduction to Discrete Time Fourier Series (DTFS) and Discrete-Time Fourier Transform (DTFT) - Z transform – ROC –Inverse Transform use Residue, Partial Fraction methods - Properties of Z transform – working with simple Sensors and DT signals Processing.

MODULE V LINEAR TIME INVARIANT –DISCRETE TIME SYSTEMS 13 Difference Equations-Block diagram representation - Linear and Circular Convolutions -Pole-zero plot- Analysis and characterization of LTI system using Z transform- step response and impulse response of LTI systems - frequency response of DT systems - Stability and Causality

TOTAL: 60HOURS

TEXTBOOKS:

1 Alan V Oppenheim, Alan S Willsky and S Hamid Nawab “Signals and Systems”, Second edition, PHI Learning

Private Limited,New Delhi, 2010

REFERENCES:

1 Krishnaveni.V, Rajeswari.A, “Signals and Systems”, First Edition, Wiley India Pvt. Ltd, 2012. 2 Haykin. S and Barry Van Veen, “Signals and Systems”, John Wiley and Sons, Second Edition, 2012 3 Hsu.H.P, Rakesh Ranjan, “Signals and Systems”, Schaums’s Outlines, Tata McGraw Hill , Second Edition, 2010.

4 Edward W.Kamen, “Fundamentals of Signals and Systems Using the Web and MATLAB", Pearson Education

U19EC203 DIGITAL ELECTRONICS **L T P C** 3 1 0 4

Upon completion of this course, students will be able to

Outcomes

CO1 **(Apply):** Apply different minimization techniques for designing various combinational logic circuits K3

CO2 **(Analyze):** Analyze and design the synchronous sequential digital circuits for real time applications K4

CO3 **(Analyze):** Analyze and design the asynchronous sequential digital circuits K4

CO4 **(Apply):** Implementation of the PLDs for combinational circuit design K3

CO5 **(Apply):** Develop a HDL program for combinational and sequential circuits using HDL K3

MODULE I MINIMIZATION TECHNIQUES AND COMBINATIONAL LOGIC 14 Minimization Techniques: Boolean postulates and laws - Karnaugh map Minimization – Review of logic gates - NAND–NOR implementations.

Combinational Logic: Adders – Subtractors - Multiplexer/ Demultiplexer – decoder - encoder – parity generator – parity checker - Magnitude Comparator - Code converters.

MODULE II SYNCHRONOUS SEQUENTIAL LOGIC 14 Flip flops – SR, D, JK, T – Realization of one flip flop using other flip flops, Analysis and design of clocked sequential circuits - Moore/Mealy models, state minimization, state assignment, logic implementation – Design of Counters, Shift registers, Shift register counters.

MODULE III ASYNCHRONOUS SEQUENTIAL LOGIC 12 Pulse mode and fundamental mode sequential circuits, Stable and Unstable states, cycles and races, state reduction, race free state assignments, Hazards, Essential Hazards, Design of Hazard free circuits. **MODULE IV MEMORY DEVICES LOGIC FAMILIES 10 Memory Devices:** Classifications of memory – ROM - PROM – EPROM – EEPROM – RAM – Static and dynamic RAM – Programmable Logic Devices – Implementation of combinational logic circuits using PLA, PAL and PROM.

Logic Families: TTL and CMOS Logic and their characteristics.

MODULE V SYSTEM DESIGN USING VERILOG HDL 10 VLSI Circuit Design Flow - Basic concepts: Data types – Modules and ports for modelling in Verilog

HDL – Gate level modelling – Dataflow modelling – Behavioral modelling – structural modelling – Switch level modelling – Design examples of basic combinational and sequential circuits. **TOTAL: 60 HOURS**

TEXTBOOKS:

1 M. Morris Mano and Michael D. Ciletti, Digital Design, 5th Edition, Pearson, 2014.

2 S. Palnitkar, Verilog HDL – A Guide to Digital Design and Synthesis, Pearson, 2003.

REFERENCES:

1 Thomas L.Floyd, Digital Fundamentals, Prentice Hall, 11th Edition, 2015.

2 A.Anand Kumar, “Fundamentals of Digital Circuits, 4/e, PHI Learning Private Limited, 2016. 3

D. Donald Givone, Digital principles and design, Tata McGraw Hill, 2008.

4Leach D, Malvino A P & Saha —Digital Principles and Applications 8th Edition, Tata McGraw-Hill Publishing Company, 2014.

U19CS201 DATA STRUCTURES **L T P C** 3 0 0 3

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

Outcomes

CO1 (Understand) Understand the basics of data structures and algorithms.. K2

CO2 (Understand) Comprehend the working of linear data structures and identify their applications.. K2

CO3 (Apply) Apply the concept of stacks, queues on specific applications.. K3

CO4 (Understand) Understand the various tree data structures for efficient storage and retrieval of data. K2

CO5 (Apply) Employ graph data structure for solving real world problems and apply suitable methods for efficient data access through hashing K3

MODULE-I FUNDAMENTALS OF DATA STRUCTURES 8 Introduction – Need for data structures – Types of data

structures – Algorithm: Characteristics – Analysis of complexity – time complexity, space complexity, order of growth – Linear List: Array representation and its operations.

MODULE-II LINKED LIST 9 Representation – Basic Operations – Types: Singly linked list – Doubly linked list – Circular linked list – Applications: Polynomial Addition, Sparse Matrices.

MODULE III STACK AND QUEUE 9 Stack: Array and Linked Stacks – Applications: Balancing Symbols, Expression conversion, Postfix evaluation, Recursion – Queue: Array and Linked Queue, Circular Queue – Double Ended Queue – Applications.

MODULE IV TREE 10

Tree Terminologies – Binary tree: Representation - Tree traversal: In-order, Pre-order, Post order, Level order – Binary Search Tree: Representation – Operations – AVL Tree – B-Tree – Applications: Expression tree. **MODULE V GRAPH AND HASHING 9** Graph: Terminologies – Representation of Graph - Graph traversal – Topological sort – Hashing: Hash table – Hash functions – Resolving Collision Techniques: Separate chaining – Open addressing – Double hashing. **TOTAL : 45 Hours**

TEXTBOOKS

1 Mark A.Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 2010. 2 Seymour Lipschutz, ”Data Structures using C”, First Edition, McGraw Hill Education, 2017. **REFERENCES**

1 Salaria R S, “Data Structues and Algorithms using C”, Fifth Edition, Khanna Book Publishing, New Delhi, 2012

2 Venkatesan R and Lovelyn Rose S, “Data Structures”, Wiley India Pvt. Ltd., New Delhi, 2015.

3 Karumanchi Narasimha, ”Data Structures and Algorithms Made Easy”, Fifth Edition, Career Monk Publication, 2016

U19IT301 COMPUTER ARCHITECTURE L T P C 3 1 0 4

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

addressing modes used in a processor.

Outcomes

CO1 (Understand) Choose appropriate instruction set architecture and K2

CO2 (Understand) Apply the knowledge of arithmetic operations to perform K2 calculations.

CO3 (Understand) Understand Design and analyze pipelined control units.. K2 **CO4 (Understand)** Understand parallel processing architectures. K2 **CO5 (Understand)** Understand performance of memory systems. K2

MODULE-I BASIC STRUCTURE OF COMPUTERS 12 Functional Units - Basic Operational Concepts - Bus Structures - Performance of Computer – Memory Locations and Addresses - Instruction and Instruction Sequencing - Addressing Modes. **MODULE-II COMPUTER ARITHMETIC 13** Addition and Subtraction of Signed Numbers - Design of Fast Adders - Multiplication of Positive numbers, Signed Operand Multiplication, Booth's Algorithm - Fast Multiplication - Integer Division - Floating Point Numbers and Operations.

MODULE III PROCESSOR AND CONTROL UNIT 10 Basic MIPS implementation – Building data path – Control Implementation scheme – Pipelining – Pipelined data path and control – Handling Data hazards & Control hazards – Exceptions.

MODULE IV MEMORY SYSTEMS AND I/O ORGANIZATION 13

Basic Concepts - Speed, Size and Cost - Cache Memories - Performance Considerations - Virtual Memories memory management requirements.

Accessing I/O devices- Interrupts – Enabling and disabling interrupts- Handling multiple devices - Direct Memory Access.

MODULE V PARALLELISM 12 Instruction- level - parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading – Multi core processors.

TOTAL : 60 Hours

TEXTBOOKS

1 V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, “Computer Organisation and Embedded Systems“, sixth edition, Mc Graw-Hill Inc, 2019.

2 David A. Patterson and John L. Hennessey, “Computer organization and design“, Morgan Kauffman / Elsevier, Fifth edition, 2016.

REFERENCES

1 William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2013.

2 John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2014.

U19MC201 ENVIRONMENTAL SCIENCES **L T P C** 2 0 0 2

Upon completion of this course, students will be able to

CO4 **(Apply) –**Identify the application of natural resources for creating a

Outcomes

CO1 **(Analyze) -** Analyze human interaction for the sustainability of a social eco-system. K4

CO2 **(Analyze) -** Examine the impact of pollution and hazardous chemical on environment and human health. K4

CO3 **(Analyze)** – Inspect the effect of different wastes and chemical on the environment and its mitigation methods. K4

CO4 **(Apply) –**Identify the application of natural resources for creating a good eco-system. K3

CO5 **(Apply) –** Apply the basic concepts to understand various environmental issues. K3

MODULE I ENVIRONMENT AND ECOSYSTEM 6 Key environmental issues, their basic causes and sustainable solutions-concept of an ecosystem– structure and function of an ecosystem–producers, consumers and decomposers–energy flow in the ecosystem–food chains and food webs.

MODULE II ENVIRONMENTAL POLLUTION 6 Primary and secondary air pollutants-Air, Water, Marine and soil pollution: causes, effects and control measures.

MODULE III RISK AND SECURITY OF ENVIRONMENT 6 Heavy metals, E-waste and Hazardous waste management-green and blue revolution, GM crops: merits and demerits-ecological impacts of modern agriculture- Bio-fertilizer technology-organic farming. **MODULE IV ENERGY RESOURCES 6** Non-renewable energy resources- oil, Natural gas, Coal - Renewable energy resources - Solar energy, Hydroelectric power, Wind, biomass and geothermal energy.

MODULE V SOCIAL ISSUES AND THE ENVIRONMENT 6 Environmental ethics: Issues and possible solutions-water conservation, rain water harvesting, watershed management -Sustainable development– global climatic change, global warming, ozone layer depletion.

TOTAL: 30 HOURS

TEXTBOOKS:

1 Miller T. G. and Spoolman S. E., “Environmental Science”, Cengagelearning16th Edition, 2017. 2 Sinha J., “Environmental Science”, Galgotia Publications, 2nd Edition, 2011. **REFERENCES:**

1 W.H. Hayt and J.A. Buck, Engineering electromagnetics, 7th ed., McGraw-Hill (India), 2006 (UNIT I-V)

WEB - RESOURCES:

1 Air Pollution - https://nptel.ac.in/courses/105104099/

2 Energy Resources-https://www.slideshare.net/PritiThakkar/energy-resources-65436458

U19CS211 DATA STRUCTURES LABOROTARY **L T P C** 0 0 4 2

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

Outcomes

CO1 **(Apply)** Implement linear data structures to solve problems. K3 CO2 **(Apply)** Implement non-linear data structures K3

CO3 **(Apply)** Select and implement suitable tree algorithms for efficient data storage and retrieval with better time complexity K3

CO4 **(Apply)** Apply various search algorithms for efficient data retrieval K3

CO5 **(Apply)** Apply graph concepts and different hashing data structures for efficient data storage. K3

MODULE-I INTRODUCTION TO DATASTRUCTURES 14 • Array based list Implementation

• Linked List implementation (Singly, Doubly, Circular)

• Problem: Removal of duplicates

MODULE-II STACK AND QUEUES 14 • Stack implementation

• Queue implementation

• Problems: Balancing symbols, Expression conversion, Postfix evaluation

MODULE III TREES 14 • Binary Tree - Creation

• Traversals: In-order, pre-order, post-order, level-order

• Problems: Height of a tree, Leafs of a tree, Mirroring of a tree, Max and Min Elements in a tree **MODULE IV SEARCH STRUCTURES 14** • Binary Search Tree : Major Operations

• Heap: Min-heap and Max-heap

• Problem: K^{th} highest element in an array

MODULE V GRAPH AND HASHING 14 • Graph Traversal

• Hashing Data structure

• Problem: Shortest path in a graph

Total: 60 Hours

References:

1. Mark A.Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 2010. 2. Venkatesan R and Lovelyn Rose S, “Data Structures”, Wiley India Pvt. Ltd., New Delhi, 2015. 3. Karumanchi Narasimha,”Data Structures and Algorithms Made Easy”, Fifth Edition, Career Monk Publication, 2016.

4. Seymour Lipschutz, “Data Structures using C”, First Edition, McGraw Hill Education, 2017.

5. Reema Thareja, “Data Structures Using C”, Second Edition, Oxford University Press, 2019.

U19EC212 DIGITAL ELECTRONICS LABORATORY L T P C 0 0 4 2 Upon completion of this course, students will be able to

Outcomes

CO1**(Apply)** Design a combinational circuit using various ICs and discrete component. K3

CO2 **(Apply**Design a sequential circuit (counters) using various flip flops.. K3

CO3 **(Apply)** Design a sequential circuit (shift registers) using various flip flops. K3

CO4**(Apply)** Develop a HDL program to implement the combinational and sequential circuits K3

CO_5**(Apply)** Design/Develop a project using a sequential or combinational logic with HDL support. K3

LIST OF EXPERIMENTS

1 Implementation of Adder and Subtractor using logic gates.

2 Implementation of Multiplexer and De-multiplexer using logic gates.

3 Implementation of 3 bit odd/even parity generator and checker.

4 Construction and verification of 4 bit ripple counter.

5 Implementation of SISO and PIPO shift registers using Flip- flops.

6 Coding combinational and sequential circuits using HDL.

7 Design and implementation of combinational circuit using FPGA.

8 **Mini Projects**

1. Digital Score Display Board
2. Automatic Day Indicator
3. 4 way traffic light
4. Electronic Cricket Match Digital counter

9 **Major Project** (To be Selected by student).

TOTAL: 30 HOURS

REFERENCES:

1 M. Morris Mano and Michael D. Ciletti, Digital Design, 5th Edition, Pearson, 2014. 2 S. Palnitkar, Verilog HDL – A Guide to Digital Design and Synthesis, Pearson, 2003. 3 Thomas L.Floyd, Digital Fundamentals, Prentice Hall, 11th Edition, 2015.

4 A.Anand Kumar, Fundamentals of Digital Circuits, 4th Edition, PHI Learning Pvt. Ltd., 2016. 5 D. Donald Givone, Digital principles and design, Tata McGraw Hill, 2008.

6 Leach D, Malvino A P &Saha —Digital Principles and Applications 8th Edition, Tata McGraw-Hill Publishing Company, 2014.

***** Open Elective –L T P C for Open Electives can either be 3 0 0 3 or 2 0 2 3

SEMESTER – IV

U19MA206 PROBABILITY AND STATISTICS **L T P C** 3 2 0 4

Outcomes

After completion of this course, students will be able to

CO_1**(Apply)** Apply the basic probability concepts for random variables and random experiments. K3

CO_2**(Analyze)** Analyze various standard distributions applicable to engineering which can describe real life phenomenon. K4

CO_3**(Analyze)** Analyze the functions of two-dimensional random variables through its probability values. K4

CO_4 **(Apply)** Apply statistical tests in testing of hypothesis. K3

CO_5**(Analyze)** Estimate the values of parameters based on measured empirical data that has a random component. K4

MODULE I PROBABILITY 12 Probability axioms-Conditional probability– Baye‘s theorem (statement only) –

Discrete and continuous random variables - Moments and moment generating functions.

MODULE II STANDARD DISTRIBUTIONS 12 Binomial - Poisson – Geometric - Uniform - Exponential - Gaussian distributions.

MODULE III PAIR OF RANDOM VARIABLES 12 Joint distributions - Marginal and conditional distributions – Covariance – Linear correlation – Regression lines. **MODULE IV TESTING OF HYPOTHESIS 12** Sampling distributions – Statistical hypothesis – Large sample test: single mean, difference of means and Proportion -Small sampletests based on t and F test– Chi-square test for independence of attributes and goodness of fit. **MODULE V ESTIMATION THEORY 12** Unbiased estimators – Method of moments – Maximum likelihood estimation - Curve fitting by principle of least squares.

TOTAL : 60 Hours

TEXTBOOKS:

1 Johnson R. A., Miller and Freund's, "Probability and Statistics for Engineers", 8th Edition, Pearson Education, Delhi, 2015.

2 Walpole R. E., Myers S.L. and Keying Ye, "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education Inc, 2012.

REFERENCES:

1 Devore. J. L., "Probability and Statistics for Engineering and the Sciences", 8th Edition, Cengage Learning, New Delhi, 2014.

2 Gupta S. P, "Statistical Methods", Sultan Chand & Sons Publishers, 2014.

3 Veerarajan. T, "Probability, Statistics and Random Processes", 3rd Edition, Tata McGraw Hill, 2009.

U19CS202 DATABASE MANAGEMENT SYSTEMS **L T P C** 3 1 0 4

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

CO1 (Understand) Understand the fundamentals of data models, views and schema K2 **CO2 (Understand)** Understand normalization criteria and optimize queries K2

Outcomes

CO3 (Understand) Understand the fundamental concepts of transaction processing concurrency control techniques and recovery procedures K2

CO4 (Understand) Acquire knowledge on various indexing strategies in different database systems K2

CO5 (Apply) Build NoSQL Relational Database Models and perform operations K3

MODULE I INTRODUCTION TO DATABASES 10 Purpose of Database - Database System Architecture - Views of Data– Schema architecture – Data Independence – Schema and instance- Data Models– Benefits of Data Model – Phases of Data Model.ER Diagram - Extended ER Diagram – Examples.

MODULE II RELATIONAL DATABASE AND DESIGN 15 Relational Data Model – Keys - Relational Algebra - SQL Fundamentals – Advanced SQL Features - Embedded SQL Dynamic SQL. Normalization - Functional Dependency - First, Second, Third Normal Form - BCNF, Non Loss Decomposition - 4NF - Multi valued Dependency - 5NF - Join Dependency.

MODULE III TRANSACTION AND CONCURRENCY CONTROL 10 Transaction processing - ACID Properties - failure

and recovery – Schedules – Serializability - Concurrency Control - Lock based protocol - Two Phase Commit - Isolation levels - SQL Facilities for concurrency and recovery - Database integrity and security.

MODULE IV STORAGE & INDEXING 10 Overview of Storage Techniques – file organization - RAID –Indexing - Types of ordered indices - B & B+ tree – Hashing - Static & Dynamic Hashing. Query Processing & Optimization

MODULE V NOSQL 15 Need for NO SQL – Characteristics of NOSQL - Comparison of relational databases to new No SQL stores - Key-value database - Apache Cassandra – Columnar Databases – Mongo DB – CRUD operations with Mongo DB - Document Databases – Graph Databases.

TOTAL : 60 Hours

TEXTBOOKS

1 Abraham Silberschatz, Henry F. Korth, S. Sudharshan, ”Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2013.

2 RamezElmasri, Shamkant B. Navathe, ”Fundamentals of Database Systems”, Sixth Edition, Pearson Education, 2014.

REFERENCES

1 C.J.Date, A.Kannan, S.Swamynathan, ”An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2013.

2 Eben Hewitt, "Cassandra – The Definitive Guide", O’ Reilly, 2010.

3 KrisitnaChodorow, "MongoDB – The Definitive Guide", O’ Reilly, 2013.

U19CS203 OBJECT ORIENTED PROGRAMMING **L T P C 3 0 0 3**

Outcomes

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

CO1 (Apply) Understand the principles of object-oriented programming K2 **CO2** (Understand) Understand the core concepts of Java programming K2 **CO3** (Understand) Understand the concepts of arrays, strings and packages K2 **CO4** (Apply) Use relevant exception-handling mechanisms for different scenarios K3 **CO5** (Apply) Apply multithreading concepts in concurrent application development K3

MODULE I OBJECT ORIENTED MECHANISMS 9 Introduction to Object Oriented Programming & Features, Thinking in Object Oriented Approach, OOPs Based Application Design, OOPS-Class and Objects, Inheritance, Abstraction, Polymorphism (static & dynamic), Overloading, Encapsulation, Dynamic Binding, Marker Interface, Association, Aggregation

MODULE II BASICS OF JAVA PROGRAMMING 9 Introduction to java, JVM, JDK, Java Features, Data types, Operators and expressions, Java Naming conventions , Command Line arguments, Scanner ,Class and Objects – Constructors-Wrapper classes, Variables, Conditional Statements and looping statements,

MODULE III ARRAYS, STRINGS AND PACKAGES 8 Array-1D-2D-Array-Declaration-initialization-array functions-Array manipulation using util package, advanced for loop ,foreach() method in java 1.8,Strings, creation ,declaration of a string, storage structure of a string and its methods, String Builder, String Buffer , regex, packages-user defined –built-in packages-IO package-Buffered Reader/Writer-File IO **MODULE IV EXCEPTION HANDLING AND DATE –TIME 9** Exception handling-Hierarchy, Types of exception, Mechanisms-try, catch, throw, throws and finally, Exception propagation-Exception in Inheritance –Introduction Date time Object in java 1.8 and its functions

MODULE V MULTITHREADING AND COLLECTION FRAMEWORK, JDBC 10 Introduction to Multiprocessing-threads

vs process-threads-Creation of thread-Thread states- Thread Lifecycle and and its methods, Executor Framework, Concurrency API, Synchronization Blocks. Collection Interface – List, Set ,Map interfaces and classes, Comparable-Comparator ,JDBC –drivers, Steps to create a JDBC application- DB Connection Pool.

TOTAL : 45 Hours

TEXTBOOKS

1 Herbert Schildt, Java The complete reference‖, 8th Edition, McGraw Hill Education, 2011 2 Cay S. Horstmann, Gary cornell, —Core Java Volume –I Fundamentals‖, 9th Edition, Prentice Hall, 2013.

REFERENCES

1 Paul Dietel and Harvey Deitel, "Java How to Program", , 8th Edition Prentice Hall of India. 2 Mahesh P. Matha, "Core Java A Comprehensive Study", Prentice Hall of India, 2011.

3 Steven Holzner, "Java 2 Black book‖, Dream tech press," 2011.

4 Timothy Budd, "Understanding Object-oriented programming with Java, Updated Edition, Pearson Education, 2000.

U19CS205 DESIGN AND ANALYSIS OF ALGORITHMS **L T P C** 3 0 2 4

Outcomes

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

CO1 (Understand) Estimate the time and space complexities of algorithms. K2 **CO2 (Apply)** Apply algorithm analysis techniques for a given algorithms. K3

CO3 (Analyse) Analyse different algorithms for solving a given problem. K4 **CO4 (Apply)** Apply various graph traversal techniques to find the shortest path. K3

CO5 (Understand) Compare the time and space complexities of different types of algorithms.K2

MODULE-I ALGORITHM ANALYSIS TECHNIQUES 12 Notion of an Algorithm - Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties. Analysis Framework - Mathematical analysis for Recursive and Non-recursive algorithms – Algorithm Visualization.

MODULE-II BRUTE FORCE and DIVIDE-AND-CONQUER 12 Brute Force – Selection sort– String Matching – Exhaustive Search – Travelling Salesman Problem – Knapsack Problem – Assignment problem-Convex-Hull Problems. Divide-And-Conquer-Binary Search – Merge sort – Quick sort – Heap Sort – Multiplication of Large Integers –Closest-Pair Problems.

MODULE III DYNAMIC PROGRAMMING 12 Principle of optimality – Coin changing problem, Computing a Binomial Coefficient –Warshall's algorithm– Floyd's algorithm – Multi stage graph – Optimal Binary Search Trees – Knapsack Problem and Memory functions. **MODULE IV GREEDY APPROACH 12** Prim's algorithm and Kruskal's Algorithm - Dijkstra's Algorithm– 0/1 Knapsack problem, Optimal Merge pattern – Huffman Trees.

MODULE V BACKTRACKING AND BRANCH AND BOUND 12 Backtracking – n-Queen problem – Hamiltonian Circuit Problem – Subset Sum Problem- Graph coloring-Branch and Bound – LIFO Search and FIFO search – Assignment problem – Knapsack Problem – Travelling Salesman Problem. **TOTAL : 60 Hours**

TEXTBOOKS

1 AnanyLevitin, —Introduction to the Design and Analysis of Algorithms‖, Third Edition, Pearson Education, 2012

REFERENCES

1 Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2008.

2 Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, —Introduction to Algorithms‖, Third Edition, PHI Learning Private Limited, 2012.

U19MC202 INDIAN CONSTITUTION AND TRADITION **L T P C** 1 0 0 0

After completion of this course, students will be able to

CO1 **(Understand)** Understand the characteristics of the Constitution of India K2 CO2 **(Understand)** Understand the fundamental rights and duties K2

Outcomes

CO3 **(Understand)** Understand the federal structure and distribution of legislative and financial powers K2 CO4 **(Understand)** Understand the constitutional amendments and emergency provisions K2

CO5 **(Understand)** Understand the fundamental right to equality, freedom, life and personal freedom K2

MODULE I HISTORY OF INDIAN CONSTITUTION 3 Meaning of the constitution law and constitutionalism - Historical perspective of the Constitution of India - Salient features and characteristics of the Constitution of India

MODULE II FUNDAMENTAL RIGHTS AND DUTIES 3 Scheme of the fundamental rights - Fundamental Duties and its legal status - Directive Principles of State Policy – Its importance and implementation

MODULE III FEDERAL STRUCTURE AND DISTRIBUTION OF POWERS 3 Federal structure and distribution of legislative and financial powers between the Union and the States - Parliamentary Form of Government in India – The constitution powers and status of the President of India - Amendment of the Constitutional Powers and Procedure

MODULE IV CONSTITUTIONAL AMENDMENTS AND EMERGENCY PROVISIONS 3 The historical perspectives of the constitutional amendments in India - Emergency Provisions : National Emergency, President Rule, Financial Emergency - Local Self Government – Constitutional Scheme in India **MODULE V RIGHT TO EQUALITY, FREEDOM, AND PERSONAL LIBERTY 3** Scheme of the Fundamental Right to Equality - Scheme of the Fundamental Right to certain Freedom under Article 19 - Scope of the Right to Life and Personal Liberty under Article 21

TOTAL : 15 Hours

TEXTBOOKS:

1 Madhav Khosla, “The Indian Constitution”, Oxford University Press. New Delhi, 2012.

2 Brij Kishore Sharma, “Introduction to the Indian Constitution”, PHI, New Delhi

REFERENCES:

1 Sunil Khilnani, “The Idea of India”, Penguin India Ltd., New Delhi.

2 Sumantra Bose, “Transforming India: Challenges to the World’s Largest Democracy”, Picador India, 2013. 3 Atul Kohli, “Democracy and Discontent: India’s Growing Crisis of Governability”, Cambridge University Press, Cambridge, U. K., 1991.

4 M. P. Singh and Rekha Saxena, “Indian Politics: Contemporary Issues and Concerns”, PHI, New Delhi, 2008. 5 Rajni Kothari, “Rethinking Democracy”, Orient Longman, New Delhi, 2005.

U19CS212 DATABASE MANAGEMENT SYSTEMS LABORATORY L T P C 0 0 2 1

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

CO1 **(Apply)**Develop ER model for the given problem K3 CO2 **(Apply)** Apply appropriate SQL constraints to a business case. K3

complex queries in K3

Outcomes

CO3 **(Apply)** Utilize relational database using simple and Structured Query Language (SQL).

CO4 **(Apply)** Formulate procedural language queries (PL/SQL) to the given scenario. K3

CO5 **(Apply)** Apply database connectivity concepts in an application development K3

scenario.

MODULE I ER DIAGRAM 6 • • Design a database (ER diagram) based on case study.

• • Queries based on ER Diagram case study.

MODULE II BASIC SQL - STACK AND QUEUES 6 • • Creation of tables and simple queries.

• • Practice on queries using DCL and TCL commands.

• • Implementation of Key constraints.

MODULE III ADVANCED SQL 6 • Queries using aggregate function, grouping, sorting.

• Practice on string function, date function, nested queries and joins.

• Implementation of views.

MODULE IV PL/SQL 6 • • Develop program using feature parameter in a cursor, creation of procedure, functions and exceptional handling. • Develop program using Before/After trigger, row and statement trigger and instead of trigger.

MODULE V NOSQL 6 • • Implement database using MongoDB and run through CRUD operations.

• • Create tables and execute the queries using CQL (Cassandra Query Language).

• • Prioritize consistency, availability and partition tolerance in making NoSQL database design decisions..

Mini Project on Application Development with Front End Tools

Total: 30 Hours

References

1 Abraham Silberschatz, Henry F. Korth, S. Sudharshan, ”Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2013.

2 RamezElmasri, Shamkant B. Navathe, ”Fundamentals of Database Systems”, Sixth Edition, Pearson Education, 2014.

3 Ivan Bayross “Sql,Pl/sql: The Programming Language of Oracle”, Bpb Publication” , New Delhi , 2003. 4 C.J.Date, A.Kannan, S.Swamynathan, ”An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2013.

5 KrisitnaChodorow, "MongoDB – The Definitive Guide", O’ Reilly, 2013.

6 NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence “Sadalage, P. & Fowler , Pearson Education, 2013

U19CS213 OBJECT ORIENTED PROGRAMMING LABORATORY **L T P C 0 0 2 1**

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

CO1 **(Apply)** Use JRE , JDK and Java-IDE’s K3 CO2 **(Apply)** Select the required Object oriented mechanism K3

CO3 **(Apply)** Use relevant exception-handling mechanisms

Outcomes

exception K3 CO4 **(Apply)** Model the real world problems for **(Apply)** Apply concepts of java collections API for the given efficient outcomes using concurrency concepts K3 CO5 scenario K3

MODULE I BASICS OF JAVA PROGRAMING 6 Program using

- Data Types, Wrapper Classes
- Scanner
- looping and conditional statements
- Command Line Arguments
- Auto boxing , Unboxing concepts
- Operators and expressions

MODULE II ARRAY ,STRINGS AND PACKAGES 6 Program using

- Array initialization, creation with advanced for loop
- Array manipulation with Arrays.util package
- String,String functions
- String Builder, String Buffer
- Regex, Buffered Reader

MODULE III OBJECT ORIENTED MECHANISMS 6 Program using

- class and objects (Object creation and accessing class properties)
- Scenario based Program using Inheritance(IS-A)
- Scenario based Program using Encapsulation
- Scenario based Program using Polymorphism
- Scenario based Program using Abstraction-abstract class, Interface
- lambda expression, for each() method

MODULE IV EXCEPTION HANDLING AND DATE -TIME 6 Program using

- Exception mechanisms-try-catch
- Exception mechanisms-try-catch-finally
- Exception mechanisms-try-finally
- Exception mechanisms-throw(Custom Exception)
- Exception mechanisms-throws
- Exception with inheritance
- Basic Date Time program

MODULE V MULTITHREADING AND COLLECTION FRAMEWORK-JDBC 6 Program using

- Creating a thread-Extends Thread/Runnable interface
- Scenario based Program for Multithreading
- Generic Method

- Generics-wildcard expression

Program to implement

- List
- Map
- Set
- JDBC with Connection pool

Minor Project using JDBC-OOPS-Collections(Separation of concerns)in eclipse IDE based on Use cases

All the Programs listed above should follow proper naming conventions.

Each Module can contain an average of 5 to 6 Program.

Total: 30 Hours

References

1 Paul Dietel and Harvey Deitel, “Java How to Program”, 8th Edition Prentice Hall of India.

2 Mahesh P. Matha, “Core Java A Comprehensive Study”, Prentice Hall of India, 2011.

3 Steven Holzner, —Java 2 Black bookǁ, Dreamtech press, 2011.

4 Timothy Budd, —Understanding Object-oriented programming with Javaǁ, Updated Edition, Pearson Education, 2000.

U19EM201 VERBAL AND SOFT SKILLS **L T P C 0 0 2 1**

Outcomes

CO1 **(Apply)** Inculcate rhetorical skills to build confidence level. K3 CO2 **(Apply)** Creative employability attribution for campus interview. K3 CO3 **(Apply)** Improve verbal skills through vocabularies. K3 CO4 **(Analyze)** Develop comprehending ability in various contexts. K3 CO5 **(Analyze)** Improve sentence formation by collaborative learning methods. K3

MODULE I Public speaking 9 Public speaking basic topic sessions – Out door speech – Stress buster sessions – Voice modulation session **MODULE II Resume, Round Table Discussion 9** Handling critics session – Round table discussion – Creative resume writing – Essay writing tougher topics – Self introduction session(In extremely creative manner)

MODULE III Vocabulary Building 9 Synonyms & Antonyms - Spell Check - One word substitution - Analogy - Foreign Words

MODULE IV Comprehending passages 9 Reading Comprehension, Theme Detection, Jumbled Sentence

MODULE V Sentence Construction 9 Sentence Correction Rules - Spot the error – Closet test Sentence Completion – Sentence improvement - Idioms and Phrases – Phrasal Verbs

TOTAL: 45 HOURS

REFERENCES:

1 Dan Clay, “How to write the perfect resume”, 2018

2 Daniel Robbins ,PUBLIC SPEAKING: The Secrets To Making A Lasting Impression

3 Objective English Authors: Harimohan Prasad & Uma Rani Sinha

4 Objective English Authors: Dr. R.S. Aggarwal & Vikas Aggarwal

5 Objective English Authors: Edger Thorpe & Showick Thorpe

SEMESTER – V

U19EC206 MICROPROCESSOR AND MICROCONTROLLER **L T P C 3 0 0 3**

Upon completion of this course, students will be able to

CO1 **(Apply)** Understand the architecture of 8 bit , 16 bit and develop an ALP for 8085 and 8086 processor K3 CO2 **(Understand)** Understand the working of peripherals and its interface

with microprocessors K2

Outcomes

CO3 **(Apply)** Understand the microcontroller architecture and develop an ALP for 8051 controller K3

CO4 **(Apply)** Understand the ARM architecture and develop a ALP for 32-bit ARM processor K3

CO5 **(Understand)** Interpret the real time applications based on Microprocessor/Microcontrollers K2

MODULE I 8-BIT & 16-BIT MICROPROCESSORS 9 8085: Architecture, Addressing modes, Instruction set, 8086: Architecture, Minimum and Maximum mode configurations, Interrupts, Addressing modes, Assembler directives, Instruction set and programming. **MODULE II PERIPHERALS 9** Programmable Peripheral Interface (8255), Serial Communication Interface (8251),Keyboard display controller (8279), Programmable Interval Timer (8253), Programmable interrupt controller (8259), DMA Controller (8257), ADC and DAC Interface.

MODULE III MICROCONTROLLER 9 8051 Architecture, Memory organization, Special Function Registers (SFRs), Port operation, Timers / counters, Serial communication, Interrupts, Addressing modes, Instruction set, Assembly language programming. **MODULE IV ARM PROCESSOR AND ADVANCED PLATFORMS 9** RISC Vs CISC Architecture, ARM Architecture, ARM Assembly language Programming, ARM Organization and Implementation, Thumb Instruction set, ARM Processor Cores - Introduction to Raspberry pi and Arduino platforms (Qualitative analysis)

MODULE V INTERFACING AND APPLICATIONS 9 Interfacing 8051 with Keyboard, LED, 7-Segment - Applications: Wave form Generation, Fire Alarm System, Traffic Light control, Washing Machine control

TOTAL: 45 HOURS

TEXTBOOKS:

1 Krishna Kant, “Microprocessor and Microcontrollers”, PHI Learning, 2nd edition, 2014 2 A.K.Ray, K.M.Bhurchandi, “Advanced Microprocessors and Peripherals Architecture, Programming and Interface”, Tata McGraw Hill, 2006

3 Steve Furber ,”Arm System-on-chip Architecture “2nd Edition Pearson Publisher ,2015

REFERENCES:

1 Ramesh S. Goankar, “Microprocessor Architecture: Programming and Applications with the 8085", Fourth edition, Penram International, 2002

2 Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, “8051 Microcontroller and Embedded Systems”, Pearson Education, 2nd edition

3 Douglas V Hall and SSSP Rao, ”Microprocessor and Interfacing”,3rd edition, Tata McGraw Hill Publications

4 The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, and Pentium Pro Processor, Architecture, Programming and Interfacing, Barry b. Brey, 8/e, PHI

5 Simon Monk, “Programming Arduino”, Tata McGraw Hill Publications, 2012

L T P C

U19EC207 DIGITAL SIGNAL PROCESSING

Upon completion of this course, students will be able to

3 2 0 4

Outcomes

CO1 **(Apply)** Apply the Discrete Fourier transform and Fast Fourier Transform for analysis of digital signals K2

CO2**(Apply)**Apply the design and characteristics of infinite impulse response (IIR) filters for filtering undesired signalsK3 CO3**(Apply)**Apply the design and characteristics of finite impulse response (FIR) filters for filtering undesired signalsK3 CO4 **(Analyze)** Analyze the effects of Finite precision representation on digital filters K4 CO5 **(Analyze)**Analyze the concepts of adaptive filters and DSP Applications K4

MODULE I DISCRETE FOURIER TRANSFORM 12 Discrete Fourier Transform (DFT) - Properties of DFT - periodicity, symmetry, circular convolution, Linear filtering using DFT, Filtering long data sequences - overlap save and overlap add method, Efficient computation of FFT algorithms - Radix-2 Decimation-in-time (DIT), Decimation-in-frequency (DIF), Applications of FFT algorithms- Computation of DFT of two real sequences.

MODULE II IIR FILTER DESIGN 12 Frequency Transformations in Analog Domain – Butterworth filters, Chebyshev filters, Design of Digital IIR filter using impulse invariant method and Bilinear Transformation method. Realization structures of IIR filters-Direct form, Cascade form and parallel form structures.

MODULE III FIR FILTER DESIGN 12 Symmetric and Anti-symmetric FIR filters - Design of Linear Phase FIR filters using windows (Rectangular, Hamming and Hanning window), Design of Linear Phase FIR filters using Frequency-sampling method. Structures of FIR filters - direct form structures, linear phase structures.

MODULE IV FINITE WORD LENGTH EFFECTS 12

Fixed point Representation of numbers, Binary Floating point Representation of numbers, Error resulting from Truncation and Rounding, Quantization of coefficients in FIR Filters, Limit- cycle oscillation in Recursive Systems, Scaling to prevent overflow.

MODULE V DSP APPLICATIONS 12 Adaptive Digital Filter structure – Least Mean-Square Algorithm, Applications of DSP in Wireless Communication, Voice Processing – Speech signal, Digital representation of Speech signals, Analysis of Speech signals, Biomedical Engineering – Removal of Artifacts, EEG ECG, Image Processing.

TOTAL : 60 HOURS

TEXTBOOKS:

1 John G. Proakis & Dimitris G. Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, Pearson education / Prentice Hall, Fourth edition, 2007.

2 Salivahanan, “Digital Signal Processing”, Mc Graw Hill, Fourth Edition, 2019.

REFERENCES:

1 Sanjit K. Mitra, “Digital Signal Processing – A Computer Based Approach”, Tata McGraw Hill, Third Edition, 2007.

2 Alan V. Oppenheim, Ronald W. Jchafer & Hohn. R. Back, “Discrete Time Signal Processing”, Pearson Education, Second Edition, 2001.

3 Andreas Antoniou, “Digital Signal Processing”, Tata McGraw Hill, 2006.

U19CC301 ANALOG AND DIGITAL COMMUNICATIONS **L T P C** 3 0 0 3

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

techniques in generation of K3

amplitude modulation.

Outcomes

CO1 **(Apply)** Apply the basic concepts of modulation

CO2 **(Apply)** Apply the basic concepts of modulation

techniques in generation and demodulation of angle modulation. K3

digital modulation schemes.

CO3 **(Analyze)** Analyze the performance of various digital transmission techniques for noisy channel conditions. K4

CO5 **(Apply)** Apply the features of various error control coding schemes intended for a specific application. K3

CO4 **(Apply)** Apply the basic concepts of modulation techniques in generation of various K3

MODULE I FUNDAMENTALS OF AMPLITUDE MODULATION 9 Introduction – AM: Need for modulation – Types of Analog CW Modulation – Linear CW Modulation schemes – Double Side Band (DSB) Modulation – Amplitude Modulation – Suppressed side band modulation (SSB) – Frequency Conversion.

MODULE II ANGLE MODULATION SYSTEMS 9 Introduction – Angle modulated signals – Spectra of angle modulated signals – Power and Bandwidth of FM signals –

Generation of FM signals – Demodulation of FM signals – Phase Lock Loops.

MODULE III DIGITAL TRANSMISSION 9 Introduction – Sampling theory – Uniform Quantization – Non-uniform Quantization – PCM systems – Differential PCM systems – Delta modulation systems – Time Division Multiplexing - Comparison of TDM and FDM. **MODULE IV DIGITAL MODULATION TECHNIQUES 9** Optimum Receiver for Binary Digital Modulation Schemes - Description of Binary ASK, PSK, and FSK Schemes - Binary PSK Signalling Schemes - M-ary Signalling Schemes - Synchronization Methods.

MODULE V ERROR CONTROL CODING 9 Linear block codes - Single Error-Correcting Hamming Codes- Binary Cyclic Codes - Syndrome Calculation, Error Detection, and Error Correction- Convolutional Codes - Performance of Convolutional Codes. **TOTAL: 45 HOURS**

TEXT BOOK:

1 K Sam Shanmugam, Digital and Analog Communication Systems, Wiley, 2019.

REFERENCES:

1 Simon Haykin, “Communication Systems”, Wiley Publication, New Delhi, 2011.

2 Taub, H., Schilling, D. L., & Saha, G. “Principles of communication systems”, McGraw Hill Education, 2013. 3 Bernard Sklar, “Digital Communications- Fundamentals and applications”, Pearson Education, New Delhi, 2009. 4 J.G Proakis, “Digital Communication”, 5/e, Tata Mc Graw Hill Company, 2008.

5 B.P.Lathi, “Modern Digital and Analog Communication Systems”,‖ 3rd Edition, Oxford University Press 2007

6 Sanjay Sharma, “Communication Systems (Analog and Digital)”, S.K. Kataria & Sons; Reprint 2013.

U19IT201 SOFTWARE ENGINEERING L T P C 3 0 0 3

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

Outcomes

CO1(Apply) Apply appropriate software engineering model for a given development scenario.K3

CO2(Apply) Apply appropriate requirement engineering techniques for real time projects.K3 **CO3(Evaluate)** Compare and choose the suitable design models for the given application scenario.K3 **CO4 (Apply)** Modelling the application based on the customer requirements. K3 **CO5 (Apply)** Apply the testing principles to software project development. K3

MODULE I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9 Introduction to Software Engineering – Software Process - Perspective Process Models - Waterfall model – Incremental Process model – RAD Model and Spiral model - Specialized Process Models- Software Crisis -

Software Myths – Introduction to Agility : Agile process - Extreme programming - XP Process.

MODULE II REQUIREMENTS ANALYSIS 9 Software Requirements: Functional and Non-Functional, User requirements, System requirements – Software Requirements Document - IEEE Standards for SRS – Requirement Engineering Process: Feasibility Studies, Requirements elicitation – Requirements analysis modelling techniques – requirements validation. **MODULE III DESIGN 10** Design process: Design Concepts, Quality-Design Model, Heuristics - Architectural Design: Architectural styles Architectural Mapping using Data Flow - Performing User interface design: Golden rules - Golden rules for interface design – Interface analysis and design models-Component level Design - GRASP: Creator – Information expert – Low Coupling – High Cohesion – Controller – Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioural – Strategy – observer

MODULE IV MODELING AND IMPLEMENTATION 9 Unified Modelling Language - principles of modelling - Basic Behavioural Modelling: Use Case - Class Diagram - Activity Diagram - Interactive Diagram -System sequence diagrams - Relationship between sequence- diagrams and use cases - Architectural Modelling: Component diagram, Deployment diagram, Package Diagram, Software Implementation Techniques: Coding practices

MODULE V TESTING AND MAINTENANCE 8 Software testing fundamentals – Testing Strategies: White box testing – control structure testing, black box testing – Unit Testing, Integration Testing, Acceptance Testing, Performance Testing – Regression Testing, Validation Testing, System Testing and Debugging – Refactoring – Reverse and Forward Engineering **TOTAL : 45 Hours**

TEXT BOOKS

1 R.S. Pressman, “Software Engineering – A Practitioner’s Approach”, Eighth Edition, McGraw Hill International Edition, 2015.

2 Martin Fowler, “UML Distilled With Access codes: A Brief Guide to the Standard Object Modeling Language”, Pearson Education India, 2015.

REFERENCES

1 Ian Sommerville, ”Software Engineering”, 10th Edition, Pearson Education Asia, 2016. 2 Ronald J. Leach, “Introduction to Software Engineering”, CRC Press, 2016. 3 Larman Craig, “Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development”, Pearson Education; Third

edition, 2015.

U19EC213 DIGITAL SIGNAL PROCESSING LABORATORY L T P C 0 0 2 1

Outco mes

Upon completion of this course, students will be able to

CO1 **(Analyze)** Analyze the Computation of Convolutions and Frequency Analysis using DFT K4

CO2 **(Apply)** Design the digital IIR and FIR filters using MATLAB based filter design methods K3

CO3 **(Understand)** Understand the architecture of a DSP Processor K2

CO4 **(Apply)** Design and Implement the digital FIR and IIR Filters in DSP Processor for performing filtering operation over real-time signals K3

CO5 **(Apply)** Apply the signal processing algorithms in various applications of DSP systems K3

MATLAB / EQUIVALENT SOFTWARE PACKAGE

1 Linear and Circular convolution

2 Frequency Analysis using DFT and FFT

3 Design of Butterworth and Chebyshev IIR filters (LPF/HPF/BPF/BSF) and demonstrate the filtering operation

4 Design of FIR filters (LPF/HPF/BPF/BSF) and demonstrate the filtering operation

DSP PROCESSOR BASED IMPLEMENTATION

5 Perform MAC operation using various addressing modes

6 Generation of various signals and random noise

7 Implementation of Butter worth and Chebyshev IIR Filters for Low pass, High pass, Band pass and Band stop filtering

8 Implementation of FIR Filter for Low pass, High pass, Band pass and Band stop Filtering

DSP APPLICATION BASED EXPERIMENTS

9 Spectrum Analysis of Speech signals

10 Image processing using Digital filters

TOTAL: 30 HOURS

REFERENCES:

1 John G. Proakis& Dimitris G.Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, Pearson education / Prentice Hall, Fourth edition, 2007

2 S.Salivahanan, “Digital Signal Processing”, Mc Graw Hill, Fourth Edition, 2019.

3 Emmanuel C, & Barrie.W.Jervis, “Digital Signal Processing”, Pearson Education /Prentice Hall, Second edition, 2002.

4 www.vlabs.co.in

U19EC214 MICROPROCESSOR AND MICROCONTROLLER LAB L T P C 0 0 2 1

Outcomes

Upon completion of this course, students will be able to

CO1 **(Apply)** Develop an assemble level programs in MASM using assembler directives for 8086 K3

CO2 **(Apply)** Interpret the peripheral devices and develop interface with microprocessors and / microcontrollers K3

CO3 **(Apply)** Develop an assembly level programs for 8051 K3

CO4 **(Understand)** Understand the sensor and display interface with Arduino development boards K2

CO5 **(Apply)** Build a project using 8086/8051/Arduino development boards K3

LIST OF EXPERIMENTS

8086 KIT AND MASM ASSEMBLER BASED EXPERIMENTS

1 Basic arithmetic and Logical operations

2 Floating point operations, string manipulations, sorting and searching

PERIPHERALS AND INTERFACING EXPERIMENTS

3 8255 PPI interface

4 8253 Counters and Time Delay

5 ADC & DAC Interface

6 8279 Key board and Display Interface

8051 HARDWARE KIT BASED EXPERIMENTS

7 Basic arithmetic and Logical operations

8 Stepper motor control using 8051

ARDUINO BASED EXPERIMENTS

9 LED Interface

10 Sensor and LCD Interface

MINOR PROJECT Using 8051 or Arduino

TOTAL: 30 HOURS

REFERENCES:

1 “Microprocessor and Microcontroller Laboratory Manual” prepared by ECE Department 2 A.K. Ray and K.M. Bhurchandi, “Advanced Microprocessors and Peripherals”, TMH 3 Muhammad Ali Mazidi , Janice Gillispie Mazidi, Rolin D. McKinlay, “The 8051 Microcontroller and embedded systems using assembly and C”, Pearson Education, 2nd edition,2014

4 Dogan Ibrahim, “Microcontroller Projects Using C for 8051”, Newnes Publications, 2000 5 www.microsoft.com/en-in/download/details.aspx?id=

6 www.electronicshub.org/microcontroller-based-mini-projects-ideas/

7 www.arduino.cc

8 www.instructables.com/circuits/arduino/projects/

U19EM301 APTITUDE I **L T P C** 0 0 2 1

Upon completion of this course, students will be able to

CO1 (Solve) Solve problems based on application of aptitude concepts in real life K2

CO2 Understand (Understand)the importance and impact created by aptitude concepts in real life K2

Outcomes

CO3 (Create) Create shortcut formulas by self. K6

CO4 (Analyze) Analyze, evaluate and compare different scenarios given in a problem and find the strategically best solutions. K4 **CO5 (Create)** creating their own questions based on parameters and constraints given. K6

(Understand) understand lot of learning methods and will be able to apply them in real life problems. K2

MODULE I FOUNDATION 3 Why Aptitude? - Need for Problem solving skill– Application of problem solving in real life – Different types of problems and its worth – Product Vs Service companies - case study – Creativity and Innovation – problem statement – Design thinking basics. Understanding Vs Method memorization, validation of understanding, different algorithms in problem solving - Brute force approach, Pattern finding method and Deep Learning Approach.

MODULE II NUMBER SYSTEMS 3 Primes and factors, Eulers theorem, Totient function & application, factors and factorials, divisibility rule, unit digit calculation and power cycle method, remainder concepts, primality tests, Binomial theorem. **MODULE III AVERAGES** 3 Introduction – Traditional approach – Thinking methods - Arithmetic progression – Application /formula creation - Insert and Delete problems - group averages - ANT method – Weighted averages – principle of balancing moments – see saw method and its application, practical demonstration.

MODULE IV PERCENTAGES - PROFIT AND LOSS - INTERESTS CALCULATION 3 Introduction - Utility of percentage - fraction to percentage conversion table increase and decrease concepts – successive increase decrease concepts, shortcuts and its application. Creative problems – dry/fresh fruit – 2x2 problem – venn diagrams application. Basic understanding of Gain/Loss and percentage gain/percentage loss-Multiplying equivalents to find sale price - an article sold at two different selling price / two different articles sold at same selling price -percentage gain or percentage loss on selling price -percentage gain or percentage loss on whole property, False weight problem. Basic understanding and calculation of simple and compound interest, varies problems based on simple interest & compound interest, shortcuts. Rule of 72.

Financial education fundamentals – Understanding of assets & liabilities - Money Box / Corpus fund / pension scheme creation – sample visualization. Application of CI in real life -Warren buffet – case study.

MODULE V RATIO, PROPORTION / MIXTURE 2 Definition –DP/IP concepts and its application – Problem based on ages – coin bag problems – partnerships- allegation rule –cris x cross method – Solid mixing – 3-variable mixing – liquid mixing problem – Percentage and ratio based problem – profit loss application – water addition and replacement problems – repetitive iteration problems.

LOGICAL ABILITY 1 1 Paradigm shift and its application - Syllogism, Cube 3-D visualization problems, Blood Relation, Coding decoding – basics and advanced.

TOTAL: 15 HOURS

REFERENCES:

1 https://www.hackerearth.com and https://www.geeksforgeeks.org

2 Dr.R S Aggarwal, Quantitative Aptitude, 7th Revised Edition, S. Chand Publishing Company Ltd 3 Arun Sharma, How to prepare for Quantitative Aptitude for the CAT, Fifth Edition, Tata McGraw-Hill Publishing Company Ltd, 2013

4 Rich Dad Poor Dad, 7 Habits of Highly Effective People, Richest Man in Babylon, Think & Grow Rich