ACADEMIC REGULATIONS (R17)

COURSE STRUCTURE AND DETAILED SYLLABUS

(CHOICE BASED CREDIT SYSTEM (CBCS))

ELECTRONICS & COMMUNICATION ENGINEERING

For

B. Tech. - Regular Four Year Degree Course
(Applicable for the batches admitted from 2017 - 2018)
&
B. Tech. - Lateral Entry Scheme
(Applicable for the batches admitted from 2018 - 2019)

CMR INSTITUTE OF TECHNOLOGY

(UGC - Autonomous)
Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with A Grade and NBA
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FOREWORD

CMR Institute of Technology, established in the year 2005 has been bestowed with autonomous status by the UGC from the Academic Year 2017-18 for its remarkable academic accomplishments accompanied by its unflinching spirit and dedication to impart quality technical education to the deserving aspirants. The institution has commenced functioning independently within the set norms prescribed by UGC and AICTE. The performance of the institution manifests the confidence that the prestigious monitoring body, the UGC has on it, in terms of upholding its spirit and sustenance of the expected standards of functioning on its own consequently facilitating the award of degrees for its students. Thus, an autonomous institution is provided with the necessary freedom to have its own **curriculum, examination system and monitoring mechanism**, independent of the affiliating University but under its observance.

CMR Institute of Technology takes pride for having won the confidence of such distinguished academic bodies meant for monitoring the quality in technology education. Besides, the institution is delighted to sustain the same spirit of discharging the responsibilities that it has been conveying since a decade to attain the current academic excellence, if not improving upon the standards and ethics. Consequently, statutory bodies such as the Academic Council and the Boards of Studies have been constituted under the supervision of the Governing Body of the College and with the recommendations of the JNTU Hyderabad, to frame the regulations, course structure and syllabi for autonomousstatus.

The autonomous regulations, course structure and syllabi have been framed in accordance with the vision and mission of the institution along with certain valuable suggestions from professionals of various ancillary fields such as the academics, the industry and the research, all with a noble vision to impart quality technical education and contribute in catering full-fledged engineering graduates to the society.

All the faculty members, the parents and the students are requested to study all the rules and regulations carefully and approach the Principal to seek any clarifications, if needed, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the institution and for brightening the career prospects of engineering graduates.

PRINCIPAL

CMR INSTITUTE OF TECHNOLOGY

Vision: To create world class technocrats for societal needs.

Mission: Impart global quality technical education for a better future by providing appropriate learning environment through continuous improvement and customization.

Quality Policy: Strive for global excellence in academics & research to the satisfaction of students and stakeholders.

Department of Electronics & Communication Engineering (ECE)

Vision: To be a centre of excellence in the field of electronics and communication engineering where learners are nurtured in a scholarly environment to meet global challenges

Mission: Provide conducive environment to hone up the learners' technical skills by imparting quality education in the field of electronics and communication engineering to fulfill societal needs

I. PROGRAMME EDUCATIONAL OBJECTIVES (PEO's)

PEO1: Graduatewill have effective foundation in mathematics, science, engineering, technology, management, humanities and various other interdisciplinary subjects for successful career in electronics and communication engineeringand related fields.

PEO2: Graduate will be able to design and develop innovative systems that contribute to socio-economic development and/or pursue higher education and research.

PEO3: Graduate exhibits professional ethics, communication skills, teamwork and adapts to changing environments of engineering and technologyby engaging in lifelong learning.

II. PROGRAMME OUTCOMES (PO's)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
13. **PSO1:** Identify the complex problems and develop solutions in the area of communication, signal processing, VLSI, embedded systems and IoT.
14. **PSO2:** Demonstrate proficiency in utilization of software and hardware tools along with analytical skills to arrive at appropriate solutions.

B.Tech. - Regular Four Year Degree Program
(For batches admitted from the academic year 2017 - 18)
&
B.Tech. - Lateral Entry Scheme
(For batches admitted from the academic year 2018 - 19)

PREAMBLE

For pursuing four year under graduate Bachelor Degree Programme in Engineering (B.Tech.) offered by **CMR Institute of Technology** under Autonomous status will herein be referred to as CMRIT (Autonomous).

All the specified rules are herein approved by the Academic Council. These rules will be in force and are applicable to students admitted from the Academic Year 2017-18 onwards. Any reference to "Institute" or "College" in these rules and regulations stand for CMRIT (Autonomous).

All the rules and regulations specified shall hereafter be read as a whole for the purpose of interpretation, as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, CMRIT (Autonomous) shall beThe Chairman, Academic Council.

1. UNDER GRADUATE PROGRAMSOFFERED (E&T)

CMR Institute of Technology, an autonomous college affiliated to JNTUH, offers 4 Year(8 Semesters) **Bachelor of Technology**(B.Tech.) Degree Programme, under Choice Based Credit System (CBCS) with effect from the Academic Year 2017 - 18 onwards, in the following Branches of Engineering:

1) B.Tech.- CivilEngineering
2) B.Tech. - MechanicalEngineering
3) B.Tech. - Electronics and CommunicationEngineering
4) B.Tech. - Computer Science andEngineering

2. ADMISSION CRITERIA AND MEDIUM OF INSTRUCTION

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

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

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

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

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

(a) Category A: 70% of the seats are filled through TSEAMCETcounseling.
(b) Category B: 30% of the seats are filled by the Management.

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

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

2.2.2 AdmissionProcedure: Admissions are made into the II year of four year B.Tech. (Regular) Degree Programme through Convenor, TSECET (FDH) against the sanctioned intake in each Programmeof study as lateral entrystudent.

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

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

3. B.Tech. PROGRAMME STRUCTURE

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

3.1.1 A student after securing admission shall pursue the under graduate programme in B.Tech. in a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which, students shall forfeit their seat in B.Tech course.

3.1.2 Each semester is structured to provide 24 credits, totaling to 192 credits for the entire B.Tech.programme.

3.1.3 Each student shall secure 192 credits (with CGPA ≥ 5) required for the completion of the under graduate programme and award of the B.Tech. degree.

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

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

3.2.2 The student shall register for 144 credits and secure 144 credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) for the award of B.Tech. degree.

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

3.3.1 Semester Scheme:

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

3.3.2 Credit Courses:

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

- One Credit - for One hour/Week/Semester for Theory/Lecture (L) Courses;and
- One Credit - for Two hours/Week/Semester for Laboratory/Practical (P) Courses

All Mandatory Courses, Study Tour, Guest Lecture, Tutorials, etc., will not carry any Credits.

b) **Contact Hours:** Weekly contact hours - equal to 33 hours per week (i.e. 1 hour = 60 Minutes) including credit and non-credit courses.

3.3.3 Subject / CourseClassification and Nomenclature:

CMRIT has followed almost all the guidelines specified by AICTE / UGC / JNTUH for the classification of all subjects/ courses offered atB.Tech. programme andare mentioned below.

S. No.	Broad Course Classification	Course Group / Category	Course Description	Range of Credits
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes - Mathematics, Physics and Chemistry Subjects	15%-20%
2		ES – Engg. Sciences	Includes fundamental engineering subjects.	15%-20%
3		HS – Humanities and Social Sciences	Includes subjects related to Humanities, Social Sciences and Management.	5%-10%
4	Core Courses (CoC)	PC – Professional Core	Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.	30%-40%
5	Elective Courses (EℓC)	PE – Professional Electives	Includes Elective subjects related to the Parent Discipline / Department / Branch of Engg.	10%-15%
6		OE – Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/ Department / Branch of Engg.	5%-10%
7	CoreCourses	Project Work	B.Tech. Project or UG Project or UG Major Project.	10%-15%
8		Industrial Training / Mini-Project	Industrial Training/ Internship/ UG Mini-Project/ Mini-Project.	
9		Technical Seminar	Seminar / Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.	
10	Minor Courses	Minor Courses	1 or 2 Credit Courses (subset of HS)	-
11	Mandatory Courses(MC)	MC - Mandatory Courses	These courses are non-credit courses with evaluation.	-
12	Audit Courses (AC)	AC- Audit Courses	These courses are non-credit courses without evaluation	-
Total Credits for UGP (B. Tech.) Programme				**192 (100%)**

4. COURSE REGISTRATION

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

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

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

4.4 A student may be permitted to register for his/her subjects/course of **choice** with a total of 24 credits per semester (minimum of 20 credits and maximum of 28 credits, permitted deviation being± 17%), based on the student's**progress** and SGPA/CGPA, and completion of the '**pre-requisites'** as indicated for various subjects/courses, in the department course structure and syllabuscontents. However, a**minimum** of 20 credits per semester must be registered to ensure the **studentship** in any semester.

4.5 Choice for '**additional subjects / courses**' to reach the maximum permissible limit of 28 credits (above the typical 24 credit norm) must be clearly indicated, which needs the specific approval and signature of the facultyadvisor / counselor.

4.6 If the student submits ambiguous choices or multiple options or erroneous (incorrect) entries during **online** registration for the subject(s)/course(s) under a given/specified course group/ category as listed in the course structure, only the first mentioned subject/course in that category will be taken intoconsideration.

4.7 Subject/course options exercised through **online** registration are final and **cannot** be changed or inter- changed; further, alternate choices will not be considered. However, if the subject/ course that has already been listed for registration by Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice - either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made byHead of the Department, with due notification and time-framed schedule, within the **first week** from the commencement of class-work for thatsemester.

4.8 Dropping of subjects/courses may be permitted, only after obtaining prior approval from the faculty advisor / counselor (subject to retaining a minimum of 20 credits), '**within a period of 15 days**' from the commencement of that semester.

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

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

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

4.11.1 NSS / Physical Education / Yoga Requirements:

i) The student has to enroll for NSS / Physical Education/ Yoga programme from the date of commencement of class work for I year Isemester.

ii) The NSS / Physical Education / Yoga programme schedule will be announced time to time by the respective coordinator(s).

iii) The Student has to submit the NSS / Physical Education / Yoga certificate on or before the last instruction day of I year I semester, otherwise his / her Semester End Examinationresults will not be declared.

4.11.2 Micro Project Requirements:

i) The student has to enroll for Micro-Project from the date of commencement of I Year IISemester class work in any topic of their choice, in consultation with the class coordinator / Counselor.

ii) The student has to collect relevant information on Science / Engineering & Technological advancements, prepare and present a report to the department evaluation committee for assessment.

4.11.3 Internship / Industrial Training / Certification Course / MOOCs:

i) Student has to Enroll for Internship / Industrial Training/ Certification Course / MOOCs under the guidance and approval from the concerned faculty advisor / Counselor on or before the date of commencement of class work for II Year ISemester.

ii) Internship / Industrial Training / Certification Course / MOOCs completion certificate must be submitted to the Head of the Department on or before the last instruction day of III Year II Semester, otherwise his / her Semester End Examination results will be withheld.

5. SUBJECTS / COURSES TO BE OFFERED

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

i) More than **one faculty member** may offer the **same subject** (lab / practical's may be included with the corresponding theory subject in the same semester) in any semester. However, selection choice for students will be based on '**first come first serve** basis and CGPA criterion' (i.e. the first focus shall be on early **on-line entry** from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

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

6. ATTENDANCEREQUIREMENTS

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

6.2 Condoning of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be granted by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.

6.3 A stipulated fee shall be payable towards condoning of shortage ofattendance.

6.4 Shortage of attendance below 65% in aggregate shall in **no** case becondoned.

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

6.6 A student fulfilling the attendance requirementin the present semester shall not be eligible for readmission into the sameclass.

7. ACADEMIC REQUIREMENTS

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

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

7.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to industry oriented mini-project and seminar, if student secures not less than 40% of the total marks in each of them. The student would be treated as failed, if student (i) does not submit a report on his industry oriented mini-project, or does not make a presentation of the same before the evaluation committee as per the schedule, or (ii) does not present the seminar as required in the IV year I/II semester, or (iii) secures less than 40% of marks in industry oriented mini-project/seminar evaluations. Student may reappear once for each of the above evaluations, when they are scheduled again; if he fails in such 'one re-appearance' evaluation also, student has to reappear for the same in the next subsequent semester, as and when it isscheduled.

7.3 Promotion Rules

7.3.1 Four year B.Tech. (Regular):

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year firstsemester.
2	First year second semester to second year first semester	**(i)** Regular course of study of first year secondsemester. **(ii)** Must have secured at least 24 credits out of 48 credits i.e., 50% credits upto first year second semester from all the relevant regular and supplementary examinations whether the student takes those examinations or not.
3	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year firstsemester	**(i)** Regular course of study of second year secondsemester. **(ii)** Must have secured at least 58 credits out of 96 credits i.e., 60% credits upto second year

		second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations ornot.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	**(i)** Regular course of study of third year secondsemester. **(ii)** Must have secured at least 86 credits out of 144 credits i.e., 60% credits upto third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations ornot.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

7.3.2 Four year B.Tech. (LES):

S. No.	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year firstsemester	**(i)** Regular course of study of second year secondsemester. **(ii)** Must have secured at least 29 credits out of 48 credits i.e., 60% credits up tosecond year second semester from all therelevant regular and supplementary examinations, whether the student takes those examinations ornot.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	Third year second semester to fourth year firstsemester	**(i)** Regular course of study of third year secondsemester. **(ii)** Must have secured at least 58 credits out of 96 credits i.e., 60% credits uptothird year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

7.4 A student has to register for all subjects covering 192 credits (144 credits in case of LES) as specified and listed (with the relevant course/ subject classifications as mentioned) in the course structure, fulfill all the attendance and academic requirements for 192 credits (144 credits in case of LES) securing a minimum of **'C'** grade or above in each subject, and 'earn all 192 credits (144 credits in case of LES) securing SGPA ≥ 5.0 (in each semester), and CGPA (at the end of each successive semester) ≥ 5.0, to successfully complete the under graduateprogramme.

7.5 After securing the necessary 192 credits (144 credits in case of LES) as specified for the successful completion of the entire under graduate programme, the student can avail exemption of two subjects up to6 credits, that is, one open elective and one professional elective subject or two professional elective subjects for optional drop out from these 192 credits (144 credits in case of LES) earned; resulting in 186 credits (138 credits in case of LES) for under graduate programme performance evaluation, i.e., the performance of the student in these 186 credits (138 credits in case of LES) shall alone be taken into account for the calculation of 'the final CGPA (at the end of under graduate programme, which takes the SGPA of the IVyear II semester into account)', and shall be indicated in the grade card of IVyear II semester. However, the performance of student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not bealtered.

7.6 If a student registers for some more '**extra subjects'** (in the parent department or other departments/branches of engineering) other than those listed subjects totaling to 192 credits (144 credits in case of LES) as specified in the course structure of parent department, the performances in those '**extra subjects**' (although evaluated and graded using the same procedure as that of the required 192 credits (144 credits in case of LES)) will not be taken into account while calculating the SGPA and CGPA. For such '**extra subjects'** registered, % of marks and letter grade alone will be indicated in the grade card as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations 6 and 7.1 to7.5 above.

7.7 A student eligible to appear in the semester end examination for any subject/ course, but absent from it or failed (thereby failing to secure **'C'** grade or above)may reappear for that subject/ course in the supplementary examination as and when conducted. In such cases, internal marks (CIE) assessed earlier for that subject/ course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that subject.

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

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

8. EVALUATION - DISTRIBUTION AND WEIGHTAGE OFMARKS

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

8.2 Evaluation of Theory Subjects / Courses

A) Continuous Internal Evaluation: For each theory subject, during the semester, there shall be 2 mid-term examinations of30 marks each. Each mid-term examination consists of subjective paper for 25 marks & assignment for 5 marks and the average of the two mid-term examinations marks shall be taken as the final marks.

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

II. The subjective paper shall be conducted for duration of 2 hours. Each subjective paper shall contain 2 parts (Part-A and Part-B). Part-A consists of one compulsory question with five sub questions carrying two marks each. Part-B consists of 3 essay questions carrying five marks each with internal choice; the student has to answer all 3 questions.

III. First assignment should be submitted before the commencement of the first mid-term examinations, and the second assignment should be submitted before the commencement of the second mid-term examinations. The assignments shall be specified / given by the concerned subjectteacher.

IV. Absence in mid-term examination(s):

i) If any student is absent in one mid-term examination for any course on health grounds / any valid reasons approved by the college academic committee, only one test shall be conducted on all units by the college in each course at the end of each semester on payment of prescribed fee.

ii) If any student is absent in both mid-term examinations for any course on health grounds / any valid reasons approved by the college academic committee, only one test for 25 marks shall be conducted on all units and the marks secured out of 25 shall be divided by two, which shall be awarded against the said mid-term examination(s) on payment of prescribed fee.

B) Semester End Examinations: The duration of SEE is 3 hours. The details of the question paper pattern are as follows:

- The end semester examinations will be conducted for 70 marks consisting of two parts viz. i) **Part- A** for 20 marks, ii) **Part - B** for 50 marks.
- Part-A is compulsory question which consists of ten sub-questions (two from each unit) carry 2 marks each.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. One question from each unit (may contain sub-questions) with internal choice.

8.3 Evaluation of Practical Subjects / Courses: In any semester, a student has to complete a minimum of 10 experiments / exercises in each laboratory course and get the record certified by the concerned Head of the Department to be eligible for Semester End Examination.

For practical subjects, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 30 internal marks and 70 marks for Semester End Examination (SEE).

A) Continuous Internal Evaluation (CIE): Out of the 30 marks, 15 marks are allocated for day-to-day work evaluation and for the remaining15 marks - two mid-term examinations of each 15 marks will be conducted by the concerned laboratory teacher for a duration of two hours and the average of the two mid-term examinations is taken into account.

I. Absence in Laboratory Internal Examinations:

a. If any student is absent in one laboratory internal examination for any laboratory course on health grounds / for any valid reasons approved by the college academic committee, only one test shall be conducted for 15 marks on all experiments of that laboratory course, by the college at the end of the semester.

b. If any student is absent in both the laboratory internal examinations on health grounds / for any valid reasons approved by the college academic committee, only one test shall be conducted on all experiments and the marks secured out of 15 marks shall be divided by two, which shall be awarded against the said laboratory internal examinations.

B) Semester End Examination (SEE): The SEE for practical subject / course shall be conducted at the end of the semester with duration of 3 hours by one internal and one external examiner appointed by the Head of the Institution as per the recommendation of the concerned Head of the Department.

8.4 **Evaluation of Design / Drawing Subjects / Courses:** For the subjects such as Engineering Graphics, Machine Drawing and estimation, the distribution shall be 30 marks for CIE (15 marks for day-to-day work and 15 marks for internal examination) and70 marks for SEE. There shall be two internal examinations in a semester and the average of the two shall be considered for the award of marks for internal examinations.

8.5 **Evaluation of Industry-Oriented Mini-Project:** There shall be an industry-oriented mini-project, in collaboration with an industry of their specialization, to be registered immediately after III year II semester examinations, and taken up during the summer vacation for four weeks duration. The industry oriented mini-project shall be submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 marks by the committee consisting of Head of the Department, concerned supervisor and twosenior faculty membersof the department. There shall be no internal marks for industry-oriented mini- project.

8.6 **Evaluation of Technical Seminar:** The student has to enroll and get approval for technical seminar on a specialized topic from the concerned advisor / counselor in the beginning of IV year II semester. The student should collect the information on a specialized topic, prepare a technical report, give seminar presentation onthe topic and submit it to the department as notified by the concerned Head of the Department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and two senior faculty members. The seminar report and the seminar presentation shall be evaluated for 100 marks. There shall be no semester end examination for the seminar.

8.7 **Evaluation of Major Project:**Student shall enroll for the project work during the IV year I semester, as per the instructions of the project guide / supervisor assigned by the Head of Department. Out of total 100 marks allotted for the project work 30 marks shall be for continuous internal evaluation and 70 marks for the end semester viva-voceexamination. Out of 30 marks allocated for CIE, 15 marks shall be awarded by the project supervisor (based on the continuous evaluation of student's performance throughout the project work period), and the other 15 marks shall be awarded by a Departmental Committee consisting of Head of the Department and Project Supervisor, and two senior faculty members, based on the work carried out and the presentation made by the student during internal reviews (at least two internal reviews shall be conducted). The project viva-voce shall be conducted by a committee comprising an external examiner, Head of the Department and Project Supervisor.

8.8 **Evaluation of Mandatory Non-Credit Courses:**For Mandatory non credit courses '**Satisfactory'** or "**Unsatisfactory'** shall be indicated instead of marks or letter grade and this will not be counted for the computation of SGPA / CGPA.

(i) For mandatory non-credit theory or practical courses such as Environmental Science & Technology, Gender Sensitization Lab,Human Values & Professional Ethics, Verbal Ability, Analytical Skills, Soft Skills, Quantitative Aptitude, the student has to secure ≥ 65% attendance and not less than 40 marks out of 100 marks in the CIE, then the student is declared as **pass** and will be qualified for the award of the degree.

(ii) For mandatory non-credit courses such as NSS / Physical Education / Yoga, Micro Project, Internship / Industrial Training / Certification Course / MOOCs, the student has to submit **satisfactory participation certificate** from the concerned authority.

9. GRADING PROCEDURE

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

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

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

9.3 A student obtaining '**F'**grade in any subject shall be considered **'failed**' and will be required to reappear as '**supplementary student**' in the end semester examination (SEE), as and when offered. In such cases, his internal marks (CIE marks) in those subject(s) will remain same as those he obtainedearlier.

9.4 A letter grade does not imply any specific % of marks.

9.5 In general, a student shall not be permitted to repeat any subject/course (s) only for the sake of '**grade improvement**' or 'SGPA/CGPA improvement'. However, he has to repeat all the subjects/courses pertaining to that semesterifhe isdetained.

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

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

9.7 The student passes the subject/course only when he gets GP ≥5 (Cgrade orabove).

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

$$\mathbf{SGPA\ (S_i) = \sum (C_i\ X\ G_i) / \sum C_i}$$

Where C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} course.

9.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in **all** registered courses in **all** Semesters, and the total number of credits registered in **all** the semesters. CGPA is rounded off to **two** decimal places. CGPA is thus computed from the I year second semester onwards, at the end of each semester, as per theformula

$$\mathbf{CGPA = \sum (C_i\ X\ S_i) / \sum C_i}$$

where S_i is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester.

Illustration of calculation of SGPA					Illustration of calculation of CGPA			
Course /Subject	Credits	Letter Grade	Grade Points	Credit Points	Semester	Credits	SGPA	Credits x SGPA
Course 1	4	A	8	4 x 8 = 32	Sem I	24	7	24x7=168
Course 2	4	O	10	4 x 10 = 40	Sem II	24	6	24x6=144
Course 3	4	C	5	4 x 5 = 20	Sem III	24	6.5	24 x 6.5 =156
Course 4	3	B	6	3 x 6 = 18	Sem IV	24	6	24x6 =144
Course 5	3	A^+	9	3 x 9 = 27	Sem V	24	7.5	24 x 7.5 =180
Course 6	3	C	5	3 x 5 = 15	Sem VI	24	8	24x8 =192
Total	21			152	Sem VII	24	8.5	24 x 8.5 =204
SGPA = 152/21 = 7.23					Sem VIII	24	8	24x8 =192
					Total	192		1380
					CGPA = 1380/192 = 7.18			

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

9.11 For calculations listed in Item 9.6–9.10, performance in failed subjects/courses (securing **F**grade) will also be taken into account, and the credits of such subjects/courses will also be included in the multiplications and summations. However, mandatory courses will not be taken into consideration.

10 PASSING STANDARDS

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

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

10.3 After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. it will show the details of the courses registered (course code, title, no. of credits, grade earned etc.), credits earned, SGPA, and CGPA.

11 DECLARATION OF RESULTS

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

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

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

12 AWARD OF DEGREE

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

Class Awarded	Grade to be Secured	Remarks
First Class with Distinction	≥ 8 CGPA	**From the aggregate marks secured from 192 Credits for Regular Students and 144 Credits for Lateral Entry Students.**
First Class	≥ 6.5 to < 8 CGPA	
Second Class	≥ 5.5 to < 6.5 CGPA	
Pass Class	≥ 5.00 to < 5.5 CGPA	
FAIL	CGPA < 5	

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

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

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

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

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

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

12.5 **Transcripts:** After successful completion of prerequisite credits for the award of degree a transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

13 WITH HOLDING OF RESULTS

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

14 SUPPLEMENTARY EXAMINATIONS

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

15. TRANSITORY REGULATIONS

A. For students detained due to shortage of attendance:

1. A Student who has been detained in I year of R09/R13/R15/R16 Regulations due to lack of attendance, shall be permitted to join I year I semester of R17 Regulations and he is required to complete the study of B.Tech.programme within the stipulated period of eight academic years from the date of first admission in I Year.
2. A student, who has been detained in any semester of II, III and IV years of R09/R13/R15/R16 regulations for want of attendance, shall be permitted to join the corresponding semester of R17 regulations and is required to complete the study of B.Tech.within the stipulated period of eight academic years from the date of first admission in I Year. The R17 Academic Regulations under which a student has been readmitted shall be applicable to that student from that semester.

   See rule (C) for further Transitory Regulations.

B. For students detained due to shortage ofcredits:

3. A student of R09/R13/R15/R16 Regulations, who has been detained due to lack of credits, shall be promoted to the next semester of R17 Regulations only after acquiring the required credits as per the corresponding regulations of his/her first admission. The student is required to complete the study of B.Tech.within the stipulated period of eight academic years from the year of first admission. The R17 Academic Regulations are applicable to a student from the year of readmission onwards.

   See rule (C) for further TransitoryRegulations.

C. For readmitted students in R17 Regulations:

4. A student who has failed in any subject under any regulation has to pass those subjects in the sameregulations.

5. The maximum credits that a student acquires for the award of degree, shall be the sum of the total number of credits secured in all the regulations of his/her study including R17 Regulations. The performance evaluation of the student will be done after the exemption of two subjects if total credits acquired are ≤ 206, three subjects if total credits acquired are > 206 (see R16 Regulations for exemption details).

6. If a student readmitted to R17 Regulations, has any subject with 80% of syllabus common with his/her previous regulations, that particular subject in R17 Regulations will be substituted by another subject to be suggested by the CMRIT Academic Council.

Note: If a student readmitted to R17 Regulations, has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in R17 Regulations, the Principal shall conduct remedial classes tocover those subjects/topics for the benefit of thestudents.

D. Promotion Rule: Where the credits allotted to a semester/year under the regulations studied in are different from that under R17 regulations for the corresponding semester/year, the promotion rules of R17 vide section 7.3 shall be applied after normalization.Normalization is done by scaling down or up the number of credits of a semester/year under the previous regulations to equal the number of credits of the corresponding semester/year under R17 regulations and revising the secured credits also in the same proportion.

16 STUDENT TRANSFERS

There shall be no transfers from other colleges / streams.

17 RULES OF DISCIPLINE

17.1 Any attempt by any student to influence the teachers, examiners, faculty members and staff of Controller of Examination office for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice case and the student can be debarred from the college.

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

17.3 When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Malpractice Prevention Committee is final.

18. MALPRACTICE

18.1 Malpractice Prevention Committee: The committee shall examine the student's malpractice and indiscipline cases occurred, while conducting the examinations and recommend appropriate punishment to the Academic Council after taking explanation from the student and concerned invigilator as per the malpractice rules mentioned below. The committee consists of

a) Controller of Examinations - Chairman
b) Addl. Controller of Examinations.- Convener
c) Subject Expert - Member
d) Head of the Department of which the student belongs to - Member
e) The Invigilator concerned - Member

18.2 Malpractice Rules: Disciplinary Action for Improper Conduct in Examinations

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

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

		academic regulations in connection with forfeiture ofseat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall notbe permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall notbe permitted for the remaining examinations of the subjects of thatsemester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the principal for further action to award suitable punishment.	

19. SCOPE

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

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

iii) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.

20. REVISION AND AMENDMENTS TO REGULATIONS

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

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COURSE STRUCTURE

B.Tech. – R-17 COURSE STRUCTURE

(Applicable from the batch admitted during 2017-18 and onwards)

I – B.Tech. – I - Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17EC1101BS	Engineering Mathematics – I	1,2,12	4	1	-	4
2	17EC1102HS	Professional Communication in English	10,12	3	-	-	3
3	17EC1103ES	Basic Electrical & Electronics Engineering	1,2,3,12	4	1	-	4
4	17EC1104ES	Engineering Graphics	1,5,10	2	-	3	4
5	17EC1105ES	Computer Programming	1,2,3,12	3	1	-	3
6	17EC1106HS	English Language Communication Skills Lab	5,10	-	-	3	2
7	17EC1107ES	Computer Programming in C Lab	4	-	-	3	2
8	17EC1108ES	Basic Electrical & Electronics Engineering Lab	4	-	-	3	2
TOTAL				**16**	**3**	**12**	**24**
Mandatory Course (Non-Credit)							
9	17AC1109MC	NSS / Physical Education /Yoga	3,6,8,9,12	-	-	2	-

I – B.Tech. – II - Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17EC1201BS	Engineering Mathematics – II	1,2,12	4	1	-	4
2	17EC1202BS	Applied Physics	1,2,12	4	1	-	4
3	17EC1203BS	Engineering Chemistry	1,2,12	4	1	-	4
4	17EC1204ES	Electric Circuits & Machines	1,2,12	3	1	-	3
5	17EC1205ES	Data Structures through C	1,2,3,12	3	1	-	3
6	17EC1206BS	Applied Physics /Engineering Chemistry Lab	4	-	-	3	2
7	17EC1207ES	Data Structures through C Lab	4	-	-	3	2
8	17EC1208ES	IT & Engineering Workshop	1,5,9,10	-	-	3	2
TOTAL				**18**	**5**	**9**	**24**
Mandatory Course (Non-Credit)							
9	17AC1209MC	Micro Project	1 to 14	-	-	2	-

II – B.Tech. – I – Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17EC2101BS	Complex Analysis and Numerical Methods	1,2,12	4	-	-	4
2	17EC2102BS	Probability Theory & Stochastic Processes	1,2,12,13	4	-	-	4
3	17EC2103PC	Analog Electronics	1,2,3,12,13	4	-	-	4
4	17EC2104PC	Signals and Systems	1,2,12,13	3	1	-	3
5	17EC2105PC	Switching Theory and Logic Design	1,2,3,12,13	3	-	-	3
6	17EC2106PC	Analog Electronics Lab	4,5,14	-	-	3	2
7	17EC2107PC	Basic Simulation Lab	4,5,14	-	-	3	2
8	17EC2108ES	Electric Circuits & MachinesLab	4,5,14	-	-	3	2
TOTAL				**18**	**1**	**9**	**24**
Mandatory Course (Non-Credit)							
9	17HS2109MC	Environmental Science & Technology	1,6,7,12	3	-	-	-
10	17BS2110MC	Analytical Skills	9,10	-	-	2	-

II – B.Tech. – II – Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17EC2201PC	Pulse & Digital Circuits	2,3,12,13	3	1	-	3
2	17EC2202PC	Analog Communications	1,2,3,12,13	4	-	-	4
3	17EC2203PC	Electro Magnetic Theory & Transmission Lines	1,2,12,13	4	1	-	4
4	17EC2204PC	Digital Design through Verilog HDL	2,3,12,13	4	-	-	4
5	17EC2205HS	Financial Analysis, Management & Economics	11,12	3	-	-	3
6	17EC2206PC	Pulse & Digital Circuits Lab	4,5,14	-	-	3	2
7	17EC2207PC	Analog Communications Lab	4,5,14	-	-	3	2
8	17EC2208PC	Digital Design through Verilog HDL Lab	4,5,14	-	-	3	2
TOTAL				**18**	**2**	**9**	**24**
Mandatory Course (Non-Credit)							
9	17HS2209MC	Gender Sensitization Lab	9,12	-	-	2	-
10	17HS2210MC	Verbal Ability	9,10	-	-	2	-

Note: 1. Enrollment of Internship / Industrial training / Certification course / MOOCs initiation from II-B.Tech.-I-Semester

III – B.Tech. – I - Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17EC3101PC	Linear & Digital IC Applications	2,3,12,13	4	-	-	4
2	17EC3102PC	Digital Communications	2,3,8,12,13	4	-	-	4
3	17EC3103PC	Control Systems	1,2,12	3	1	-	3
4	17EC3104PC	Antenna & Wave Propagation	2,3,12,13	4	-	-	4
5	**Open Elective – I**			3	-	3	-
	17CE3105OE	Disaster Management	2,7,8,12				
	17ME3105OE	Operations Research	1,2,12				
	17EC3105OE	Electronic Measurements and Instrumentation	1,2,12				
	17CS3105OE	JAVA Programming	1,2,3,5,12				
6	17EC3106PC	Linear & Digital IC Applications Lab	4,5,14	-	-	3	2
7	17EC3107PC	Digital Communications Lab	4,5,14	-	-	3	2
8	17EC3108HS	Advanced English Communication Skills Lab	5,10	-	-	3	2
TOTAL				**18**	**1**	**9**	**24**
Mandatory Course (Non-Credit)							
9	17HS3109MC	Human Values & Professional Ethics	6,7,8,12	3	-	-	-
10	17BS3110MC	Quantitative Aptitude	9,10	-	-	2	-

III – B.Tech. – II – Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17EC3201PC	Micro Processors & Micro Controllers	2,3,7,12,13	4	1	-	4
2	17EC3202PC	Digital Signal Processing	2,3,6,12,13	4	1	-	4
3	17EC3203PC	Micro Wave Engineering	2,3,12,13	4	-	-	4
4	**Open Elective – II**			3	-	-	3
	17CE3204OE	Global Warming & Climate Change	2,6,7,8,12				
	17ME3204OE	Fundamentals of Robotics	1,2,5,12				
	17EC3204OE	Principles of Communication Systems	1,2,3,12				
	17CS3204OE	Database Management Systems	1,2,3,5,12				
5	**Professional Elective – I**			3	-	-	3
	17EC3205PE	Computer Organization & Operating Systems	2,3,12,13				
	17EC3206PE	Data Communications	2,3,12,13				
	17EC3207PE	Advanced Digital Design	2,3,5,12,13				
	17EC3208PE	Telecommunication Switching Systems and Networks	2,3,6,12,13				
6	17EC3209PC	Micro Processors & Micro Controllers Lab	4,5,14	-	-	3	2
7	17EC3210PC	Digital Signal Processing Lab	4,5,14	-	-	3	2
8	17EC3211PC	Micro Wave Engineering Lab	4,5,14	-	-	3	2
TOTAL				**18**	**2**	**9**	**24**
Mandatory Course (Non-Credit)							
9	17HS3212MC	Soft Skills	9,10	-	-	2	-
10	17AC3213MC	Internship / Industrial training / Certification Course / MOOCs Certificate	1 to 14	-	-	2	-

Note: 1. Industry Oriented Mini Project Carried out during summer vacation between III - B.Tech. – II – Sem. & IV- B.Tech. – I Sem. and evaluated in IV-B.Tech.-I-Semester

2. Internship / Industrial training / Certification course / MOOCs certificate submission on or before last instruction day of III-B.Tech.-II semester

IV – B.Tech. – I - Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17EC4101PC	Cellular and Mobile Communications	2,3,6,12,13	4	1	-	4
2	17EC4102PC	VLSI Design	2,3,7,12,13	4	1	-	4
3	17EC4103PC	Satellite Communications	2,3,6,12,13	4	1	-	4
4	**Open Elective – III**			3	-	-	3
	17CE4104OE	Environmental Impact Assessment	6,7,10,12				
	17ME4104OE	Principles of Entrepreneurship	7,8,9,11,12				
	17EC4104OE	Principles of Embedded Systems	1,2,3,12				
	17CS4104OE	Web Technologies	2,3,5,6,12				
5	**Professional Elective – II**			3	-	-	3
	17EC4105PE	Computer Networks	2,6,12,13				
	17EC4106PE	Wireless Communications and Networks	2,3,5,8,12,13				
	17EC4107PE	Bio-Medical Instrumentation	2,3,5,12,13				
	17EC4108PE	Coding Theory & Techniques	2,3,8,12,13				
6	17EC4109PC	Cellular and Mobile Communications Lab	4,5,14	-	-	3	2
7	17EC4110PC	VLSI Design Lab	4,5,14	-	-	3	2
8	17EC4111CC	Industry Oriented Mini Project	1 to 14	-	-	-	2
TOTAL				**18**	**2**	**6**	**24**
Mandatory Course (Non-Credit)							
9	17HS4112MC	Foreign Language: French	9,10	2	-	-	-
	17HS4113MC	Foreign Language: German					

IV – B.Tech. – II - Semester							
S. No.	Subject Code	Subject	POs	Hours Per Week			Credits
				L	T	P	
1	17EC4201ES	Internet of Things	2,3,6,7,12,13	4	1	-	4
2	**Professional Elective – III**			3	-	-	3
	17EC4202PE	Digital Signal Processors and Controllers	2,3,5,12,13				
	17EC4203PE	Radar Systems	2,3,7,12,13				
	17EC4204PE	Artificial Neural Networks	2,3,5,6,12,13				
	17EC4205PE	Television Engineering	2,5,6,7,12,13				
3	**Professional Elective - IV**			3	-	-	3
	17EC4206PE	Data Analytics & Machine Learning	1,2,3,5,12				
	17EC4207PE	Digital Image Processing	2,5,12,13				
	17EC4208PE	RF Circuit Design	2,3,5,12,13				
	17EC4209PE	Adhoc Wireless Sensor Networks	2,3,6,12,13				
4	17EC4210CC	Technical Seminar	1 to 14	-	-	3	2
5	17EC4211CC	Major Project	1 to 14	-	-	18	12
TOTAL				**10**	**01**	**21**	**24**

I-B.TECH.-I-SEMESTER SYLLABUS

ENGINEERING MATHEMATICS – I

(Differential Equations & Matrix Algebra)

(Common to all Branches)

I -B.Tech.-I-Sem **L T P C**

Subject Code: 17EC1101BS **4 1 0 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	solve linear and non-linear ordinary differential equations	3	2	1
CO2	solve system of linear equations by using matrices	3	2	1
CO3	find Eigen values and Eigen vectors	3	2	1
CO4	find the extreme values of functions of several variables and evaluation of improper integrals by using Beta and Gamma functions	3	2	1
CO5	evaluate multiple integrals and find the line, surface and volume integrals and convert them by using multiple integrals	3	2	1

UNIT - I

Differential Equations: Introduction, exact & Reducible to exact, Linear and Bernoulie's Differential Equations Applications to Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories, Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, Sin ax, cos ax, polynomials in x, $e^{ax}V(x)$, $xV(x)$,method of Variation of parameters. Applications: Simple Harmonic Motion (SHM)

UNIT-II

Linear System of Equations:

Types of real matrices and complex matrices, rank, Echelon form, normal form consistency and solution of linear systems (homogeneous and No- homogeneous) – Gauss Elimination, Gauss Jordon and LU decomposition methods-Applications: Finding current in the electrical circuits.

UNIT –III

Eigen values, Eigen vectors and Quadratic forms:

Eigen values, Eigen vectors and their properties, Cayley – Hamilton theorem (without proof),Inverse and powers of a matrix using Cayley – Hamilton, Diagonalization, Quadratic forms, Reduction of Quadratic forms into their canonical form, rank and nature of the Quadratic forms – index and signature

Unit IV

Functions of Several Variables: Functions of several variables-Partial differentiation, Functional dependence, Jacobian, Maxima and Minima of functions of two variables with constraints and without constraints.

Beta and Gamma Functions: Beta and Gamma functions, properties, relation between Beta and Gamma functions, evaluation of integrals using Beta and Gamma functions.

Unit V

Multiple Integrals: Double and triple integrals, Change of variables, Change of order of integration. Applications: Finding areas, volumes& Center of gravity (evaluation using Beta and Gamma functions).

TEXT BOOKS:

1. B.S.Grewal,HigherEngineeringMathematics,42nd Ed.,KhannaPublishers,NewDelhi,2012
2. E. Kreyszig, Advanced Engineering Mathematics, 9th Ed., Wiley,2012
3. R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, 4th ed., Narosa Publishing House, NewDelhi,2014

Reference(s)

1. B.V.Ramana,EngineeringMathematics,4thEd.,TataMcGrawHill,NewDelhi,2009
2. D.S. Chandrashekharaiah, Engineering Mathematics, Volume 1, Prism Publishers,2010
3. T.K.V.Iyengar, B. Krishna Ghandhi, S. Ranganathan and M.V. S.S.N. Prasad, Engineering Mathematics,Volume-I,12thEd.,S.ChandPublishers,2014
4. U. M. Swamy, P. VijayaLaxmi, K. L. Sai Prasad and M. Phani Krishna Kishore, A Text Book of EngineeringMathematics–I,ExcelBooks,NewDelhi,2010

PROFESSIONAL COMMUNICATION IN ENGLISH

I-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC1102HS **3 0 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO10	PO12
CO1	apply appropriate vocabulary and grammar	3	1
CO2	use effective writing skills in formal and informal situations	3	1
CO3	demonstrate reading skills to pursue research and academic activities	3	1
CO4	apply and exhibit professional and social Etiquette	3	1
CO5	employ reference and study skills for lifelong learning	3	1

SYLLABUS

Reading Skills:
Objectives:
To develop an awareness in students about the significance of silent reading and comprehension.
To develop students' ability to guess meanings of words from the context and grasp the overall message of the text, draw inferences, etc., by way of:

- Skimming and Scanning the text
- Intensive and Extensive Reading
- Reading for Pleasure
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Recognizing Coherence/Sequencing of Sentences

NOTE: The students will be trained in reading skills using the prescribed texts for detailed study. They will be tested in reading comprehension of different 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:
Objectives:

1. To develop an awareness in the students about writing as an exact and formal skill
2. To create an awareness in students about the components of different forms of writing, beginning with the lower order ones through;
   - Writing of sentences
   - Use of appropriate vocabulary
   - Paragraph writing
   - Coherence and cohesiveness
   - Narration / description
   - Note Making
   - Formal and informal letter writing
   - Describing graphs using expressions of comparison

In order to improve the proficiency of the students in the acquisition of language skills mentioned above, the following text and course contents, divided into Five Units, are prescribed:

Text Books:

- "Fluency in English – A Course book for Engineering Students" by Board of Editors: Hyderabad: Orient Black Swan Pvt. Ltd. 2016. Print.
- "Fluency in English – A Practice Manual" for B.Tech I year I Sem (ECE&CE) & II Sem (CSE & ME) comprising the Five Units and practice exercises for all the topics.

Note: Listening and Speaking skills are covered in the syllabus of ELCS Lab.

UNIT –I: Motivation

Chapter entitled '**Presidential Address' by Dr. A.P.J. Kalam** from "Fluency in English– A Course book for Engineering Students" published by Orient Blackswan, Hyderabad.

- **Vocabulary**: Word Formation — Root Words –The Use of Prefixes and Suffixes– Changing Words from one form to another – Transition Words - Exercises for Practice.
- **Grammar:** Punctuation – Parts of Speech- Articles – Prepositions-Types & Kinds –Exercises for Practicewith focus on identifying Errors.
- **Reading:** Double Angels by David Scott-Reading and Its Importance- Techniques for Effective Reading- Signal Words- Exercises for Practice
- **Writing:** Writing Sentences- Techniques for Effective Writing– Paragraph Writing- Types, Structure and Features of a Paragraph-Coherence and Cohesiveness: Logical, Lexical and Grammatical Devices – Patterns of Writing - Cause and Effect - Classification and Division - Compare and Contrast - Definition - Description - Exemplification - Narration - Persuasion - Process - Exercises for Practice

UNIT –II: Leadership

Chapter entitled Satya Nadella: **Email to Employees on his First Day as CEO** from "Fluency in English– A Course book for Engineering Students" Published by Orient Black Swan, Hyderabad.

- **Vocabulary**: Collocations - Synonyms and Antonyms – Homonyms, Homophones, Homographs- Exercises for Practice
- **Grammar:** Verbs-Transitive, Intransitive and Non-finite Verbs –Gerund – Exercises for Practice with focus on identifying Errors.
- **Reading:** Sub-skills of Reading- Skimming, Scanning, Extensive Reading and Intensive Reading – **The Road Not Taken by Robert Frost** — Exercises for Practice
- **Writing**: Letter Writing –Format, Styles, Parts, Language to be used in Formal Letters- Letter of Apology – Letter of Complaint-Letter of Inquiry with Reply – Letter of Requisition –- Exercises for Practice

UNIT –III: Human Relations

Chapter entitled The **Gift of the Magi** by **O Henry** from the Course/Study Material.

- **Vocabulary:** Introduction- A Brief History of Words – Using the Dictionary and Thesaurus– Confusables- Spellings
- **Grammar:** Tenses: Present Tense- Past Tense- Future Tense- Active Voice – Passive Voice- Conditional Sentences – Adjective and Degrees of Comparison – Adverbs - Exercises for Practice with focus on identifying Errors.
- **Reading: TheCuddalore Experience** by **Anu George** -Improving Comprehension Skills – Techniques for Good Comprehension- Skimming and Scanning- Non-verbal Signals – Structure of the Text – Structure of Paragraphs – Punctuation – Author's viewpoint (Inference)
- **Anticipation:** Determining the Meaning of Words – Summarizing- Typical Reading Comprehension Questions.
- **Writing:** Introduction- Letter Writing-Writing the Cover Letter- Cover Letters Accompanying Resumes- E-Correspondence – Emails – Social Networks – Dos and Don'ts.

UNIT –IV: Human Values and Professional Ethics

Chapter entitled **'Good Manners' by J.C. Hill** from Fluency in English – A Course book for Engineering Students" published by Orient Blackswan, Hyderabad.

- **Vocabulary**: Phrasal Verbs - Idiomatic Expressions –One- word Substitutes – Analogies (Exercises for Practice.)
- **Grammar:** Sequence of Tenses- Concord (Subject in Agreement with the Verb) – Exercises for Practice with focus on identifying Errors.
- **Reading:** '**If' poem by Rudyard Kipling**–Tips for Writing a Review — Author's Viewpoint – Reader's Anticipation– Herein the Students will be required to Read and Submit a Review of a Book (Literary or Non-literary) of their choice – Exercises for Practice.
- **Writing**: Information Transfer-Bar Charts-Flow Charts-Tree Diagrams etc., — Exercises for Practice. Introduction – Steps to Effective Précis Writing – Guidelines- Samples

UNIT –V: Wisdom

Chapter entitled '**Father Dear Father' by Raj Kinger** from Fluency in English – A Course book for Engineering Students" Published by Orient Black Swan, Hyderabad

- **Vocabulary:** Foreign Words—Words borrowed from other Languages- Exercises for Practice
- **Grammar**: Direct and Indirect Speech- Question Tags- Common Errors in English - Exercises for Practice with focus on identifying Errors**.**
- **Reading**: Predicting the Content- Understanding the Gist – SQ3R Reading Technique- Study Skills – Note Making - Understanding Discourse - Coherence – Sequencing Sentences.
- **Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports – Formats- Prewriting – Structure of Reports (Manuscript Format) – Types of Reports – Writing the Report - Exercises from both the texts not prescribed shall be used for classroom tasks.

References

1. Prof. N. Krishna Swamy Modern English A Book of Grammar, Usage and Composition
2. Prof. Krishna Swamy and Sri Ram
3. Green, David. Contemporary English Grammar –Structures and Composition. MacMillan India. 2014 (Print)
4. Rizvi, M. Ashraf. Effective Technical Communication. Tata Mc Graw –Hill. 2015 (Print)
5. Raman, Meenakshi and Sharma, Sangeeta. "Technical Communication- Principles and Practice". Third Edition. New Delhi: Oxford University Press. 2015. Print.
6. Text for Communication Skills- Current English for Colleges – N. Krishnaswamy & T. Sriram - Mc Millian.
7. English for Science and Technology by.Prof.P.Ramani, Mc Millan
8. The Structure of Technical English - A.J.Hebert, Orient Longman
9. Communication in English for Technical Students – Curriculum Development Centre, Calcutta, Orient Longman
10. Business letters for Different Occasions - A.N. Kapoor, S.Chand & Company Pvt. Ltd.
11. Writing That Works: How to Communicate Effectively in Business by Kenneth Roman
12. Words that Sell by Richard Bayan
13. Business Writing Today: A Practical Guide by Natalie Canavor
14. A Course in English Grammar by Raj N Bakshi Orient Black Swan Pvt. Ltd. 2000. Print
15. O Henry 100 Short Stories
16. Novels and Short Story collections of W. Somerset Maugham
17. Selected Writings of R.K Narayan
18. Wings of Fire by APJ Kalam
19. Literary Horizon Orient Black Swan Pvt. Ltd. 2013
20. The Gardener by Rabindranath Tagore

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

I-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC1103ES **4 1 0 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12
CO1	solve electrical circuits using circuit laws and explain single phase AC circuits	3	3	2	1
CO2	solve electrical circuits using network theorems and illustrate diode characteristic	3	3	2	1
CO3	identify special purpose devices and use diode circuits for various applications	3	3	2	1
CO4	illustrate the configurations and biasing techniques of Bi-polar junction transistor	3	3	2	1
CO5	characterize JFET	3	3	2	1

UNIT-I: INTRODUCTION TO ELECTRICAL CIRCUITS & SINGLE PHASE AC CIRCUITS
Electrical Circuits: R-L-C Parameters, Voltage and Current, Independent and Dependent Sources, Source Transformation – V-I relationship for passive elements, Kirchhoff's Laws, Network reduction techniques – series, parallel, series-parallel, star-to-delta, delta-to-star transformation, Nodal Analysis & Mesh Analysis.

Single Phase AC Circuits: R.M.S. and Average values, Form and peak factor, steady state analysis of series, parallel and series-parallel combinations of R, L and C with sinusoidal excitation, concept of reactance, impedance, susceptance and admittance – phase and phase difference, Concept of power factor, j-notation, complex and polar forms of representation.

UNIT-II: NETWORK THEOREMS & P-N JUNCTION DIODE
Network Theorems: Thevenin's, Norton's, Maximum power transfer, Superposition, Reciprocity, Tellegen's Millman's and compensation theorems for DC and AC excitations.

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances.

UNIT- III: SPECIAL PURPOSE DEVICES & DIODE CIRCUITS
Special Purpose Devices: Breakdown Mechanisms in Semi-Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics of Tunnel Diode (With help of Energy band diagram) and Varactor Diode.

Rectifiers and Filters: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

UNIT- IV: BIPOLAR JUNCTION TRANSISTOR
Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations. Comparison of CE, CB and CC configurations
Transistor Biasing And Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Emitter Feedback Bias, Collector to Emitter feedback bias, Voltage divider bias, Bias stability, Stabilization against variations in V_{BE} and β, Bias Compensation using Diodes and Transistors. Principle of operation of SCR.

UNIT- V: JUNCTION FIELD EFFECT TRANSISTOR
Junction Field Effect Transistor: Construction, Principle of Operation, Symbol, Pinch-Off Voltage,

Volt-Ampere Characteristic, Comparison of BJT and FET, Small Signal Model, Biasing FET.

Text Books:

1. Circuit Thoery (Analysis and synthesis) - A. Chakrabarti, Dhanpat Rai&co (Pvt) Ltd 7th Ed,2015
2. Electrical Technology Vol-I B.L. Theraja. S. Chand publications
3. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
4. Integrated Electronics – J.Millman and C.C.Halkias, Satyabratajit, TMH.
5. Basic Electrical and electronics Engineering- M S Sukija TK Nagasarkar Oxford University.

References:

1. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6th edition
2. Introduction to Electronic Devices and Circuits-Rober T. Paynter, Pearson Education.
3. Electronic Devices and Circuits - K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.
4. Electronic Devices and Circuits – Anil K. Maini, Varsha Agarwal –Wiley India Pvt. Ltd. 1/e 2009.
5. Linear circuit analysis (time domain phasor and Laplace transform approaches)- 2nd edition by Raymond A.DeCarlo and Pen-Min-Lin, Oxford University Press-2004.
6. Network Theory by N.C.Jagan & C.Lakshminarayana, B.S. Publications.
7. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
8. Electronic Devices and Circuits – 2nd Edition by Muhammad H.Rashid, Cengage Learning.

ENGINEERING GRAPHICS

I-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC1104ES **2 0 3 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO5	PO10
CO1	apply engineering drawing concepts in technical graphic communication	3	3	2
CO2	construct conic sections using various methods	3	3	2
CO3	draw orthographic projections of points, lines, planes and solids	3	3	2
CO4	draw development of solid surfaces	3	3	2
CO5	draw the conversions of orthographic to isometric projections & vice versa	3	3	2

UNIT – I
INTRODUCTION TO ENGINEERING DRAWING: Principles of Engineering Graphics and their significance, Conic Sections-ellipse, parabola, hyperbola, including the Rectangular Hyperbola. Cycloid, Epicycloid and Hypocycloid, Involute. Scales – Plain and Diagonal.

UNIT- II
ORTHOGRAPHIC PROJECTIONS:
Principles of Orthographic Projections – Conventions – Projections of Points and Straight Lines. Projections of Plane regular geometric figures. - Auxiliary Planes.

UNIT – III
Projections of Regular Solids - Auxiliary Views.

UNIT – IV
Sections and developments; Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone.

UNIT – V
ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple Solids.Conversion of Isometric Views to Orthographic Views and Vice-versa.

Text Books:
1. Engineering Drawing N.D. Bhatt / Charotar
2. A Text Book of Engineering Drawing / basant agarwal.
3. Engineering Drawing and Graphics Rane and Shah/ Pearson Edu.

Reference Books:
1. A Text Book of Engineering Drawing / Dhawan R K / S. Chand
2. Engineering Graphics with Auto CAD / James D Bethune / Pearson Edu.
3. Engineering Graphics / K R Mohan / Dhanpat Rai.

COMPUTER PROGRAMMING

I-B.Tech.-I-Sem **L T P C**
Subject Code: 17EC1105ES **3 1 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12
CO1	write simple programs using C language	3	3	2	2
CO2	design structured programs using functions	3	3	2	2
CO3	develop programs using arrays, strings and pointers	3	3	2	2
CO4	construct programs for heterogeneous data	3	3	2	2
CO5	implement various file operations in C programming	3	3	2	2

UNIT – I

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Program Development, algorithms and flowcharts. Introduction to C Language – Background, C Programs, Identifiers, Types, Variables, Constants, Input / Output, Operators(Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements- Selection Statements(making decisions) – if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping – break, continue, goto, Simple C Program examples.

UNIT – II

Functions-Designing Structured Programs, Functions, user defined functions, inter function communication, Standard functions, Scope, Storage classes-auto, register, static, extern, scoperules, type qualifiers, recursion- recursive functions, Limitations of recursion, example Cprograms.
Arrays – Concepts, using arrays in C, inter function communication, array applications- linearsearch, binary search and bubble sort, two – dimensional arrays, multidimensional arrays, C program examples.

UNIT – III

Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, Pointer Applications-Arrays and Pointers, Pointer Arithmetic and arrays, Passing an array to a function, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions.
Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

UNIT – IV

Enumerated, Structure and Union Types – The Type Definition (typedef), Enumerated types, Structures –Declaration, initialization, accessing structures, operations on structures, Complex structures-Nested structures, structures containing arrays, structures containing pointers, arrays of structures, structures and functions, Passing structures through pointers, self referential structures, unions, bit fields, C programming examples, command–line arguments, Pre processor commands.

UNIT – V

Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions (fseek ,rewind and ftell), C program examples.

Text Books:

1. Computer Science: A Structured Programming Approach Using C, B. A. Forouzan andR. F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh , Second Edition, Oxford UniversityPress.

Reference Books:

1. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, SecondEdition, Pearsoneducation.
2. Programming with C, B. Gottfried, 3rdedition, Schaum's outlines, McGraw HillEducation (India) Pvt Ltd.
3. C From Theory to Practice, G S. Tselikis and N D. Tselikas, CRCPress.
4. Basic computation and Programming with C, Subrata Saha and S. Mukherjee,Cambridge UniversityPress.

ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

I-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC1106HS **0 0 3 2**

The **Language Lab** focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO5	PO10
CO1	apply the sounds of English for proper pronunciation	3	3
CO2	use the right accent and intonation in formal and informal situations	3	3
CO3	distinguish and neutralize various accents for intelligibility	3	3
CO4	develop speaking and listening skills through audio-visual experiences	3	3
CO5	demonstrate employability skills through various activities	3	3

COMPUTER ASSISTED LANGUAGE LEARNING (CALL) LAB

Exercise – I
Introduction to Phonetics -Speech Sounds -Vowels and Consonants
Minimal Pairs- Consonant Clusters
Past Tense Marker and Plural Marker

Exercise – II
Structure of Syllables
Word Stress-Sentence Stress – Intonation
Basic Rules of Word Accent - Stress Shift

Exercise - III
Errors in Pronunciation-the Influence of Mother Tongue (MTI)
Common Indian Variants in Pronunciation – Differences between British and American Pronunciation

Exercise – IV
Listening for General Details
Listening Comprehension Tests

Exercise – V
Listening for Specific Details
Listening Comprehension Tests

Online Resources for Teaching Listening Skills
Listening for General & Specific Details
www.learnenglishteens.britishcouncil.org
http://learnenglishteens.britishcouncil.org/skills/listening-skills-practice
https://www.skillsyouneed.com/ips/listening-skills.html
https://www.youtube.com/watch?v=qYb0LCqqJbU
https://www.englishlistening.com/
http://esl-lab.com/
http://www.trainyouraccent.com/

Listening Comprehension Test
www.examenglish.com/IELTS/IELTS_listening.html
https://www.englishlistening.com/index.php/listen-to-passages/
www.examenglish.com/TOEFL/toefl_listening.html

INTERACTIVE COMMUNICATION SKILLS (ICS) LAB

Exercise – I
Ice-Breaking Activity - Introducing Oneself and Others
JAM Session

Exercise – II
Situational Dialogues – Greetings – Taking Leave
Role-Play- Expressions in Various Situations
Making Requests and Seeking Permissions
Telephone Etiquette

Exercise – III
Descriptions- Narrations
Giving Directions and Guidelines

Exercise – IV
Public Speaking – Exposure to Structured Talks
Non-verbal Communication
Presentation Skills
Making a Short Speech
Extempore- Making a Presentation

Exercise – V
Group Discussion- Interview Skills
Group Discussion Activity - Mock Interviews

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**
   The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration ii) High Fidelity Headphones

2. **Interactive Communication Skills (ICS) Lab :**

   The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

Lab Manuals:

1) A book entitled "***ELCS Lab Manual – A Workbook for CALL and ICS Lab Activities"*** by Board of Editors: Hyderabad: Orient BlackSwan Pvt. Ltd. 2016.Print.
2) Hart Steve; Nair, Aravind R.; Bhambhani, Veena. **"*EMBARK- English for undergraduates"*** Delhi: Cambridge University Press. 2016. Print.

References:

1. Jayashree Mohanraj. *Let Us Hear Them Speak*. New Delhi: Sage Texts. 2015. Print. Hancock, M. *English Pronunciation in Use. Intermediate Cambridge*: Cambridge University Press. 2009. Print.

COMPUTER PROGRAMMING IN C LAB

I-B.Tech.-I-Sem **L T P C**
Subject Code: 17EC1107ES **0 0 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4
CO1	execute simple programs using C compiler	3
CO2	apply control statements in designing programs	3
CO3	design programs using functions, arrays, strings and pointers	3
CO4	construct programs for heterogeneous data	3
CO5	implement various file operations in C programming	3

Week1: Basics

1. Write a program to print sample strings like “hello world”, “Welcome toC Programming” with different formats using escape sequences.
2. Write a Program to print different data types in „C“ and their ranges.
3. Write a Program to initialize, assignment & printing variables of different datatypes.

Week2: Operators

1. Write a Program to demonstrate arithmetic operators. (+,-,*,/,%)
2. Write a Program to demonstrate logical operators.(logical AND, logical OR)
3. Write a Program to read radius value from the keyboard and calculate the area ofcircle and print the result in both floating and exponential notation.
4. Write a Program to calculate simple interest.
5. Write a Program to convert temperature. (Fahrenheit –Centigrade and vice-versa)

Week3: Operators

1. Write a Program to demonstrate relational operators.(<,>,<=,>=,==,!=)
2. Write a program to check equivalence of two numbers using conditional operator.
3. Write a Program to demonstrate pre increment and post increment.(++a, a++ where a is aValue to be initialized)
4. Write a program for computing the volume of sphere, cone and cylinder assume thatDimensions are integers use type casting where ever necessary.

Week4: Decision Statements

1. Write a Program to read marks of a student in six subjects and print whether pass or fail(Using if-else).
2. Write a Program to calculate roots of quadratic equation (using if-else).
3. Write a Program to calculate electricity bill. Read starting and ending meter reading.

The charges are as follows.
No. of Units Consumed Rate in(Rs)
1-100 1.50 per unit
101-300 2.00 per unit for excess of 100 units
301-500 2.50 per unit for excess of 300 units
501-above 3.25 per unit for excess of 500 units

Week5: Switch operations

1. Write a Program to perform arithmetic operations using switch case.
2. Write a Program to display colors using switch case (VIBGYOR).
3. Write a Program to display vowels and consonants using switch case.
4. Write a Program to display names of days in a Week using switch case.

Week6: Basic Loop operations

Do the Following Programs Using for, while, do-while loops.
1. Write a program to calculate sum of individual digits of a given number.
2. Write a program to check whether given number is palindrome or not.
3. Write a program to print prime numbers in the given range.
4. Write a program to display multiplication tables from 1 to 10 except 3 and 5.

Week7: Advanced loops

1. Write a program to print the Fibonacci series for given „N‟ value.
2. Write a program to check whether a given number is a Fibonacci number or not.
3. Write a program to read 2 numbers x and n then compute the sum of the GeometricProgression. 1+x+ x2+x3+ - - - - - - - +xn
4. Write a program to print the following formats.

1	*
1 2	* *
1 2 3	* * *
1 2 3 4	* * * *

5. Write a C Program to construct pyramid of numbers.

Week8: 1-D arrays

1. Write a program to store 10 elements in the 1-D array and print sum of the array.
2. Write a program to print minimum and maximum elements in the 1-D array.
3. Write a program to count no. of positive numbers, negative numbers and zeros in thearray.
4. Write a program to search the given element by using linear search and binary search.
5. Write a program to sort the given elements using bubble sort technique.

Week9: 2-D arrays

1. Write a program to perform matrix addition
2. Write a program to perform matrix multiplication by checking the compatibility.
3. Write a program to print the transpose of a matrix.

Week10: Functions

1. Write a program to find sum of two numbers using functions.
2. Write a program to find product of two numbers using functions without arguments, without return type.
3. Write a program to find difference of two numbers using functions without arguments, with return type.
4. Write a program to find sum of two numbers using functions with arguments &without return type.
5. Write a program to find product of two numbers using functions with arguments, with return type.

Week11: Functions and Recursion

1. Write a program to swap two numbers using
a) Call By Value B) Call By Reference.
2. Write a program to calculate factorial, gcd using recursion and non-recursionfunctions.
3.Write C program that reads two integers x and n and calls a recursive function to compute x^n
4. Write a C program that reads two integers and calls a recursive function to compute ncr

Week 12: Math Functions and I/O Functions

1. Write a program to read values from keyboard and find the values using abs(),sqrt(),floor(),ceil()and pow().
2. Write a program to read and display a value using getch () and putch().
3. Write a program to read and display a value using getchar(), putchar(),gets() and puts().

Week 13: Strings

1. Write a program to perform various string manipulations using built-in functions.
2. Write a program to print the given strings in ascending order.
3. Write a program to verify the given string is palindrome or not (without built-in functions, with using built-in functions).
4. Write a program to concatenate two strings using arrays

.

Week14: Structures

1. Write a program to create structure for an account holder in a bank with following Fields: name, account number, address, balance and display the details of fiveaccount holders.
2. Write a program to find total marks of individual student and average marks for 10students using structures.
3. Write a program to create structure called traveler and members of structure are train no,coach no, seat no, source ,destination , gender, age, name and departure date.
4. Write a program to illustrate passing an entire structure to a function.
5. Write a C Program to perform addition and multiplication of two complex numbers usingstructures.

Week15: File operations

1. Write a program which copies the contents of one file to another file.
2. Write a program to reverse the first n characters in a file.
3. Write a C program to merge two files into a third file (i.e., the contents of the firs t file followed by those of the second are put in the third file).
4. Write a C program to count the number of times a character occurs in a text file.

Reference Books:

1. Problem Solving and Program Design in C, 4th edition, by jeri R. Hanly and ElliB.Koffman.
2. Programming in C by Pradip Dey, Manas Ghosh 2nd edition Oxford UniversityPress.
3. E.Balaguruswamy, Programming in ANSI C 5th Edition McGraw-Hill
4. A first book of ANSI C by Gray J.Brosin 3rd edition Cengagedelmer Learning India P.Ltd
5.AL Kelly, Iraphol,Programming in C,4th edition Addison-Wesley – Professional
6.Brain W.Kernighan & Dennis Ritchie, C Programming Language, 2nd edition, PHI

BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

I-B.Tech.-I-Sem. **L T P C**
Subject Code:17EC1108ES **0 0 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4
CO1	design electrical circuits to verify circuit laws and network theorems	3
CO2	verify the V-I characteristics of various electronic devices	3
CO3	determine the efficiency of various rectifiers	3
CO4	illustrate the configurations of Bi-polar junction transistor	3
CO5	demonstrate the characteristics of FET and SCR	3

PART A:
ELECTRICAL & ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions)

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Bread Boards,
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, Power Transistors, LED's, LCD's, SCR.
3. Study and operation of
   - Multimeters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO.

PART B:
(For Laboratory examination list of experiments – Minimum of 10 experiments to be conducted)

PART-1 ELECTRICAL LAB

1. Verification of KVL & KCL.
2. Verification of Superposition and Reciprocity theorems.
3. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
4. Experimental determination of Thevenin's Theorem equivalent circuits and verification by direct test.
5. Experimental determination of Norton's Theorem equivalent circuits and verification by direct test.

PART-2 ELECTRONICS LAB

6. Forward and reverse bias characteristics of PN-Junction Diode.
7. Zenor diode V-I characteristics and Zenor diode as voltage regulator.
8. Half wave rectifier with & without filters.
9. Full wave rectifier with & without filters.
10. Input & output characteristics of Transistor in CB/CE configuration.
11. FET Characteristics.
12. SCR Characteristics.

Equipment required for Laboratory:

1. Regulated Power supplies (RPS) : 0-30 V
2. CRO's: 0-20 MHz
3. Function Generators: 0-1 MHz
4. Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital) : 0-20 µA, 0-50µA, 0-100µA, 0-200µA,10mA,20 mA
8. Voltmeters (Analog or Digital) : 0-30V,0-50V,
9. Electronic Components: Resistors, Capacitors, BJTs, SCRs, FETs, LEDs, Diodes-Ge & Si type, Transistors – NPN, PNP type

NATIONAL SERVICE SCHEME (NSS) / PHYSICAL EDUCATION / YOGA MANDATORY COURSE (NON-CRIDIT)

I-B.Tech.-I-Sem. **L T P C**
Subject Code: 17AC1109MC **0 0 2 -**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO3	PO6	PO8	PO9	PO12
CO1	harness physical literacy and lifelong engagement	3	3	3	3	3
CO2	use aesthetic appreciation	2	1	2	3	3
CO3	build competence and confidence to face challenges	1	2	1	3	3
CO4	develop Sports related values and attitudes	3	3	2	2	3
CO5	follow appropriate etiquette and sports	1	1	2	3	3

Aim of NSS Programme: The programme aims to inculcate social welfare in students, and to provide service to society without bias. NSS volunteers work to ensure that everyone who is needy gets help to enhance their standard of living and lead a life of dignity. In doing so, volunteers learn from people in villages how to lead a good life despite a scarcity of resources. It also provides help in natural and man-made disasters by providing food, clothing and first aid to the disaster victims. The Main Objectives and outcomes are:

S.No.	Name of the Activity	S.No.	Name of the Activity
1	First-aid	9	Anti-Ragging Awareness
2	Blood donation camp	10	Social Activities Awareness
3	Traffic awareness program	11	Cyber Crime
4	Environmental Awareness	12	Digital India
5	Swachh Bharat Abhiyan	13	Substance Abuse Awareness Program (SAAP)
6	Health awareness program	14	Telanganaku Haritha Haram (Sapling Plantation)
7	Fire Safety Awareness	15	Garments / Essential Education Material Collection and distribution
8	Non-formal education		

Aim of Physical Education: The aim of course is to make Physical Education as an integral part of Educational System. Students studying in the colleges should have the benefit of Physical Education to improve their health during the course of college education. It is designed to ensure that on completion of this training they would attain the minimum prescribed standard.

Name of the Individual Event		Name of the Team Event	
S.No.	Event	S.No.	Event
1	Badminton	1	Basketball
2	Gymnastics	2	Football
3	Judo	3	Hockey
4	Swimming	4	Kabaddi
5	Table Tennis	5	Kho –Kho
6	Tennis	6	Volleyball
7	Weight Lifting and Power Lifting	7	Cricket
8	Wrestling	8	Hand ball
9	**Yoga**	9	Throw ball
10	Archery	10	Badminton
11	Body Building	11	Table Tennis
12	Carroms	12	Tennis
13	Chess	13	Swimming
14	Boxing	14	Carroms
15	Taekwondo	15	Taekwondo
16	Fencing	16	Fencing
17	Athletics	17	Athletics

I-B.TECH.-II-SEMESTER SYLLABUS

ENGINEERING MATHEMATICS – II

(Vector Calculus, Fourier Analysis & PDE)

(Common to all Branches)

I-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC1201BS **4 1 0 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	solve ODE by using Laplace transforms	3	2	1
CO2	determine vector field, scalar field, gradient, divergence and curl by using vector differentiation	3	2	1
CO3	solve the line, surface and volume integrals by using vector integration	3	2	1
CO4	find periodic functions in terms of Fourier series and non-periodic functions of Fourier transform	3	2	1
CO5	formulate Partial Differential Equation, solve Linear and non-linear Differential Equations and analyze one dimensional heat and wave equation	3	2	1

Unit I

Laplace Transforms: Laplace transforms of standard functions–Shifting Theorems, Transforms of derivatives and integrals–Unit step function–Dirac delta functionLaplace Transform ofPeriodicFunctions.Inverse Laplace transforms by Partial fractions–Convolution theorem (with proof)-Application of Laplace transforms to ordinary differential equations with constant coefficients

Unit II

Vector Differentiation: Scalar and vector point functions, Gradient, Divergence, Curl and their physical and geometrical interpretation, Laplacian operator, Vector identities.

Unit III

Vector Integration: Line Integral, Work done, Potential function, area, surface and volume integrals, Vector integral theorems: Greens, Stokes and Gauss divergence theorems (without proof) and related problems

Unit IV

Fourier Series and Transformations: Fourier series–even and odd functions–Half-range sine and cosine series, Fourier integral theorem (without proof)–Fourier transforms–sine and cosine transforms–properties–inverse transforms–Finite Fourier transforms
FourierTransformofConvolutionProducts (Without Proof)

Unit V

Partial Differential Equations and Applications: Formation of partial differential equations-by elimination of arbitrary constants and arbitrary functions– solutions of first order linear (Lagrange) equations and nonlinear equations (Four standard types)–Method of Separation of Variables-Applications to wave equation, heat conduction equation in one dimension.

Textbook(s)

1. B.S.Grewal,HigherEngineeringMathematics,42nd Ed.,KhannaPublishers,NewDelhi,2012
2. S.R.K.Iyengar,R.K.Jain,AdvancedEngineeringMathematics,4th Ed.,NarosaPublishingHouse,New Delhi,2014
3. Advanced Engineering Mathematics, V.O.Neil, Cengage Publications

Reference (s)

1. T.K.V.Iyengar, B. Krishna Ghandhi, S. Ranganathan and M.V. S.S.N. Prasad, Engineering Mathematics,12th Ed.,Volume–I,S.ChandPublishers,2014

APPLIED PHYSICS

I-B.Tech.-II-Sem **L T P C**
Subject Code:17EC1202BS **4 1 0 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	analyze the crystal structures and X-ray diffraction techniques	3	2	1
CO2	explain the particle behavior in solids using quantum mechanics and band theory of solids	3	2	1
CO3	outline Dielectric and magnetic properties of materials and their applications	3	2	1
CO4	illustrate principles and applications of lasers and optical fibers	3	2	1
CO5	classify semiconductors & Nano-materials and illustrate functioning of various semiconductor devices	3	2	1

Unit: I

1. Crystallography and Crystal Structures: Space Lattice, Unit Cell, Basis, Lattice parameters, Crystal Systems, Bravais Lattices, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, Diamond Structure, Crystal Planes and Directions, Miller Indices, Inter Planar Spacing of Cubic Crystal Systems.

2. X-ray Diffraction: Basic Principles of **X**-ray Diffraction, Bragg's Law, Laue Method, Powder Method, Applications of X-ray Diffraction.

Unit: II

3. Principles of Quantum Mechanics & Statistical Mechanics : Waves and Particles, De Broglie Hypothesis, Matter Waves, Davisson and Germer's Experiment, Heisenberg's Uncertainty principle, Physical Significance of the Wave Function, Schrodinger's Time -Independent Wave Equation, Particle in One Dimensional Potential Box.

Maxwell – Boltzmann, Bose – Einstein and Fermi – Dirac statistics (Qualitative).

4. Electron theory of Metals: Bloch Theorem (Qualitative), Kronig-Penny Model (Qualitative Treatment), E-K Curve, Origin of Energy Band Formation in Solids, Classification of Materials into Conductors, Semiconductors and insulators, Effective mass of an electron.

Unit: III

5. Dielectric Properties: Basic definitions: Electric dipole, Dipole moment, Permittivity, Dielectric constant, Polarizability, Electric susceptibility, Displacement vector; Electronic Polarization, Ionic Polarization and Orientation Polarization (Qualitative), Internal Fields in Solids, Clausius - Mossotti Equation ,Piezo electricity , Ferro electricity.

6. Magnetic Properties: Basic definitions , Origin of Magnetic moment, Bohr magneton, Classification of Dia, Para and Ferro Magnetic Materials on the basis of Magnetic Moment, Explanation of Hysteresis Curve on the basis of Domain Theory of Ferro magnetism.

Unit IV

7. Lasers: Characteristics of Lasers, Spontaneous and stimulated Emission of Radiation, Einstein's Coefficients, Population Inversion, Lasing Action, Ruby Laser, Helium- Neon Laser, Semiconductor Laser and Applications of Lasers.

8. Fiber Optics: Basic Principles & construction of an Optical Fiber, Acceptance Angle, Numerical Aperture, Types of Optical Fibers, Losses in Optical Fibers, Application of Optical fibers in communication system.

Unit: V

9. Semiconductor Physics: Introduction, Estimation of Position of Fermi Level and Carrier concentration in Intrinsic and Extrinsic (p-type & n-type) Semiconductors, Direct and Indirect Band gap Semiconductors, Hall Effect.

10. Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-Gel, Top-Down Fabrication: Chemical Vapor Deposition, Characterization Techniques (SEM &TEM) and Applications of Nanotechnology.

Text books:

1. Engineering Physics by P K.Palanisamy, Scitech Publishers
2. Modern Engineering Physics by Dr.K.Vijay kumar, Dr.S.Chandralingam, S.Chand & Company LTD.
3. Applied Physics by P.K.Mittal, I K International Publishers.
4. Engineering Physics by Dr. M.Armugam, Anuradha Publication.
5. Applied Physics for Engineers by P.Madhusudana Rao, Academic Publishing Company.

References:

1. Principles of physics by Halliday, Resnick, Walker, Wiley India Pvt Ltd,9thEdition.
2. Introduction to solid state physics by Charles Kittel, Wiley India Pvt Ltd,7thEdition
3. Engineering Physics by R. K. GAUR & S.L.GUPTA, Dhanpat Rai Publications.
4. Solid State Physics by AJ Dekker, Macmillan INDIA LTD.

ENGINEERING CHEMISTRY

I-B.Tech.-II-Sem **L T P C**
Subject Code:17EC1203BS **4 1 0 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	identify the properties of water and various treatment methods	3	2	1
CO2	apply the concepts of electrochemistry and corrosion control	3	2	1
CO3	make use of polymers in domestic and industrial fields	3	2	1
CO4	analyze the quality of fuels used in automobiles, industry and aerospace	3	2	1
CO5	illustrate the properties of various engineering materials	3	2	1

UNIT-I

Water and its treatment: Introduction – hardness of water – causes of hardness – types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Numerical problems. Boiler troubles: Sludges, scales and Caustic embrittlement. Internal treatment of Boiler feed water – Calgon conditioning – Phosphate conditioning – Colloidal conditioning – Softening of water by ion exchange processes. Potable water and its specification- Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and Ozonization Desalination of water – Reverse osmosis.Deflouridation-Nalgonda technique.

UNIT-II

Electrochemistry and Corrosion:

Electrochemistry: Introduction, conductance-specific,equivalent and molar conductance,Electrode-Types of electrodes – Construction and functioning of Standard hydrogen electrode calomel and glass electrode. Nernst equation – electrochemical series and its applications. Electrochemical cells: Daniel cell – cell notation, cell reaction and cell EMF – Numerical problems.

Batteries: Cell and battery – Primary battery (dry cell, alkaline and Lithium cell) and Secondary battery (lead acid, Ni-Cd and lithium ion cell),

Fuel cells: Hydrogen –oxygen and methanol-oxygen fuel cells – Applications.

Corrosion and its Prevention: introduction-theories of corrosion: dry corrosion-wet corrosion-types: galvanic corrosion-concentration cell corrosion-waterline and pitting corrosion-factors influencing rate of corrosion by environment-Corrosion control methods-cathodic protection-metallic coatings: galvanization and tinning.

UNIT-III

Polymers: Definition – Classification of polymers with examples – Types of polymerization – addition(free radical mechanism),Co-Polymerization and condensation polymerization with examples.

Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding). Preparation, properties and engineering applications of PVC and Bakelite.

Fibers: Characteristics of fibers – preparation, properties and applications of Nylon -6, 6 and Dacron. Fiber reinforced plastics (FRP) – Applications.

Rubbers and Elastomers: Natural rubber and its vulcanization – compounding of rubber. – Preparation – properties and applications of Buna-S and Thiokol rubber.

Conducting polymers: Characteristics and Classification with examples – mechanism of conduction in trans- polyacetylene and applications of conducting polymers.

UNIT-IV

ENERGY SOURCES: Fuels: Classification of fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking – moving bed catalytic cracking, Knocking – octane and cetane rating, synthetic petrol-Fischer- Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG. Analysis of Flue gas by using Orsat's apparatus.

Combustion: Definition, Calorific value of fuel – HCV, LCV; Determination of calorific value of solid fuels by using Bomb Calorimeter.

UNIT-V

ENGINEERING MATERIALS:

Cement: Portland cement, its composition, setting and hardening of Portland cement.

Refractories: Classification and characteristics of refractories, properties and application of Refractories.

Lubricants Classification of lubricants with examples – characteristics of a good lubricants-mechanism of lubrication (thick film, thin film and extreme pressure) –properties of lubricants: viscosity cloud point, pour point, flash point and fire point.

Nano materials: Introduction to nano technology,preparation ,properties and applications of carbon nano tubes(CNTs)

Text books:

1) Engineering Chemistry by P.C Jain and M.Jain, Dhanpatrai Publishing Company, New Delhi(2010)
2) Engineering Chemistry by Rama Devi ,Venkata Ramana Reddy and Rath, Cengage learning, New Delhi.(2016)

Reference Books:

1) Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi(2015)
2) Engineering Chemisty by Shashi Chawla, Dhanpatrai and Company (P) Lid. Delhi(2011)

ELECTRIC CIRCUITS & MACHINES

I-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC1204ES **3 1 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	design resonant circuits, network topology and magnetic circuits	3	3	1
CO2	explain the transient response of RLC circuits	3	2	1
CO3	illustrate the two port network parameters and characteristics of filters & attenuators	3	3	1
CO4	analyze the performance of DC generators and DC motors	3	2	1
CO5	evaluate the performance of single phase transformer	3	2	1

UNIT –I: Network Topology and Magnetic circuits
Network Topology:-Network Topology, Terminology, Basic cutest and tie set matrices for planar networks, Illustrative Problems
Resonance Circuits:-Series and parallel resonance circuits, Concept of Quality factor, resonant frequency and band width, Magnetic Circuits, Self and Mutual inductances, co-efficient of coupling.

UNIT –II: Transient Analysis
Transient analysis of RL, RC and RLC Circuits, Circuits with switches, step response, 2nd order series RLC Circuits. Network Analysis using Laplace transform techniques for step excitation.

UNIT -III: Two Port Networks, Filters and Attenuators
Two port network parameters: Z, Y, h and ABCD parameters.Inter connection of two port networks.
Filters and Attenuators: Classification of filters, characteristic impedance in pass band and stop bands. Constant-K LP, HP, BP and BE filters. Design of symmetrical Attenuators

UNIT - IV: D.C. Generators and DC Motors:
Principle of operation of DC Machines- EMF equation – Types of generators – characteristics of DC generators,DC Motors – Types of DC Motors – Characteristics of DC motors - Losses and efficiency – Swinburne's test – Speed control of DC shunt motor.

UNIT-V: Single PhaseTransformers & Performance:
Principle of operation of single phase transformer – types – Constructional features – Phasor diagram on No Load and Load – Equivalent circuit, Losses and Efficiency of transformer and Regulation – OC and SC tests,(Simple Problems).

Text Books

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
2. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition, 1999.
3. Circuit Thoery (Analysis and synthesis) - A. Chakrabarti, Dhanpat Rai&co (Pvt) Ltd 7th Ed,2015
4. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.

References

1. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, MGH, 5th Edition, 1993.
2. Network Analysis and Synthesis – N.C.Jagan and C.Lakshminarayana, B.S. Publications, 2004.
3. Electric Circuits – J.Edminister and M.Nahvi – Schaum's Outlines, TMH, 1999.
4. Network Theory – Sudhakar and Shyam Mohan, TMH.
5. Principles of Electrical Engineering - V.K Mehta, S.Chand Publications.

DATA STRUCTURES THROUGH C

I-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC1205ES **3 1 - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12
CO1	classify different data structures to design efficient programs	3	3	2	2
CO2	identify appropriate sorting and searching techniques	3	2	2	2
CO3	illustrate operations and applications of linear data structures	3	3	2	2
CO4	explain various concepts of non-linear data structures	3	3	2	2
CO5	choose an appropriate hashing technique for a given problem	3	3	2	2

UNIT – I

INTRODUCTION TO DATA STRUCTURES, SEARCHING AND SORTING: Basic concepts: Introduction to data structures, classification of data structures, operations on data structures, abstract data type, algorithms, different approaches to design an algorithm, recursive algorithms; Searching techniques: Linear search, binary search and Fibonacci search; Sorting techniques: Bubble sort, selection sort, insertion sort, quick sort, merge sort, and comparison of sorting algorithms.

UNIT – II

LINEAR DATA STRUCTURES: Primitive operations, implementation of stacks using Arrays, applications of stacks arithmetic expression conversion and evaluation; Queues: Primitive operations; Implementation of queues using Array, applications of linear queue, circular queue and double ended queue (deque).

UNIT – III

LINKED LISTS: Linked lists: Introduction, singly linked list, representation of a linked list in memory, operations on a single linked list; Applications of linked lists: Polynomial representation and sparse matrix manipulation.Types of linked lists: Circular linked lists, doubly linked lists;linked list representation and operations of Stack, linked list representation and operations of queue.

UNIT – IV

NON LINEAR DATA STRUCTURES: Trees: Basic concept, binary tree, binary tree representation, array and linked representations, binary tree traversal, binary search tree, tree variants, application of trees; Graphs: Basic concept, graph terminology, graph implementation, graph traversals, Application of graphs, Priority Queue.

UNIT – V

BINARY TREES AND HASHING: Binary search trees: Binary search trees, properties and operations; Balanced search trees: AVL trees; Introduction to M-Way search trees, B trees; Hashing and collision: Introduction, hash tables, hash functions, collisions, applications of hashing.

Text Books:

1. Mark A. Weiss, “Data Structures and Algorithm Analysis in C”, Pearson, 2nd Edition, 1996.
2. Ellis Horowitz, Satraj Sahni, Susan Anderson Freed, “Fundamentals of Data Structures in C”, Universities Press, 2nd Edition, 2008.

Reference Books:

1. Reema Thareja, “Data Structures using C”, Oxford University Press, 2nd Edition, 2014.
2. S. Lipschutz, “Data Structures”, Tata McGraw Hill Education, 1st Edition, 2008.
3. D. Samanta, “Classic Data Structures”, PHI Learning, 2nd Edition, 2004.

APPLIED PHYSICS / ENGINEERING CHEMISTRY LAB

I -B.Tech.-II-Sem **L T P C**
Subject Code: 17EC1206BS **0 0 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4
CO1	identify modulus of elastic materials , determine the characteristics & applications of LED and SOLAR CELL, find the energy gap of a semiconductor and analyze the wavelength of laser source	3
CO2	demonstrate the resonance of LCR circuit, determine Time Constant of RC circuit & find variation of the magnetic field and determine losses in optical fiber	3
CO3	determine the hardness, viscosity and pH of various samples	3
CO4	synthesize the drug used in pharmaceutical industry	3
CO5	estimate the strength of solutions and amount of coloured solutions	3

List of Engineering Physics Lab Experiments: (Any 08 experiments compulsory)

1. To determine the Rigidity modulus of a wire - Torsional pendulum.
2. Study the characteristics of LED and LASER Diode.
3. Verify the characteristics of a Solar Cell.
4. Determination of wavelengths of a LASER source-Diffraction Grating.
5. Bending Losses of Fibers & Evaluation of numerical aperture of given fiber.
6. Energy gap of a semiconductor diode.
7. Determination of Resonance frequency of an LCR circuit.
8. To calculate the Time constant of an R-C Circuit.
9. Determination of frequency of an Electronic Vibrator – Melde's Exp.
10. Magnetic field along the axis of current carrying coil-Stewart and Gee's method.
11. Newton's Rings-Radius of curvature of Plano convex lens.
12. Dispersive power of the material of a prism – Spectrometer.

Laboratory Manual:

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)
2. Solar photo voltaic – Technology Fundamentals system: A manual for Technics, Trainers & Engineers.

List of Engineering Chemistry Lab Experiments: (Any 08 experiments compulsory)

I) Volumetric Analysis:

1. Estimation of Ferrous ion by Permanganometry.
2. Estimation of Ferrous and ferric ions in a given mixture by Dichrometry.
3. Estimation of hardness of water by Complexometric method using EDTA
4. Estimation of copper by Iodometry.
5. Estimation of percentage of purity of Mno_2 in pyrolusite.

II) Instrumental methods of Analysis:

Conductometry:

6. Estimation of HCl by Conductometry.
7. Estimation of HCl and Acetic acid in a given mixture by Conductometry.

Potentiometry:

8. Estimation of HCl by potentiometry.

Colorimetry:

9. Estimation of manganese in $KMnO_4$ by colorimetric method

p^Hmeter:

10. Estimation of HCl by p^H meter.

Physical property:

11. Determination of viscosity of oil by redwood / Oswald's Viscometer.

Preparations:

12. Preparation of Aspirin.

Laboratory Manual:

1. Vogel's Text Book of quantitative chemical Analysis, 5th Edition(2015) G.H.Jeffery,J.Bassett, J.Mendham and R.C.Denney.
2. A text Book on experiments and calculations in Engineering Chemistry by S.S. DaraS.chand&company Ltd., Delhi(2003).

DATA STRUCTURES THROUGH C LAB

I-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC1207ES **- - 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4
CO1	implement various searching and sorting techniques	3
CO2	demonstrate basic operations of stack and queues using arrays and linked lists	3
CO3	apply stack data structure to solve various computing problems	3
CO4	demonstrate and apply different methods for traversing graphs	3
CO5	construct binary search tree	3

WEEK-1: SEARCHING TECHNIQUES

Write C programs for implementing the following searching techniques.

a. Linear search.
b. Binary search.
c. Fibonacci search.

WEEK-2: SORTING TECHNIQUES

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

a. Bubble sort.
b. Insertion sort.
c. Selection sort.

WEEK-3: SORTING TECHNIQUES

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

a. Quick sort.
b. Merge sort.

WEEK-4: IMPLEMENTATION OF STACK AND QUEUE

Write C programs to

a. Design and implement Stack and its operations using Arrays.
b. Design and implement Queue and its operations using Arrays.

WEEK-5: APPLICATIONS OF STACK

Write C programs for the following:

a. Uses Stack operations to convert infix expression into postfix expression.
b. Uses Stack operations for evaluating the postfix expression.

WEEK-6: IMPLEMENTATION OF SINGLE LINKED LIST

Write a C program that uses functions to perform the following operations on single linked list.
(i) Creation (ii) insertion (iii) deletion (iv) traversal

WEEK-7: IMPLEMENTATION OF CIRCULAR SINGLE LINKED LIST

Write a C program that uses functions to perform the following operations on Circular linked list.
(i) Creation (ii) insertion (iii) deletion (iv) traversal

WEEK-8: IMPLEMENTATION OF DOUBLE LINKED LIST

Write a C program that uses functions to perform the following operations on double linked list.
(i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways.

WEEK-9: IMPLEMENTATION OF STACK USING LINKED LIST

Write a C program to implement stack using linked list.

WEEK-10: IMPLEMENTATION OF QUEUE USING LINKED LIST

Write a C program to implement queue using linked list.

WEEK-11: GRAPH TRAVERSAL TECHNIQUES

Write C programs to implement the following graph traversal algorithms:
a. Depth first search.
b. Breadth first search.

WEEK-12: IMPLEMENTATION OF BINARY SEARCH TREE

Write a C program that uses functions to perform the following:
a. Create a binary search tree.
b. Traverse the above binary search tree recursively in pre-order, post-order and in-order.
c. Count the number of nodes in the binary search tree.

Reference Books:

1. Kernighan Brian W, Dennis M. Ritchie, "The C Programming Language", Prentice Hall of India, Re-Print, 2008.
2. Balagurusamy E, "Programming in ANSI C", Tata Mc Graw Hill, 6th Edition, 2008.
3. Gottfried Byron, "Schaum's Outline of Programming with C", Tata Mc Graw Hill, 1st Edition, 2010.
4. Lipschutz Seymour, " Data Structures Schaum's Outlines Series", Tata Mc Graw Hill, 3rd Edition, 2014
5. Horowitz Ellis, Satraj Sahni, Susan Anderson, Freed, "Fundamentals of Data Structures in C", W. H.Freeman Company, 2nd Edition, 2011.

IT & ENGINEERING WORKSHOP

I-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC1208ES **0 0 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO5	PO9	PO10
CO1	install and make use of operating systems and MS office tools	3	3	2	2
CO2	configure fire walls and trouble shoot network connections	3	3	2	2
CO3	apply safety norms while handling the workshop equipment	3	1	3	2
CO4	prepare required models using various engineering trades	3	1	3	2
CO5	make use of various power tools	3	1	3	2

LIST OF EXPERIMENTS

Part A- IT Workshop

Week-1: WINDOWS OPERATING SYSTEM & DRIVERS INSTALLATION
Windows 7, Windows 8 and Windows 10. LAN, graphics, audio, video and command prompt, commands.

Week-2: NETWORK CONNECTIONS & TROUBLESHOOTING
IP configurations, connecting devices in LAN through bridge, hub, switch; Wi-Fi, Li-Fi and Bluetooth settings; Crimping: Crossover, strait over.
Hardware, troubleshoots, software troubleshooting.

Week-3: Cyber Hygiene: Introduction to Virus, worms, threats. Threats on internet, Configure the Systems to be internet safe, Install antivirus, personal firewall, block pop-ups, block active x downloads.

Week-4: MS WORD
Prepare the project document and resume.

Week-5 : MS EXCEL
Spreadsheet basics, modifying worksheets, formatting cells, formulas and functions, sorting and filtering, charts.

Week-6: MS POWER POINT
Power point screen, working with slides, add content, work with text, working with tables, graphics, slide animation, reordering slides, adding sound to a presentation.

Part B- Engineering Workshop

Week-7: HOUSE WIRING
Power point, light fitting and switches.

Week-8 & 9: CARPENTRY
Study of tools and joints; Practice in planning, chiseling, marking and sawing; Joints: Cross joint, T joint, Dove tail joint.

Week-10,11&12:FITTING
Study of tools, practice in filing, cutting, drilling and tapping; Male and female joints, stepped joints.

Week-13 & 14: Tin Smithy & Black Smithy
Tin smithy:-Preparation of Open scoop, Cylinder, square/rectangular tray, **Black Smithy**:-S-Hook, Square /Hexagonal headed bolt.

Week 15: Demonstration of Power Tools: - Bench drilling machine, hand drilling machine, power hacksaw, grinding machine and wood cutting machine.

TEXT BOOKS:

1. PeterNorton,―IntroductiontoComputers,TataMcGrawHillPublishers,6th Edition,2010.
2. ScottMuller,Que,-UpgradingandRepairing‖,PearsonEducation,PC‘s18th Edition,2009.
3. Microsoft Office 2016 Step by Step (Microsoft)
4. H.S.Bawa,-Workshop Practice‖, Tata McGraw Hill Publishing Company Limited, NewDelhi, 2nd Edition, 2007.

MICRO PROJECT
(MANDATORY NON-CREDIT COURSE)

I-B.Tech.-II-Sem. **L T P C**
Subject Code: 17AC1209MC **0 0 2 -**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1 to PO14
CO1	select problem and evaluate	3
CO2	review the literature related to the problem	3
CO3	implement principles of science and Engineering	3
CO4	analyze the problem	3
CO5	present the essence of project work	3

EVALUATION OF MICRO PROJECT:

1. The student has to select one suitable topic in consultation with course counselor /advisor and get it approved and register with the Head of the Department.
2. The project is evaluated for 30 marks for internal and 70 marks forexternal.
3. The students shall be required to submit the rough draft of the project before the commencement of first mid examination.
4. Faculty shall make suggestions for modification in the rough draft.
5. Two copies of the final report should be submitted by the student within a weekthereafter.
6. Presentation schedules will be prepared by Department in line with the academiccalendar.

Guidelines for preparation and presentation of Micro Project:

Thereportshouldbe prepared in the prescribed format which is available with concerned course advisor/counselor. Similarly a 15 minutes power point presentation in a prescribed format should be given.

The evaluation of the Micro Project is based upon the following.

S.No	Description	Internal	External
1.	Content Covered	05 Marks	10 Marks
2.	Technicality involved	05 Marks	10 Marks
3.	Report quality	05 Marks	10 Marks
4.	Summary and findings	05 Marks	10 Marks
5.	PPT presentation	10 Marks	30 Marks
	Total	**30 Marks**	**70 Marks**

II-B.TECH.-I-SEMESTER SYLLABUS

COMPLEX ANALYSIS AND NUMERICAL METHODS

II-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC2101BS **4 0 0 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	analyze the complex functions with reference to their analyticity	3	2	1
CO2	expand complex functions using Taylor's, Laurent's and Residue theorems	3	2	1
CO3	evaluate improper integrals and bilinear transformation by using complex variables	3	2	1
CO4	solve transcendental, linear and non-linear system of equations using numerical methods	3	2	1
CO5	find the numerical solutions for first order initial value problems and integrals	3	2	1

UNIT-I

Functions of a complex variable: Introduction, Continuity, Differentiability, Analyticity, properties, Cauchy, Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions, Milney -Thompson method

UNIT-II

Complex integration: Line integral, Cauchy's integral theorem, Cauchy's integral formula, and Generalized Cauchy's integral formula.

Power series: Taylor's series- Laurent series, Singular points, isolated singular points, pole of order m – essential singularity, Residue, Cauchy Residue theorem (With proof)

UNIT- III

Evaluation of Integrals: Types of real integrals

a) Improper real integrals $\int_{-\infty}^{\infty} f(x)$ dx, (b) $\int_{c}^{c+2\pi} f(cos\theta, sin\theta)d\theta$
b) Bilinear transformation – fixed point- cross ratio – properties- invariance of circles

UNIT-IV

Algebraic and transcendental Equations & Curve Fitting: Introduction, Bisection Method, Method of Flase position, Iteration methods: fixed point iteration and Newton Raphson methods. Solving linear system of equations by Gauss Jacobi's, Gauss-Seidal Methods.

CurveFitting: Fitting a linear, second degree, exponential, power curve by method of least squares.

UNIT-V

Numerical Integration and solution of Ordinary Differential equations: Trapezoidal rule-Simpson's $1/3^{rd}$ and $3/8^{th}$ rule.

Solution of ordinary differential equations: Taylor's series, Picard's method of successive approximations, Euler's method, Runge-Kutta method (second and fourth order)

Text Books:

1. A first course in complex analysis with applications by Dennis G.Zill and Patric shanahan, Johns and Bartlett Publishers.
2. Higher Engineering Mathematics by Dr.B.S.Grewal, Khanna Publishers.
3. Complex Variables and Applications by James Ward Brown,Ruel V.Churchill
4. Numerical Methods for Scientific and Engineering Computation by M.K.Jain, S.R.K.Iyengar and R.K.Jain, New Age International Publishers.

References:

1. Fundamentals of Complex Analysis by Saff, E.B. and A.D. Snider , Pearson.
2. Advanced Engineering Mathematics by Louis C. Barrett, McGraw Hill.
3. Introductory Methods of Numerical Analysis by S.S.Sastry, PHI Learning Pvt. Ltd.

PROBABILITY THEORY & STOCHASTIC PROCESSES

II-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC2102BS **4 0 0 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12	PO13
CO1	apply the concepts of probability and random variables	3	3	2	3
CO2	evaluate the distribution and density functions of single random variables	3	3	2	3
CO3	solve the problems related to multiple random variables	3	3	2	3
CO4	analyze the stochastic process and its temporal characteristics	3	3	2	3
CO5	outline the spectral characteristics of stochastic process	3	3	2	3

UNIT-I:
Probability and Random Variable
Probability: Probability introduced through Sets and Relative Frequency, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events.
Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables

UNIT -II:
Distribution & Density Functions and Operation on One Random Variable – Expectations
Distribution & Density Functions: Distribution and Density functions and their Properties - Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh and Conditional Distribution, Methods of defining Conditional Event, Conditional Density, Properties.
Operation on One Random Variable – Expectations: Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

UNIT-III:
Multiple Random Variables and Operations
Multiple Random Variables: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem (Proof not expected), Unequal Distribution, Equal Distributions.
Operations on Multiple Random Variables: Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-IV:
Stochastic Processes – Temporal Characteristics: The Stochastic Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence, First-Order Stationary Processes, Second-Order and Wide-Sense Stationarity, Nth Order and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance and its Properties, Linear System Response of Mean and Mean-squared Value, Autocorrelation Function, Cross-Correlation Functions, Gaussian Random Processes, Poisson Random Process.

UNIT-V:

Stochastic Processes – Spectral Characteristics: Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Spectral Density of Input and Output of a Linear System.

Text Books:

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, 4Ed., 2001, TMH.
2. Probability and Random Processes – Scott Miller, Donald Childers, 2 Ed, Elsevier, 2012.

Reference Books:

1. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai, 4thEd., TMH.
2. Theory of Probability and Stochastic Processes- Pradip Kumar Gosh, University Press
3. Probability and Random Processes with Application to Signal Processing – Henry Stark and John W. Woods, 3rd Ed., PE
4. Probability Methods of Signal and System Analysis - George R. Cooper, Clave D. MC Gillem, 3rd Ed., 1999, Oxford.
5. Statistical Theory of Communication - S.P. Eugene Xavier, 1997, New Age Publications.

ANALOG ELECTRONICS

II-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC2103PC **4 0 0 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12	PO13
CO1	analyze single stage amplifiers at low frequencies	3	3	2	2	3
CO2	design multistage amplifiers at high frequencies using transistors	3	3	2	2	3
CO3	illustrate feedback amplifiers and oscillators	3	3	2	2	3
CO4	examine the power and tuned amplifiers	3	3	2	2	3
CO5	interpret various FET Amplifiers	3	3	2	2	3

UNIT – I:
DESIGN AND ANALYSIS OF SMALL SIGNAL LOW FREQUENCY BJT AMPLIFIERS
BJT Hybrid model, Determination of h-parameters from transistor characteristics, Analysis of CE, CB and CC configurations using h-parameters
Classification of Amplifiers – Distortion in amplifiers, Analysis of CE, CC, and CB Amplifiers and CE Amplifier with emitter resistance, miller's theorem and its dual, Design of single stage RC coupled amplifier

UNIT – II:
BJT AT HIGH FREQUENCIES: Frequency response of BJT amplifier – Analysis at high frequencies, The Hybrid- pi (π) – Common Emitter transistor model, CE short circuit current gain, current gain with resistive load, single stage CE transistor amplifier response, Gain-bandwidth product.

MULTISTAGE AMPLIFIERS: Low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors. Different coupling schemes used in amplifiers, Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair.

UNIT –III:
FEEDBACK AMPLIFIERS: Classification of amplifiers, Concepts of feedback – Classification of feedback amplifiers – General characteristics of negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

OSCILLATORS: Condition for oscillations. RC and LC type Oscillators – Frequency and amplitude stability of oscillators – Generalized analysis of LC oscillators, Quartz, Hartley, and Colpitts Oscillators – RC-phase shift and Wien-bridge oscillators.

UNIT – IV:
LARGE SIGNAL AMPLIFIERS: Class A Power Amplifier- series fed and Transformer Coupled Amplifier, class –B power amplifier-Push Pull and Complimentary Symmetry Amplifier, Class AB Power Amplifier – Principle of operation of class –C Amplifier, Transistor Power Dissipation, Heat Sinks.

UNIT – V:
FET AMPLIFIERS: Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOS Amplifiers, MOSFET Characteristics in Enhancement and Depletion mode, MOS Small signal model, Common source amplifier with resistive load.

TUNED AMPLIFIERS: Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading single Tuned amplifiers on Bandwidth, Effect of Cascading Double Tuned amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned amplifiers

Text Books:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, TMH
2. Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
3. Electronic Devices and Circuits, S.Salivahanan, N.Suresh Kumar, A Vallvaraj, 2nd Edition, TMH.

References:

1. Introductory Electronic Devices and Circuits (Conventional flow version) – Robert T. Paynter, 7th Edition, 2009, PEI.
2. Microelectronic Circuits – Sedra / Smith – 5th Edition – Oxford, 2009
3. Electronic Circuit Analysis – K. Lal Kishore, BS Publications, 2004.
4. Electronic Devices and Circuits, Anil.K. Maini, Varsha Agrawal, 1st Edition, WILEY.
5. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson Education.
6. Electronic Devices and Circuits – 2nd Edition by Muhammad H.Rashid,Cengage Learning

SIGNALS AND SYSTEMS

II-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC2104PC **3 1 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12	PO13
CO1	interpret various types of signals and systems	3	3	2	3
CO2	analyze the signals in frequency domain using Fourier Transform and Sampling	3	3	2	3
CO3	apply the mathematical modelling to LTI systems for processing signals	3	3	3	3
CO4	determine the convolution and correlation on various signals	3	3	2	3
CO5	evaluate the response of the systems using Laplace and Z-transforms	3	3	3	3

UNIT - I:
Signal Analysis and Fourier Series
Signal Analysis: Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.
Fourier Series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

UNIT - II:
Fourier Transforms and Sampling
Fourier Transforms: Deriving Fourier Transform from Fourier Series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.
Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Typers of Sampling - Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT - III:
Signal Transmission Through Linear Systems: Linear System, Impulse response, Response of a Linear System, Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI system, Filter characteristics of Linear Systems, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and Rise time.

UNIT - IV:
Convolution and Correlation of Signals: Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation of functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem, Power density spectrum, Relation between Auto Correlation function and Energy/Power spectral density function, Relation between Convolution and Correlation, Detection of periodic signals in the presence of Noise by Correlation, Extraction of signal from noise by filtering.

UNIT - V:
Laplace Transforms and Z-Transforms
Laplace Transforms: Review of Laplace Transforms (L.T), Partial fraction expansion, Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Constraints on ROC for various classes of signals, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.
Z–Transforms: Fundamental difference between Continuous and Discrete time signals, Discrete time

signal representation using Complex exponential and Sinusoidal components, Periodicity of Discrete time signal using complex exponential signal, Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

Text Books:

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2nd Ed., PHI.

Reference Books:

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2ndEd.
2. Signals and Signals – Iyer and K. Satya Prasad, Cengage Learning
3. Signals and Systems – A.Rama Krishna Rao – 2008, TMH.
4. Introduction to Signal and System Analysis – K.Gopalan 2009, Cengage Learning.
5. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition.
6. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, 3rd Ed., 2004, PE.

SWITCHING THEORY AND LOGIC DESIGN

II-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC2105PC **3 0 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12	PO13
CO1	interpret number systems and boolean algebra	3	3	2	2	3
CO2	solve boolean expressions and analyze combinational circuits	3	3	3	3	3
CO3	construct small combinational circuits & sequential logic circuits	3	3	3	3	3
CO4	design sequential circuits for registers and counter	3	3	3	3	3
CO5	differentiate melay and moore models and to minimize completely and incompletely specified sequential machines	3	3	3	3	3

UNIT-I:

Number System and Boolean Algebra: Review of number systems, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes.

Boolean Algebra: Basic Theorems and Properties, Switching Functions, Canonical and Standard Forms, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT-II:

Minimization and Design of Combinational Circuits – I: Introduction, The Minimization of switching function using theorems, The Karnaugh Map Method-Upto Five Variable Maps, Don't Care Map Entries, Tabular Method, Design of Combinational Logic: Adders, Subtractors, comparators, Multiplexers, Demultiplexers, Decoders, Encoders and Code converters.

UNIT-III:

Design of Combinational Circuits – II and Sequential Circuits – I: Design of ROM, PLA, PAL. Basic Architectural Distinctions between Combinational and Sequential circuits, The Binary Cell, Fundamentals of Sequential Machine Operation, Latches, Flip Flops: SR, JK, Race Around Condition in JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Design of a Clocked Flip-Flop , Timing and Triggering Consideration, Clock Skew.

UNIT-IV:

Design of Sequential Circuits - II: Conversion from one type of Flip-Flop to another. Registers and Counters**,** Shift Registers, Operation of Shift Registers, Bidirectional Shift Registers, Applications of Shift Registers, Design and Operation of Ring and Twisted Ring Counter, Operation Of Asynchronous and Synchronous Counters. Design of Synchronous Modulo N –Counter.

UNIT-V:

Sequential Circuits - III: Introduction, State Diagram, State table, Analysis of Synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Synthesis of Synchronous Sequential Circuits, Sequence Detector, Parity-bit Generator.

Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques.

TEXT BOOKS:

1. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 3rdEdition, Cambridge.
2. Switching Theory and Logic Design – A Anand Kumar, PHI,2013.

REFERENCE BOOKS:

1. Digital Design- Morris Mano, PHI, 3rd Edition.
2. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed,John Wiley & Sons Inc.
3. Digital Fundamentals – A Systems Approach – Thomas L. Floyd, Pearson, 2013.
4. Digital Logic Design - Ye Brian and HoldsWorth, Elsevier
5. Fundamentals of Logic Design- Charles H. Roth, Cengage LEanring, 5th, Edition, 2004.
6. DigitalLogic Applications and Design- John M. Yarbrough, Thomson Publications, 2006.
7. Digital Logic and State Machine Design – Comer, 3rd, Oxford, 2013.

ANALOG ELECTRONICS LAB

II-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC2106PC **0 0 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	design and analyze the transistor amplifier circuits	3	3	3
CO2	design and analyze the FET amplifiers	3	3	3
CO3	Design and analyze the feedback amplifiers	3	3	3
CO4	Design and analyze the Oscillators	3	3	3
CO5	Design and analyze the large signal amplifiers	3	3	3

List of Experiments (Sixteen experiments to be done):
Design Hardware (any six) and Simulation (any Ten) using Multisim or Pspice or Equivalent Simulation Software:

1. Common Emitter Amplifier
2. Common Base Amplifier
3. Common Collector Amplifier
4. Common Source amplifier
5. Two Stage RC Coupled Amplifier
6. Current Shunt and Voltage Series Feedback Amplifier
7. Cascode Amplifier
8. Wien Bridge Oscillator using Transistors
9. RC Phase Shift Oscillator using Transistors
10. Class A Power Amplifier (Transformer less)
11. Class B Complementary Symmetry Amplifier
12. Hartley and Colpitt's Oscillator
13. Single Tuned Voltage Amplifier
14. Darlington Pair

Equipments required for Laboratories:

1. For software simulation of Electronic circuits
   i) Computer Systems with latest specifications
   ii) Connected in LAN (Optional)
   iii) Operating system (Windows XP)
   iv) Simulations software (Multisim / TINAPRO) Package

2. For Hardware simulations of Electronic Circuits
   i) RPSs
   ii) CROs
   iii) Functions Generators
   iv) Multimeters
   v) Components

BASIC SIMULATION LAB

II-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC2107PC **0 0 3 2**

Note:

- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 15 experiment are to be completed

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	interpret various types of MATLAB tools	3	3	3
CO2	solve different signals and perform different operations on signals	3	3	3
CO3	analyze convolution, correlation between signals and sequences	3	3	3
CO4	examine the stability of the system using S-plane and Z-plane	3	3	3
CO5	identify signals in the presence of noise and find energy and power spectral density	3	3	3

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its physical realiazability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Finding the Laplace Transform of continuous signals.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Sampling Theorem Verification.
15. Removal of noise by Autocorrelation / Cross correlation.
16. Extraction of Periodic Signal masked by noise using Correlation.
17. Verification of Weiner-Khinchine Relations.
18. Checking a Random Process for Stationarity in Wide sense.

ELECTRIC CIRCUITS & MACHINES LAB

II-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC2108ES **0 0 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	design the two port network parameters	3	3	3
CO2	evaluate the different resonance circuits	3	3	3
CO3	analyze of different testing methods & speed control of DC machines	3	3	3
CO4	examine different testing methods of AC machines	3	3	3
CO5	outline the characteristics & efficiency of transformer	3	3	3

LIST OF EXPERIMENTS

PART-A: NETWORK LAB

1. Two port Network parameters- Z-Y Parameters, Chain Matrix and analytical verification
2. Two port Network Parameters h and ABCD parameters.
3. Time Response of first order RC/RL Network for a periodic non- sinusoidal inputs- Time constant and steady state error determination
4. Series and parallel resonance circuits- Timing, Resonant frequency, Band width and Q-factor determination for RLC network.

PART-B: MACHINES LAB

5. Brake Test on DC Shunt Motor. (To draw the performance curves)
6. Swinburne's Test on DC Shunt motor (Pre-Determination of efficiency of a machine when working as generator and motor).
7. Magnetization characteristics of DC shunt Generator. To determine the critical speed and critical resistance.
8. OC & SC Test on Single phase transformer (Determination of efficiency and voltage regulation at a given power factor).
9. Load Test on 1-ph Transformer.
10. Speed control of dc shunt motor.
11. Load test on DC shunt generator.

Note: - Any 10 Experiments should be conducted

ENVIRONMENTAL SCIENCE AND TECHNOLOGY
MANDATORY COURSE (NON-CREDIT)

II-B.Tech.-I-Sem. **L T P C**

Subject Code: 17HS2109MC **3 0 0 -**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO6	PO7	PO12
CO1	identify the role of ecosystem for livelihood	3	3	3	2
CO2	interpret methods to sustain environmental resources	3	3	3	2
CO3	outline bio-diversity and its relevance to ecological balance	3	3	3	2
CO4	explain laws and legislations on environmental protection	3	3	3	3
CO5	evaluate technologies for achieving sustainable development	3	3	3	2

UNIT I: Ecosystem

Introduction to ecosystem: Definition, Scope and Importance; Classification of ecosystem; Structure and functions of ecosystem food chain, food web, ecological energetic, eco-pyramids, carrying capacity); Biogeochemical cycles (Carbon and Nitrogen Cycles), flow of energy; Institutions (BNHS, BVIEER, ZSI, BSI) Environment movement in India (MedhaPatkar, SundarlalBahuguna, Indira Gandhi, Rachael Carson).

Biotic and abiotic components–Case studies of forest/aquatic/desert ecosystem.

UNIT II: Natural Resources

Renewable and Non–renewable resources–Importance, uses, classification of natural resources(i) forest: deforestation, timber extraction & conservation (ii) water: conflicts over water, dams –benefits &effects; use and over exploitation of water resources , floods, droughts (iii) mineral :use and exploitation, effects on mining, (iv) energy resources: growing needs, renewable and non renewable energy sources, use of alternative energy (v) land resources: land degradation, landslides, soil erosion and desertification; role of an individual in conservation of natural resources and equitable use.

UNIT III: Biodiversity

Definition and levels of biodiversity, Values of biodiversity Bio– geographical classification of India; hot spots of biodiversity; India as a mega diversity nation; Threats to biodiversity; Endangered and endemic species of India; Conservation of biodiversity: In–situ and Ex–situ conservation; Case studies on conservation of biodiversity. National biodiversity Act.

UNIT IV: Environmental Pollution & Control Technologies:

Types of environmental pollution; **Air pollution**: major air pollutants, sources ,effects, control measures , National Air Quality Standards. Water pollution :,sources,impacts & control technologies-STP, ETP,watershed management,rain water harvesting, Water Quality standards. Soil pollution: sources, causes & impacts on modern agriculture. Noise pollution.Solid waste Management-causes,effects and control measures; E-waste. Disaster management (floods and cyclones); **Global Environmental Issues and Treaties**: Global warming, ozone layer depletion. International protocol: earth summit, Kyoto protocol and Montreal protocol. Population Explosion

UNIT V: Environmental Acts , EIA & Sustainable Development :

Environment Protection Acts: Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act and Forest Conservation Act, Environment (Protection) Act, 1986. Handling rules of biomedical waste,municipal waste & hazardous waste. EIA: conceptual facts, base line data acquisition, EIS, EMP, Technology and Environmental Impact. **Sustainable development**-causes & threats, strategies for achieving sustainable development; Environmental Ethics and economics; CDM and concept of green building, life cycle assessment(LCA); Ecological foot print; low carbon life style; carbon sequestration; crazy consumerism; urban sprawl. **Role of Information Technology** in Environment- Remote Sensing,GIS,Environmental Modeling

Textbooks:

1. Erach Bharucha (2005), textbook of environmental studies for UG, Universities press, Hyderabad.
2. Environmental Science by Y. Anjaneyulu, B S Publications(2004)
3. Environmental studies by Rajagopalan R (2009), Oxford University Press, New Delhi.

References:

1. Environmental Science and Technology by M. Anji Reddy(2007), B.S Publications,
2. Perspectives in Environmental Science by Anubha Kaushik (2006), 3rd edition ,New ageInternational Publications
3. Environmental Studies by Anubha Kaushik (2006), 4th edition ,New age International Publications

ANALYTICAL SKILLS
MANDATORY COURSE (NON-CREDIT)

II-B.Tech.-I-Sem. **L T P C**

Subject Code:17BS2110MC **0 0 2 -**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	apply operations like searching, insertion, deletion, traversing mechanism etc. on various data structures	3	3
CO2	apply measurement techniques to data collection and utilize their innovative thinking skills to project themselves for finding fresh approaches towards tribulations	3	3
CO3	use the skills for effective communication	3	3
CO4	identify different types of arguments as well as their premises and conclusions	3	3
CO5	demonstrate the mathematical reasoning, including the ability to prove simple results and/or make statistical inferences	3	3

UNIT-I

Data Interpretation: Introduction to Data Interpretation, quantitative and qualitative data, Tabular Data, Line Graphs, Bar Chart, Pie Charts, X-Y Charts.

UNIT-II

Reasoning: Number Series, Letter Series, Series completion, Coding and Decoding,

UNIT-III

Verbal Analogy: Classifications, Word analogy-Applied analogy, verbal classification.

UNIT-IV

Reasoning Logical Diagrams: Simple Diagrammatic Relationship, Multi diagrammatic relationship, Venn-diagramms, Analytical reasoning.

UNIT-V

Reasoning Ability: Blood Relations, Seating arrangements, Directions, Decision making.

TEXT BOOKS:

1. GL Barrons, Mc Graw Hills, Thorpe's verbal reasoning, LSAT Materials
2. R S Agarwal, S.Chand, 'A modern approach to Logical reasoning'
3. Verbal and non verbal Reasoning by S.Aggarwal
4. Analytical Reasoning by M.K.Pandey

II-B.TECH.-II-SEMESTER SYLLABUS

PULSE & DIGITAL CIRCUITS

II-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC2201PC **3 1 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO12	PO13
CO1	design of linear wave shaping circuits for various applications	3	3	2	3
CO2	construct nonlinear wave shaping circuits	3	3	2	3
CO3	demonstrate the switching characteristics of diode and transistor	3	3	2	3
CO4	design and analyze multi-vibrator circuits and time-base generators	3	3	2	3
CO5	develop circuits using the concepts of sampling gates and logic families	3	3	2	3

UNIT-I
LINEAR WAVE SHAPING: High pass, low pass RC circuits, their Response for Sinusoidal, Step, Pulse, Square, and Ramp inputs. High pass RC Network as Differentiator and Low pass RC circuit as an integrator, Attenuators and its application as a CRO, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT–II
NON-LINEAR WAVE SHAPING: Diode clippers, Transistor clippers, clipping at two independent levels, Comparators, Applications of Voltage Comparators, clamping operation, Clamping Circuit taking Source and Diode Resistances into account, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Synchronized Clamping.

UNIT–III
STEADY STATE SWITCHING CHARACTERISTICS OF DEVICES: Diode as a switch, Piece Wise Linear Diode Characteristics, Diode Switching Times, Transistor Acts As a Switch, Breakdown Voltages, transistor in saturation, temperature variation of saturation parameters, transistor-switching times.

UNIT – IV
MULTIVIBRATORS: Design and Analysis of Bistable , Monostable and Astable Multivibrators, and Schmitt Trigger using Transistors
TIME BASE GENERATORS General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators, methods of linearity improvement

UNIT–V
Sampling Gates: Basic operating principles of sampling gates, unidirectional and bi-directional sampling gates, four diode sampling gate, reduction of pedestal in gate circuits.
Realization of Logic Gates Using Diodes and Transistors: AND,OR,NOT gates using Diodes and Transistors, DCTL,RTL,DTL,TTL and CML logic families and their comparisons.

TEXT BOOKS:
1. Jacob Millman, Herbert Taub, Mothiki S. Prakash Rao (2008), *Pulse, Digital and Switching Waveforms*, 3rd edition, Tata McGraw Hill, New Delhi.
2. Solid state pulse circuits---David A Bell,4 th ed.2002.PHI

REFERENCE BOOKS:
1. David A. Bell (2002), *Solid state pulse circuits*, 4th edition, Prentice Hall of India, New Delhi, India.
2. Anand Kumar (2005), *Pulse and Digital Circuits*, Prentice Hall of India, India.

ANALOG COMMUNICATIONS

II-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC2202PC **4 0 0 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12	PO13
CO1	explain various amplitude modulation techniques	3	3	2	2	3
CO2	distinguish SSB and VSB Modulations	3	3	2	2	3
CO3	outline the angle modulation and demodulation schemes	3	3	2	2	3
CO4	identify various noise sources and their effects on analog modulation techniques	3	3	3	2	3
CO5	design AM and FM receivers and also acquire knowledge of generation and demodulation of PAM, PWM, PPM	3	3	3	2	3

UNIT I

AMPLITUDE MODULATION: Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector, Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop.

UNIT II

SSB MODULATION: Introduction to Hilbert Transform, Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT III

ANGLE MODULATION: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM.

UNIT IV

NOISE: Resistive Noise Source (Thermal), Arbitrary Noise Sources, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties

Noise in Analog communication System, Noise in DSB and SSB System Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis and de-emphasis.

UNIT V

RECEIVERS: Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

PULSE MODULATION: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation and demodulation of PWM, PPM, Generation and demodulation of PPM, Time Divison Multiplexing.

TextBooks

1. Communication Systems by Simon Haykins John Wiley &Sons , 4th Edition.
2. Electronic Communications – Dennis Roddy and John Coolean , 4th Edition , PEA, 2004
3. Communication Systems – B.P. Lathi, BS Publication , 2004.
4. Electronics & Communication System – George Kennedy and Bernard Davis , TMH 2004.

ReferenceBooks

1. Electronic Communication Systems – Modulation and Transmission - Robert J. Schoenbeck, 2nd Edition, PHI.
2. Analog and Digital Communications – Simon Haykin, John Wiley, 2005.
3. Analog and Digital Communication – K. Sam Shanmugam, Willey ,2005
4. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5th Edition,2009,PHI.

ELECTRO MAGNETIC THEORY & TRANSMISSION LINES

II-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC2203PC **4 1 0 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12	PO13
CO1	illustrate the concepts of electric fields	3	2	2	3
CO2	outline the characteristics of electromagnetic fields using Maxwell's equations	3	2	2	3
CO3	explain EM wave characteristics	3	3	2	3
CO4	summarize the fundamental concepts of transmission line theory	3	3	2	3
CO5	analyze transmission lines using smith chart or classical theory	3	3	2	3

UNIT–I:
Electrostatics: Co-ordinate Systems and Transformations.Coulomb's Law, Electric Field Intensity; Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems.
Convection and Conduction Currents, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Boundary Conditions for Dielectric-Dielectric and Dielectric-Conductor, Illustrative Problems.

UNIT–II:
Magnetostatics: Introduction, Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Illustrative Problems.
Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms, Conditions at the Boundary Surface : Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems .

UNIT–III:
EM Wave Characteristics - I: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Conductors & Dielectrics – Characterization, Wave Propagation in Lossless and Conducting Media ,Wave Propagation in Good Conductors and Good Dielectrics, Polarization, Illustrative Problems.
EM Wave Characteristics – II: Reflection and Refraction of Plane Waves: – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Theorem – Applications, Illustrative Problems.

UNIT–IV:
Transmission Lines - I: Types of transmission lines, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortionlessness and Minimum Attenuation, Loading - Types of Loading, Illustrative Problems.

UNIT–V:
Transmission Lines – II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; λ/4, λ/2, λ/8 Lines – Impedance Transformations, Significance of Z_{min} and Z_{max} , Smith Chart – Configuration and Applications, Stub Matching, Illustrative Problems.

Text Books:

1. Principles of Electromagnetics – Matthew N.O. Sadiku and S.V. Kulkarni, 6th Ed., Oxford University Press, Asian Edition, 2015.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, 2nd Ed., 2000, PHI.
3. Transmission Lines and Networks –Umesh Sinha, Satya Prakashan, 2001, (Tech. India Publications), New Delhi.

Reference Books:

1. Engineering Electromagnetics – Nathan Ida, 2nd Ed., 2005, Springer (India) Pvt. Ltd., New Delhi.
2. Networks, Lines and Fields – John D. Ryder, 2nd Ed., 1999, PHI.
3. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, 7th Ed., 2006, TMH.

DIGITAL DESIGN THROUGH VERILOG HDL

II-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC2204PC **4 0 0 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO12	PO13
CO1	explain the basic concept of verilog hardware description languages (HDL)	3	2	2	3
CO2	outline the gate and switch level modelsof digital circuits	3	3	3	3
CO3	make use of behavioral level of digital circuits	3	3	3	3
CO4	design combinational circuits	3	2	2	3
CO5	conostruct sequential circuits	3	2	2	3

UNIT I: **Basics of Verilog HDL:** Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools. Language Constructs and Conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators.

UNIT II:Gate and SwitchLevel Modeling: Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives. Switch Level Modeling**:** Basic Transistor Switches, CMOS Switch, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays.

UNIT III: Behavioral Modeling: Introduction, Operations and Assignments, Functional Bifurcation, Initial Construct, Always Construct, Assignments with Delays, Wait construct, Multiple Always Blocks, Designs at Behavioral Level, Blocking and Non-Blocking Assignments, The case statement, Simulation Flow i*f* and i*f*-else constructs, Assign-De-Assign construct, Repeat construct, for loop, the Disable construct, While loop, Forever loop, Parallel Blocks, Force-Release construct, Event.

UNIT IV: Combinational System Design: Documentation standards, Circuit timings, Adders, Subtractors, Exclusive OR gates, Decoders, Encoders, Multiplexers, Comparators,

UNIT -V: Sequential System Design: Design of Latches and flip flops-SR, JK, D, T. Design of Shift Registers, BCD Counter, Ripple Counter, Mod-8 Counter.

Text Books:

1. T.R. Padmanabhan, B. Bala Tripura Sundari, Design through Verilog HDL –, Wiley, 2009.
2. John F. Wakerly, Digital Design Principles and Practices Pearson, 4nd Edition.

Reference Books:

1. Fundamentals of Logic Design – Charles H. Roth, Jr. 5th Edition
2. Fundamentals of Logic Design with Verilog Design– Stephen. Brown and Zvonko Vranesic, TMH, 2nd Edition 2010.
3. Verilog HDL – Samir Palnitkar, 2nd Edition, Pearson Education, 2009. 4.Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2009

FINANCIAL ANALYSIS, MANAGEMENT & ECONOMICS

II-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC2205HS **3 0 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO11	PO12
CO1	analyze financial performance of an enterprise using final accounts and ratio	3	2
CO2	apply principles of management in professional career	3	2
CO3	make use of principles of economics for decision making	3	2
CO4	identify business environment and laws of demand	2	3
CO5	solve problems in the areas of production, cost, price and markets	3	3

UNIT - I

Introduction to Financial Statement Analysis:

Types & Objectives of Business Enterprises, Conventional & Non Conventional Sources of Financing Business Enterprise.

Identification of Financial Statement Formats-Manufacturing A/c, Trading A/c, Profit & Loss A/c, Balance Sheet.

Techniques of Analysing Financial Statements: Analysis & Interpretation through Liquidity, Leverage, Coverage, Activity, Turnover, Profitability Ratios-Simple Problems on Liquidity, Leverage and Activity Ratios.

UNIT - II

Introduction of Management Concepts:

Concept, Origin, Growth, Nature, Characteristics, Scope and Principles of Management.

Functions of Management: Planning, Organising, Staffing, Directing, Coordinating, Reporting and Budgeting.

Scientific Management- FW Taylor Contributions to Management

Modern Management- Henry Fayol Contributions to Management

Human Relations Approach to Management: Theories of Motivation and Leadership

UNIT - III

Functional areas of Management:

Production Management: Systems of Production, PPC functions & Plant Layout.

Financial Management: Objectives, Goals, & Functions of Financial Management.

Marketing Management: Recent Trends in Marketing & Marketing Mix.

Human Resources Management: Nature, Objectives, Scope & Functions of HR Management.

UNIT - IV

Introduction to Managerial Economics & Business Environment:

Definition, Nature, Scope and Functions Managerial Economics, Difference between Micro & Macro Economics-

Internal & External Scanning of Business Environment,

Importance of National Income, Inflation, Deflation, Stagflation, Business Cycle & Product Life Cycle Concepts.

Concept & Law of Demand, Factors Influencing and Limitations.

Concept of Elasticity of Demand, Types of Elasticity, Methods of Measuring Elasticity.

Introduction to Demand Forecasting, Objectives, Scope, Types and Methods.

UNIT –V

Theory of Production, Cost, Price & Markets:

Production Function, Assumptions, Limitations & Types

Cost Concepts, Cost-Output Relationship, Break Even Analysis Assumptions, Limitations &Applications(Simple Problems).

Theory of Pricing, Objectives, Situations & Types.

Introductions Markets, Demand-Supply Schedule for Equilibrium Price, Nature & Types of Competition.

Note: Student also expected to attempt following projects as a part of assignment

Project-1: Submission of a report on Recent Economic Policy Reforms in view of demonetization, IT & GST

Project-2: Submission of a report on financial performance of any listed public limited company either through its website or through website of nse.org or bse.org

Project-3: Submission of a report by visiting any organization to observe how management functions are carried out.

Text Books:

1. Varshney, Maheswari (2003), Managerial Economics, Sultan Chand, New Delhi,India.
2. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2004.

Reference Books:

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI, 2005
2. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005 Thomas N.Duening & John M.Ivancevich Management—Principles and Guidelines, Biztantra, 2003.
3. Ambrish Gupta (2004), Financial Accounting for Management, Pearson Education, New Delhi, India.
4. DomnickSalvatore(2011),ManagerialEconomicsinaGlobalEconomy,7th edition,Oxford University Press, United States of America.
5. Narayanaswamy (2005), Financial Accounting, A Managerial Perspective, Prentice Hall of India private Ltd, New Delhi,India.
6. Aryasri (2005), Managerial Economics and Financial Analysis, 2nd edition, Tata McGraw Hill, New Delhi,India

PULSE & DIGITAL CIRCUITS LAB

II-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC2206PC **0 0 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	design linear and non linear wave shaping circuits	3	3	3
CO2	analyze multivibrators and its applications	3	3	3
CO3	create oscillations and sweep signals using UJT and Boot strap circuits	3	3	3
CO4	illustrate the switching characteristics of transistor	3	3	3
CO5	demonstrate the operation of logic gates and sampling gates	3	3	3

Note: Minimum Twelve experiments to be conducted:

1. Linearwave Shaping
   a. RC Low Pass Circuit for different time constants
   b. RC High Pass Circuit for different time constants
2. Non-linear wave shaping
   a. Transfer characteristics and response of Clippers:
      i) Positive and Negative Clippers
      ii) Clipping at two independent levels
   b. The steady state output waveform of clampers for a square wave input
      i) Positive and Negative Clampers
      ii) Clamping at different reference voltage
3. Comparison Operation of different types of Comparators
4. Switching characteristics of a transistor
5. Design a Bistable Multivibrator and draw its waveforms
6. Design an Astable Multivibrator and draw its waveforms
7. Design a Monostable Multivibrator and draw its waveforms
8. Response of Schmitt Trigger circuit for loop gain less than and greater than one
9. UJT relaxation oscillator
10. The output- voltage waveform of Boot strap sweep circuit
11. The output- voltage waveform of Miller sweep circuit
12. Pulse Synchronization of An Astable circuit
13. Response of a transistor Current sweep circuit
14. Sampling gates
    a. Response of Unidirectional gate
    b. Response of Bidirectional gate using transistors
15. Study of logic gates

ANALOG COMMUNICATIONS LAB

II-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC2207PC **0 0 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	design Amplitude Modulation and Demodulation circuits	3	3	3
CO2	analyze Frequency Modulation and Demodulation circuits	3	3	3
CO3	construct AM and FM signals using Spectrum analyzer	3	3	3
CO4	illustrate the Communication system using Multiplexing techniques	3	3	3
CO5	demonstrate the operation of Pulse Modulation and Demodulation circuit	3	3	3

Note:

- Minimum 12 experiments should be conducted:
- All these experiments are to be simulated first either using MATLAB, Comsim or any other simulation package and then to be realized in hardware

LIST OF EXPERIENTS

1. Amplitude modulation and demodulation.
2. DSB-SC Modulator & Detector
3. SSB-SC Modulator & Detector (Phase Shift Method)
4. Frequency modulation and demodulation.
5. Study of spectrum analyzer and analysis of AM and FM Signals
6. Pre-emphasis & de-emphasis.
7. Time Division Multiplexing & De multiplexing
8. Frequency Division Multiplexing & De multiplexing
9. Verification of Sampling Theorem
10. Pulse Amplitude Modulation & Demodulation
11. Pulse Width Modulation & Demodulation
12. Pulse Position Modulation & Demodulation
13. Frequency Synthesizer.
14. AGC Characteristics.
15. PLL as FM Demodulator

DIGITAL DESIGN THROUGH VERILOG HDL LAB

II-B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC2208PC **0 0 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	examine basic logic gates	3	3	3
CO2	implement boolean functions using universal gates	3	3	3
CO3	construct various combinational logic circuits	3	3	3
CO4	analyze the operation of flip-flops	3	3	3
CO5	design registers and counters using flip-flops	3	3	3

Note:

- Programming can be done using any compiler. Download the programs on FPGA / CPLD boards and performance can be verified.
- Minimum of **10** experiment are to be completed from **Part-A** & Minimum of **04** experiment are to be completed from **Part-B**

PART -A

Combinational Circuit Design

1. Design of basic Gates and universal gates
2. Design of Half-Adder, Full Adder, Half Substractor, Full Substractor.
3. Design of 8:1 Mux and 1: 8 demux
4. Design of 3:8 Decoder .
5. Design of 8:3 Priority Encoder.
6. Design of 4 Bit Binary to Grey code Converter.
7. Design of 4 Bit Binary to BCD Converter.
8. Design an 8 Bit parity generator
9. Design of N bit comparator.
10. Design of Arithmetic Logical Unit (ALU) using Verilog HDL.
11. Design of XOR gate by using NMOS inverter
12. Design of Tri state buffer

PART -B

Sequential Circuit Design

13. Design of all 1 bit memory elements (SR, JK ,D,T flip flops)
14. Design of 8-Bit Shift Register with shift Right, shift Left, Load and Synchronous reset.
15. Design of Synchronous 8-bit ring Counter.
16. Design of counters (MOD 5 & MOD 8).
17. Design a decimal up/down counter by using case construct that counts up from 00 to 99 or down from 99 to 00.
18. Design of Finite state machine

GENDER SENSITIZATION LAB
MANDATORY COURSE (NON-CREDIT)

II-B.Tech.-II-Sem. **L T P C**
Subject Code: 17HS2209MC **0 0 2 -**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO9	PO12
CO1	identify gender issues in contemporary India	2	3
CO2	explain gender roles, spectrum, relationships etc	3	2
CO3	analyze gender issues related to sexual harassment and violence	3	3
CO4	assess gender and human rights	3	3
CO5	adapt to the societal need to end prejudices and achieve gender equality	2	3

Unit I

UNDERSTANDING GENDER: **Gender: Why Should We Study It? (Towards a World of Equals: Unit -1**)
Socialization: Making Women, Making Men (Towards a World of Equals: Unit -2)
Introduction.Preparing for Womanhood.Growing up Male.First lessons in Caste. Different Masculinities.
Just Relationships: Being Together as Equals (Towards a World of Equals: Unit -12)
Mary Kom and onler tiler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers, Further Reading: Rosa Parks-The Brave Heart.

Unit II

GENDER AND BIOLOGY: Missing Women: Sex Selection and Its Consequences (Towards a World of Equals: Unit -4) Declining Sex Ratio.Demographic Consequences. Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit -10) Two or Many?Struggles with Discrimination. Additional Reading: Our Bodies, Our Health (Towards a World of Equals:Unit -13)

Unit III

GENDER AND LABOUR: Housework: the Invisible Labour (Towards a World of Equals: Unit -3) "MyMother doesn't Work." "Share the Load." Women's Work: Its Politics and Economics (Towards aWorld of Equals: Unit -7) Fact and Fiction.Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

Unit IV

ISSUES OF VIOLENCE: Sexual Harassment: Say Nol (Towards a World of Equals: Unit -6) Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment - Further Reading: "Chupulu". Domestic Violence: Speaking Out (Towards a World of Equals: Unit -8) Is Home a Safe Place? -When Women Unite [Film). Rebuilding Lives. Further Reading: New Forums for Justice. Thinking about Sexual Violence (Towards a World of Equals: Unit -11) Blaming the Victim-"I Fought for my Life...." - Further Reading: The Caste Face of Violence.

Unit V

GENDER STUDIES: **Knowledge**: Through the Lens of Gender (Towards a World of Equals: Unit -5) Point of View.Gender and the Structure of Knowledge. Further Reading: Unacknowledged Women Artists o Telangana. Whose History? Questions for Historians and Others (Towards a World of Equals: Unit -9) Reclaiminga Past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

References:

1. Agnes. Flavia. My Story … Our Story of Re-building Broken Lives. Delhi: Forum Against Oppression of Woment (FAOW), 1988. 2nd Edition. Print
2. Brady. Judy 'I want a wife,' Literature for Composition: Essays. Faction, Poetry and Drama. Ed. Sylvan Barnet. Morton Berman. Willam Burto and Marcia Stubbs. 3rd Edition. New York: HarperCollins Customs Books, 1971. Available online at: http://www.columbia. Edu/~sss31/rainbow/wife.html.Web.
3. NCERT History Textbook for Class IX. Ch 8: Clothing .
4. Roy, Rahul.A Little Book on Men. New Delhi: Yoda Books, 2007
5. Sen. Amartya. " More than One Million Women are Missing." New Yark Review of Books 37.20 (20 December 1990) . Print
6. Vimala. " Vantillu (The Kitchen). Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Thanru and K Lalita. Delhi: Oxford University Press. 1995. 599-601. Print.
7. Sen, Arnartya. 'More than One Million Women are Missing." New York Review of Books 37.20 (20 December 1990). Print. We Were Making History..' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.
8. Tripti Lahiri. "By the Numbers: Where Indian Women Work." Women's Studies Journal (14 November 2012) Available online at: http:// blogs.wsj.com/ India real time/2012111/14/by - thenumbers-where-Indian-women-work/>
9. K. Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada http://harpercollins.co.in/BookDetail.aso?Book Code=3732

VERBAL ABILITY
MANDATORY COURSE (NON-CREDIT)

II-B.Tech.-II-Sem. **L T P C**
Subject Code: 17HS2210MC **0 0 2 -**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	recall grammatical and basic sentence structures for communication	3	3
CO2	list out various vocabulary forms and improve verbal ability	3	3
CO3	use sentence structures without errors	3	3
CO4	apply the sentence structure for effective paraphrasing	3	3
CO5	demonstrate effective verbal skills	3	3

UNIT I
Grammar Fundamentals
Basic Sentence Structure
Parts of Speech

- The Noun
- The Adjective
- Articles
- Pronouns
- The Verb
- The Adverb
- The Preposition
- The Conjunction
- The Interjection

UNIT II
Synonyms and Antonyms
Homonyms and Homophones,
Word Formation,
Idioms and Phrases,
Analogy
One-word Substitutes.

UNIT III
Integrated Grammar Exercises on Common Errors, Vocabulary Enhancement, Using a dictionary

UNIT IV
Paragraph writing, Essay writing, Letter Writing, E-mail Writing, Picture Description

UNIT V
Sentence Equivalence, Text Completion, Comparison and Parallelism

Activities
1. Regular practice tests.
2. Quiz, Crossword, Word-search and related activities.
3. Picture Description including Description of Photos / Images / Posters / Advertisement Analysis etc.,

Text Books
1. Contemporary English Grammar Structure and Compositionby David Green.
2. Text for Communication Skills – Current English for Colleges by N Krishnaswamy and T.Sriram..

III-B.TECH.-I-SEMESTER SYLLABUS

LINEAR AND DIGITAL IC APPLICATIONS

III-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC3101PC **4 - - 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO12	PO13
CO1	describe various stages of operational amplifier	3	2	2	3
CO2	design active filters, PLL and 555 timers	3	3	2	3
CO3	analyze various ADCs and DACs	3	3	2	3
CO4	construct various combinational circuits using IC's	3	3	2	3
CO5	build various sequential circuits using IC's	3	3	2	3

UNIT – I: OPERATIONAL AMPLIFIER:

Ideal and Practical Op-Amp, Op-Amp Characteristics-DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation -inverting, Non-inverting, Differential, instrumentation Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, introductionto Voltage Regulators, Features of 723 Regulator, Three Terminal VoltageRegulators.

UNIT –II: OP-AMP, IC-555 & IC 565 APPLICATIONS:

Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of1st order LPF & HPF Butterworth Filters, Waveform Generators- Triangular, Saw tooth, Square Wave,IC555 Timer - Functional Diagram, Monostable andAstable Operations, Applications, IC565 PLL — Block Schematic, Description of individual Blocks, Applications.

UNIT-III: DATA CONVERTERS:

Introduction, Basic DAC techniques, Different types ofDACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC,Different Types of ADCs - Parallel Comparator Type ADC, Counter TypeADC, Successive Approximation ADC and Dual Slope ADC, DAC and AD Specifications.

UNIT-IV: DIGITAL INTEGRATED CIRCUITS:

Classification of integrated Circuits, Comparison of Various Logic families, Combinational Logic ICs- Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs, Code Converters, Decoders, Demultiplexers,LED & LCD Decoders with drivers Encoders, Priority Encoders, Multiplexers, Magnitude Comparators.

UNIT-V: SEQUENTIAL LOGIC IC'S:

Familiarity with commonly available 74XX & CMOS 40XX Series ICs- RS, JK, JK Master - Slave, D and T Type Flip-Flops & their Conversions, Synchronous & Asynchronous Counters, Decade Counters, Shift Registers & Applications.

Text Books:

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005.

References:

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Op Amps and Linear Integrated Circuits-Concepts and Applications James M. Fiore,Cengage Learning/ Jaico, 2009.
3. Operational Amplifiers with Linear Integrated Circuits by K. Lal Kishore – Pearson, 2009.
4. Linear Integrated Circuits and Applications – Salivahanan, MC Graw Hill Education.

DIGITAL COMMUNICATIONS

III-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC3102PC **4 - - 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO8	PO12	PO13
CO1	explain various elements of communication systems & pulse code modulation	3	3	2	2	3
CO2	analyze digital modulation techniques & data transmission	3	3	3	2	3
CO3	discuss information theory	3	3	3	2	3
CO4	illustrate different error control codes	3	3	2	2	3
CO5	demonstrate spread spectrum modulation	3	3	2	2	3

UNIT- I

Elements of Digital Communication Systems: Model of Digital Communication Systems, Digital Representation of Analog Signal, Certain Issues in Digital Transmission, Advantages of Digital Communication Systems, Sampling Theorem, Types of Sampling – Impulse Sampling, Natural Sampling, Flat–Top Sampling. Introduction to Base band Sampling.
Pulse Code Modulation: PCM Generation and Reconstruction, Quantization Noise, Non Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

UNIT- II

Digital Modulation Techniques: Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK and M-ary systems.
Data Transmission: Base band signal receiver, probability of error, theoptimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, QPSK and FSK

UNIT- III

Information Theory: Discrete messages, concept of amount of information and its properties. Average information, entropy and its properties.Information rate, mutual information and its properties. Source coding: Shannon‘s theorem, Shanon-Fano coding and Huffman coding. Efficiency calculations, channel capacity of discrete and analog channels, capacity of a Gaussian channel and band width – S/N trade off

UNIT- IV

Error Control Codes
Linear Block Codes: Matrix Description of Linear Block Codes, Error Detection and Error Correction Capabilities of Linear Block Codes.
Cyclic Codes: Structure, Encoding, Syndrome Calculation, Decoding.
Convolution Codes: Encoding, Decoding using State, Tree and Trellis Diagrams, Decoding using Viterbi Algorithm, Comparison of Error Rates in Coded and Uncoded Transmission.

UNIT- V

Spread Spectrum Modulation: Use of Spread Spectrum, Direct Sequence Spread (DSSS), and Code Division Multiple Access, Ranging using DSSS, Frequency Hopping Spread Spectrum, PN - Sequence: Generation and characteristics, Synchronization in Spread Spectrum Systems

Text Books:

1. Principles of Communication Systems - Herbert Taub, Donald L Schiling, GoutamSaha, 3rd Edition, Mcgraw-Hill, 2008.
2. Digital and Analog Communication Systems – Sam Shanmugam, John Wiley, 2005.

3. Communications system, S. Haykin, Wiley, 4 edition 2009.
4. Digital Communication – Simon Haykin, John Wiley, 2005

References:

1. Digital Communications – John G. Proakis , Masoud Salehi – 5th Edition, Mcgraw-Hill, 2008.
2. Digital Communications – Ian A. Glover, Peter M. Grant, 2nd Edition, Pearson Edu., 2008.
3. Communication Systems – B.P. Lathi, BS Publication, 2006.

CONTROL SYSTEMS

III-B.Tech.-I-Sem. **L T P C**
Subject code 17EC3103PC **3 1 - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	explain mathematical models of control systems in continuous time	3	3	2
CO2	determine the transient and steady state performances of a control system	3	3	2
CO3	analyze the stability by using R-H criterion and root-locus concepts	3	3	2
CO4	evaluate the stability analysis in frequency domain	3	3	2
CO5	examine the controllability and observability of a system	3	3	2

UNIT – I
Introduction: Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations - Impulse Response and transfer functions - Translational and Rotational mechanical systems.
Transfer Function Representation: Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples - Block diagram algebra – Representation by Signal flow graph - Reduction using mason's gain formula.

UNIT-II
Time Response Analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems – Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems

UNIT – III
Stability Analysis: The concept of stability - Routh stability criterion – qualitative stability and conditional stability. Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.
Frequency Response Analysis: Introduction, Frequency domain specifications-Bode Diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain Margin-Stability Analysis from Bode Plots.

UNIT – IV
Stability Analysis in Frequency Domain: Polar Plots, Nyquist Plots and applications of Nyquist criterion to find the stability - Effects of adding poles and zeros to G(s)H(s) on the shape of the Nyquist diagrams. Classical Control Design Techniques: Compensation techniques – Lag, Lead, and Lead Lag Controllers design in frequency Domain, PID Controllers.

UNIT –V
State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Concepts of observability and controllability, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties.

Text Books:
1. Control Systems Engineering,I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2009
2. Automatic Control Systems,B. C. Kuo, John Wiley and sons, 8th edition, 2003.

References:
1. Control Systems,N. K. Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
2. Control Systems Engineering,NISE, John wiley, 6th Edition, 2011.
3. Modern Control Engineering‖,K. Ogata, Prentice Hall, 4th Edition, 2003

ANTENNA AND WAVE PROPAGATION

III-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC3104PC **4 - - 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO12	PO13
CO1	explain the radiation of electromagnetic waves from antennas	3	3	2	3
CO2	explain the Characteristics antennas at VHF and UHF	3	3	2	3
CO3	design antennas at VHF and UHF	3	3	3	3
CO4	analyze antenna arrays and measure antenna parameters	3	3	3	3
CO5	identify the characteristics and effects on Radio Wave Propagation	3	3	2	3

UNIT -I

Antenna Basics: Introduction, Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height, Illustrative Problems. Fields from Oscillating Dipole, Field Zones, Front - to-back Ratio, Antenna Theorems, Radiation, Retarded Potentials – Helmholtz Theorem
Thin Linear Wire Antennas: Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area and Effective Height, Illustrative Problems.
Loop Antennas: Introduction, Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small Loops (Qualitative Treatment).

UNIT -II

VHF, UHF and Microwave Antennas - I: Arrays with Parasitic Elements, Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas – Helical Geometry, Helix Modes, Practical Design Considerations for Monofilar Helical Antenna in Axial and Normal Modes, Horn Antennas – Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns, Illustrative Problems.

UNIT -III

VHF, UHF and Microwave Antennas - II: Microstrip Antennas – Introduction, Features, Advantages and Limitations, Rectangular PatchAntennas – Geometry and Parameters, Characteristics of Microstrip Antennas. Reflector Antennas –Introduction, Flat Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, Reflector Types – Related Features, Illustrative Problems

UNIT -IV

Antenna Arrays: Point Sources – Definition, Patterns, arrays of 2 Isotropic Sources - Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Nonuniform Amplitude Distributions – General Considerations and Binomial Arrays, Illustrative Problems.
Antenna Measurements: Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods).

UNIT -V

Wave Propagation – I: Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts, Ground Wave Propagation (Qualitative Treatment) – Introduction, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections. Space Wave Propagation – Introduction, Field Strength Variation with Distance

and Height, Effect of Earth's Curvature, Absorption, Super Refraction, M-Curves and Duct Propagation, Scattering Phenomena, Troposphere Propagation.

Wave Propagation – II: Sky Wave Propagation – Introduction, Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and Skip Distance, Multi-hop Propagation.

Text Books:

1. Antennas and Wave Propagation – J.D. Kraus, R.J. Marhefka and Ahmad S. Khan, TMH, New Delhi, 4th ed., (Special Indian Edition), 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd ed., 2000.

References:

1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd Ed., 2005.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.

DISASTER MANAGEMENT

(Open Elective-I)

III-B.Tech.-I-Sem. **L T P C**
Subject Code: 17CE3105OE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO7	PO8	PO12
CO1	analyze impact of disasters	3	2	3	3
CO2	choose suitable disaster management mechanism	3	3	3	3
CO3	make use of appropriate measures for capacity building to reduce risks	2	2	3	2
CO4	develop strategies to cope up with disasters	3	3	3	3
CO5	build disaster management plan	2	3	3	3

UNIT - I

Environmental Hazards & Disasters:
Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters.Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT - II

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man indeced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters - Extra Planetary Hazards / disasters - Planetary Hazards - Endogenous Hazards – Exogenous Hazards

UNIT - III

Endogenous Hazards: Volcanic eruption - Earthquakes - landslides - Volcanic Hazards / Disasters – Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards / disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - Human adjustment, perception & mitigation of earthquake.

UNIT - IV

Exogenous hazards / disasters – Infrequent events - Cumulative atmospheric hazards / disasters
Infrequent events: Cyclones - Lightning - Hailstorms
Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local stroms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters :- Floods - Droughts - Cold waves - Heal waves
Floods: Causes of floods - Flood hazards India - Flood control measures (Human adjustment, perception& mitigation)
Droughts: - Impacts of droughts - Drought hazards in India - Drought control measures - Extra Planetary Hazards / Disasters - man induced Hazards / Disasters - Physical hazards / Disasters - Soil erosion
Soil Erosion: Mechanics & forms of Soil Erosion - Factors 7 causes of Soil Erosion - Conservation measures of Soil Erosion.
Chemical hazards / disasters: Release of toxic chemicals, nuclear explosion - Sedimentation processes Sedimentation processes: Global Sedimentation problems - Regional Sedimentation problems - Sedimentation & Environmental problems - Corrective measures of Erosion & Sedimentation
Biological hazards / disasters: Population Explosion.

UNIT - V:

Emerging approaches in Disaster Management - Three stages

1. Pre-disaster Stage (preparedness)
2. Emergency Stage
3. Post Disaster stage - Rehabilitation

Text Books:

1. Disaster Mitigation: Experiences And Reflections , Pradeep Sahni
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning

References:

1. Environmental Geography,R. B. Singh (Ed) , Heritage Publishers New Delhi, 1990
2. Environmental Geography, Savinder Singh,Prayag Pustak Bhawann 1997
3. The Environment as Hazards,Kates, B. I & White, G. F, oxford, New York, 1978
4. Disaster Management,R. B. Singh (Ed), Rawat Publication, New Delhi, 2000
5. Disaster Management, H. K. Gupta (Ed) , Universities Press, India, 2003
6. Space Technology for Disaster Mitigation in India (INCED), R. B. Singh, University of Tokyo, 1994
7. Disaster Management in Hills, Dr. Satender,Concept Publishing Co., New Delhi, 2003
8. Action Plan For Earthquake, Disaster, Mitigation,S. Arya
9. Disaster Management,V. K. Sharma (Ed) , IIPA Publication New Delhi, 1994
10. An overview on Natural & Manmade Disaster & their Reduction,R. K. Bhandani, CSIR, New Delhi
11. Manuals on Natural Disaster Management in india,M. C. Gupta, National Centre for Disaster Management, IIPA, New Delhi, 2001.

OPERATIONS RESEARCH

(Open Elective-I)

III-B.Tech.-I-Sem. **L T P C**
Subject Code: 17ME3105OE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	formulate and solve linear programming problem using various methods	3	2	3
CO2	solve transportation and assignment problems	3	3	3
CO3	compute sequencing and inventory model problems	2	2	2
CO4	analyze waiting lines and game theory problems by applying standard solution methods	3	3	3
CO5	evaluate replacement and dynamic programming problems by applying various methods	2	3	3

UNIT-I

Introduction to Operations Research: Basics definition, scope, objectives, phases, models, applications and limitations of Operations Research.

Allocation: Linear Programming Problem Formulation, Graphical solution, Simplex method, Artificial variables techniques: Two-phase method, Big M method.

UNIT-II

Transportation Problem: Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: MODI method.

Assignment model: Formulation. Hungarian method for optimal solution.Solving unbalanced problem.Traveling salesman problem and assignment problem.

UNIT—III

Sequencing: Introduction, Flow-Shop sequencing, n jobs through two machines, n jobs through three machines, Job shop sequencing, two jobs through m machines.

Inventory: Introduction, Single item, Deterministic models - Purchase inventory models with one price break and multiple price breaks -Stochastic models - demand may be discrete variable or continuous variable - Single Period model and no setup cost.

UNIT—IV

Theory of Games: Introduction, Terminology- Solution of games with saddle points and without saddle points- 2 x 2 games, dominance principle, m x 2 & 2 x n games -graphical method.

Waiting Lines: Introduction, Terminology-Single Channel-Poisson arrivals and Exponential Service times-with infinite population and finite population models-Multichannel-Poisson arrivals and exponential service times with infinite population.

UNIT—V

Replacement: Introduction, Replacement of items that deteriorate with time, when money value is not counted and counted - Replacement of items that fail completely- Group Replacement.

Dynamic Programming: Introduction, Terminology- Bellman's Principle of Optimality-Applications of dynamic programming- Project network – CPM and PERT networks – Critical path scheduling.

Text Books:

1. Operations Research ,J.K.Sharma, MacMilan.
2. Introduction to O.RIHilIier & Libermannf,TMH.

References:

1. Introduction to O.R ,TahaI,PHlPublications.
2. Operations Research!, NVS Raju, SMS Education/3d Revised Edition.
3. Operations Research ,A.M.Natarajan, P,Balasubramaniam, A Tamilarasi,Pearson Education.

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Open Elective-I)

III B.Tech. I-Sem	**L**	**T**	**P**	**C**
Subject Code: 17EC3105OE	**3**	**-**	**-**	**3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO12
CO1	apply the fundamental concepts of measuring instruments	3	2	2
CO2	distinguish signal generators and signal analyzers	3	3	2
CO3	make use of oscilloscopes	3	2	2
CO4	identify various transducers	3	3	2
CO5	develop bridges for various measuring parameters	3	2	2

UNIT- I

Block Schematics of Measurement: Performance characteristics, Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC voltmeters and Current Meters, Ohmmeters, Multimeters. Meter protection, Extension of Range, True RMS Responding voltmeters, Specifications of Instruments.

UNIT- II

Signal Analyzers:AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators, Sweep Frequency Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square Wave Generators, Function Generators, Arbitrary Waveform Generator, Video Signal Generators, and Specifications

UNIT- III

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines.Applications:Measurement of Time, Period and Frequency Specifications.

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

UNIT -IV

Transducers: Classification, Strain Gauges, Bounded, Unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature Sensing System, Piezoelectric, Variable Capacitance Transducers, Magneto Strictive Transducers.

UNIT -V

Bridges: Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge.

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, level of Measurement, Measurement of Humidity and Moisture, Force, Pressure-High pressure, Vacuum level, Temperature Measurements, Data Acquisition Systems.

Text Books:

1. Electronic Instrumentation: H.S.Kalsi-TMH 2nd Edition 2004
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D.Cooper: PHI 5th Edition**2003**

References:

1. Electronic Instrumentation and Measurements- David A. Bell, Oxford Univ.Press, 1997.
2. Electronic Measurements and Instrumentation: B.M. Oliver, J.M.Cage TMH Reprint 2009.

JAVA PROGRAMMING

(Open Elective-I)

III-B.Tech.-I-Sem. **L T P C**

Subject Code: 17CS3105OE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO5	PO12
CO1	write simple java programs using OOP concepts	3	2	2	3	2
CO2	develop programs using inheritance and polymorphism	3	2	3	3	2
CO3	build efficient code using multithreading and exception handling	3	2	3	3	2
CO4	illustrate event handling mechanism	3	2	3	3	2
CO5	make use if applets and swing concepts	3	2	3	3	2

UNIT- I

Object-oriented thinking and Java Basics:

Object-oriented thinking- Need for OOP paradigm, summary of OOP concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods.

Java Basics-History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java programs, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, exploring String class.

UNIT- II:

Inheritance, Polymorphism, Packages and Interfaces:

Inheritance- Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination. Benefits of inheritance, costs of inheritance.Member access rules, super uses, using final with inheritance, the Object class and its methods.

Polymorphism- method overriding, dynamic binding, abstract classes and methods.

Packages- Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages. Exploring java.io.

Interfaces- Differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT -III

Exception handling and Multithreading:

Exception handling- Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Multithreading- Differences between multi-threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, daemon threads. Enumerations, auto boxing, annotations, generics.Exploring java.util.

UNIT- IV

Event Handling:

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, nested and inner classes. The AWT class hierarchy, user interface components- labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists panels – scroll pane, dialogs, menu bar, graphics, Layout Managers- Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

UNIT -V

Applets and Swings:

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Swings – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, ImageIcon, JLabel, JTextfield, JButton, JCheckbox, JList, JRadiobutton, JComboBox, JTabbedPane, JScrollPane, JTree and JTable.

Text Books:

1. Java the complete reference, 8th editon, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Eduction.

References:

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John Wiley & sons.
2. Java How to Program, H.M.Dietel and P.J.Dietel, Sixth Edition, Pearson Education/PHI.
3. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
4. An introduction to Java programming and object oriented application development, Richard A. Johnson.

LINEAR &DIGITAL IC APPLICATIONS LAB

III B.Tech.I Sem. **L T P C**
SubjectCode: 17EC3106PC **- - 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	construct circuits for various applications using Op-Amp IC741	3	3	3
CO2	design various applications with specific ICs	3	3	3
CO3	model various sequential and combinational circuits using digital ICs	3	3	3
CO4	design and analyze synchronous and asynchronous counters using digital ICs	3	3	3
CO5	implement the sequential circuits	3	3	3

Part-I: Linear IC Experiments(Any 6 Experiments)

1. Op-amp Applications-Adder, Sub tractor, Comparator, Amplifier.
2. Integrator and Differentiator using IC741 Op-Amp.
3. Active Filter Applications-LPF, HPF (First Order).
4. IC 741 waveform Generators- Sine, Square wave and Triangular waves.
5. IC 555 Mono Stable and Astable Multivibrator Circuits.
6. a)Schmitt Trigger Circuits-using IC741.

b)IC 565 – PLL applications.

7. Voltage regulator IC 723, three terminal voltage regulators- 7805, 7809, 7912.

Part-II: Digital IC Experiments (Any 6 Experiments)

1. Design a 16 x 4 priority encoder using two 8 x 3 priority encoder.
2. Design a 16 bit comparator using 4 bit Comparators.
3. Design a model to 53 counter using two decade counters.
4. Design a 16 x 1 multiplexer using 8 x 1 multiplexer.
5. Design a 16 bit Adder / Sub tractor using 4 – bit Adder / Sub tractor IC's.
6. Design a 4 – bit Gray to Binary and Binary to Gray Converter.
7. Design an 8 bit parallel load and serial out shift register using two 4 bit shift register.
8. Design an 8 bit Serial in and serial out shift register using two 4 bit shift register.
9. Design a 4 digit hex counter using synchronous one digit hex counters.
10. Design a 4 digit hex counter using Asynchronous one digit hex counters.

Text Books:

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005

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DIGITAL COMMUNICATIONS LAB

III B.Tech.I Sem. **L T P C**
Subject Code: 17EC3107PC **- - 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	compare PCM , DPCM and DM	3	3	3
CO2	test FSK, PSK, DPSK & QPSK	3	3	3
CO3	demonstrate time division multiplexing & Amplitude Shift Keying	3	3	3
CO4	determine spectral characteristics of PAM & QAM	3	3	3
CO5	design OFDM	3	3	3

Note: All these experiments are to be realized in hardware.

List of Experiments

1. PCM Generation and Detection
2. Differential Pulse Code Modulation
3. Delta Modulation
4. Time Division Multiplexing of 2Band Limited Signals
5. Frequency Shift Keying: Generation and Detection
6. Phase Shift Keying: Generation and Detection
7. Amplitude Shift Keying: Generation and Detection
8. Study of the spectral characteristics of PAM,
9. Study of the spectral characteristics of QAM.
10. DPSK :Generation and Detection
11. QPSK: Generation and Detection
12. OFDM: Generation and Detection

Text Books:

1. Principles of Communication Systems - Herbert Taub, Donald L Schiling, GoutamSaha, 3rd Edition, Mcgraw-Hill, 2008.
2. Digital and Analog Communication Systems – Sam Shanmugam, John Wiley, 2005.
3. Communications system, S. Haykin, Wiley, 4 edition 2009.
4. Digital Communication – Simon Haykin, John Wiley, 2005

ADVANCED ENGLISH COMMUNICATION SKILLS (AECS) LAB

IIIB.Tech ISem. **L T P C**
Subject Code: 17EC3108HS **- - 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO5	PO10
CO1	assess and utilize vocabulary in an effective way	3	3
CO2	interpret interpersonal relationships	3	3
CO3	elaborate academic reading and writing skills	3	3
CO4	formulate appropriate communication techniques in various contexts	3	3
CO5	adapt to different work-place and socio-cultural scenarios	3	3

Unit- I

Inter-personal Communication and Building Vocabulary : Starting a Conversation –Responding Appropriately and Relevantly – Using Appropriate Body Language– RolePlayinDifferentSituations-SynonymsandAntonyms,One-wordSubstitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.

Unit- II

Reading Comprehension: General Vs Local Comprehension, Reading for Facts, Guessing Meanings from context, Skimming, Scanning, Inferring Meaning.

Unit- III

Writing Skills: Structure and Presentation of Different Types of Writing - Letter Writing/ Resume Writing/E-correspondence/Technical Report Writing.

Unit- IV

Presentation Skills: Oral Presentations (individual or group) through JAM Sessions/ Seminars/ PPTs and Written Presentations through Posters/Projects/Reports/ e-mails/Assignments…etc.

Unit- V

Group Discussion and Interview Skills: Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, FluencyandOrganizationofIdeasandRubricsofEvaluation-ConceptandProcess, Pre interview Planning, Opening Strategies, Answering Strategies, and Interview through Tele-conference & Video-conference and Mock Interviews.

References:

1. Effective Technical Communication/ Ashraf Rizvi.M – New Delhi : MGHEdu,c2018.
2. Technical Communication/ Meenakshi Raman – New Delhi: Oxford, 2016
3. English Voculabary in Use Advanced/ Micheal McCarthy – Cambridge: Cambridge University Press, 2002
4. Basic Communication Skills for Technology/ J.Andrea Ruthurford – New Delhi: Pearson, 399
5. Handbook for Technical Writing/ David Mc Murry.A- New Delhi: Cengage, 2012

Kumar, Sanjay and Pushp Lata.

6. English for Effective Communication, OxfordUniversityPress,2015.
7. Konar, Nira.English Language Laboratories – A Comprehensive Manual, PHI LearningPvt.Ltd.,2011.

HUMAN VALUES AND PROFESSIONAL ETHICS

MANDATORY COURSE (NON-CREDIT)

III-B.Tech.-I-Sem. **L T P C**
Subject Code: 17HS3109MC **3 - - -**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO6	PO7	PO8	PO12
CO1	apply the importance of human values for personal and societal development	3	3	3	2
CO2	develop ethics and professional attitude	2	2	3	2
CO3	explain ethical standards in a professional environment	3	3	3	2
CO4	distinguish between professional rights and employee rights	3	3	3	2
CO5	identify their role in professional spheres	3	3	3	3

Unit- I

Human Values: Morals, values, ethics – integrity – work ethics –service learning –civic virtue – respect for others- living peacefully - Caring –sharing –honesty – courage –valuing time – cooperation – commitment –empathy – self-confidence –spirituality – character- Mini-Cases

Unit II

Professional Ethics: Profession- and professionalism - Two models of professionalism – Professional etiquette -Three types of Ethics or morality Responsibility in Engineering – Engineering standards –Engineering Ethics – Positive and Negative Faces. Professional Codes and Code of conduct of Institute of Engineers . Mini-cases .

Unit- III

Professional Responsibilities: Ethical standards Vs Professional Conduct – Zero Tolerance for Culpable Mistakes – Hazards and Risks - congeniality, collegiality and loyalty. Respect for authority – conflicts of interest –Mini-Cases.

Unit IV

Professional Rights: Professional rights and employee rights communicating risk and public policy – Whistle blowing - Professionals /engineers as managers, advisors, experts, witnesses and consultants – moral leadership- Monitoring and control- Mini-Cases

Unit V

Ethics in global context: Global issues in MNCs- Problems of bribery, extortion, and grease payments – Problem of nepotism, excessive gifts – paternalism – different business practices – negotiating taxes. Mini-Cases.

References

1. Human Values and Professional Ethics,S B George, Vikas Publishing.
2. Professional Ethics and Human Values,KR Govindan & Saenthil Kumar, Anuradha Publications.
3. Human Values and Ethics, S K Chakraborthy & D.Chakraborthy,Himalaya.

QUANTITATIVE APTITUDE

MANDATORY COURSE (NON-CREDIT)

III-B.Tech.-I-Sem. **L T P C**

Subject Code: 17BS3110MC **- - 2 -**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	Recall the basics of number systems and apply them accordingly	3	3
CO2	Apply the concepts of percentages, profit and loss, & Interests in real life situations	3	3
CO3	demonstrate various principles related to Distance ,speed ,time and work in solving mathematical problems	3	3
CO4	distinguish between permutations and combinations ,clocks and calendars for solving problems	3	3
CO5	apply principles of geometry and menstruation to achieve qualitative results at workplace	3	3

UNIT-I

Number Systems: Basic Concepts, Number Systems: Natural numbers, whole numbers, integers, fractions (proper, Improper, mixed, split), Rational Numbers, Irrational Numbers, Real Numbers.Divisibility Rules, Logic Equations ,Two digit numbers ,three digit numbers, successive divisions, basic operations(addition, subtraction, multiplication, division)

Averages: Basic Concepts combined mean, average principles, wrong values taken, number added or deleted, average speed.

Progressions & Inequalities: Basic Concepts, Types: arithmetic, geometric, harmonic progression and applications.

Unit-II

Percentages: Basic Concepts, conversions, finding percentages from given numbers, quantity increases or decreases by given percentage, population increase by given percentage, comparisons, consumption when a commodity price increase or decrease and applications

Profit and Loss: Basic Concepts, discounts, marked price and list price, dishonest shopkeeper with manipulated weights, successive discounts etc

Interest (Simple and Compound): Basic Concepts, Yearly, Half-yearly, and quarterly calculations, multiples, differences between simple and compound interest.

Ratio and Proportion: Basic Concepts of ratio and proportion, continued or equal proportions, mean proportions, invest proportion, alternative proportion, division proportion, compound proportion, duplication of ratio, finding values, coins and currencies, etc

Unit-III

Speed, Time and Distance: Basic Concepts, Single train problems, two train problems: some point same side, some point opposite sides, relative speed, different points meeting at common points, different points same side (different timings vs. same timings), ratios, number of stoppages, average speed, etc.

Time and Work: Basic Concepts, comparative work, mixed work, alternative work, middle leave and middle join, ratio efficiency.

Unit-IV

Permutations and combinations: Basic Concepts, differences between permutations and combinations, always together-never together, alternative arrangement, fixed positions, double fixations, items drawing from a single group, items drawing from a multiple group, total ways of arrangement with repetitions and without repetitions, dictionary, handshakes or line joining between two points or number of matches , sides and diagonals, etc.

Clocks and Calendars: Basic Concepts, Angle between minute hand and hour hand, reflex angle, hours hand angle, time gap between minute hand and hour hand ,relative time : coincide ,opposite sides and right angle ,mirror images, faulty clock(slow/fast),miscellaneous, calendar.

Unit-V

Geometry and Mensuration: Basic concepts, types of angles.
Plane figures: rectangles, squares, triangles, quadrilateral, areas, perimeters, etc.
Solid figures: Cubes, cuboids, spheres, cylinders-area(total to lateral surface area),volumes, perimeters.
Others: Parallelogram, Rhombus, Trapezium, Circle, Sector, Segment, Cone, Sphere, Hemisphere, Ellipse, Star prism etc.

Text Books:

1. Thorpe's verbal reasoning, LSAT Materials,GL Barrons, Mc Graw Hills,
2. A modern approach to Logical reasoningR S Agarwal, S.Chand
3. Quantitative Aptitude,R S Agarwal, S Chand
4. Quantitative Aptitude - G. L BARRONS
5. Quantitative Aptitude - Abhijit Guha Mc Graw Hills

III-B.TECH.-II-SEMESTER SYLLABUS

MICROPROCESSORS AND MICROCONTROLLERS

III-B.Tech.-II-Sem. **L T P C**
Subject Code:17EC3201PC **4 1 - 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO7	PO12	PO13
CO1	illustrate the internal architecture and organization of 8086	3	3	2	2	3
CO2	analyze 8086 ALPs and interfacing devices	3	3	2	2	3
CO3	explain the architecture of 8051 microcontroller	3	3	2	3	3
CO4	interface memory, I/O and advanced peripherals with 8051	3	3	2	3	3
CO5	adapt the architecture and instruction set of ARM processor	3	3	2	3	3

Unit-I

8086 Architecture: Fundamentals of 8-bit microprocessor and 16-bit microprocessor, 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Signal descriptions of 8086, - Minimum mode and maximum mode of operation, Timing diagram, memory interfacing to 8086(static RAM and EPROM). Interrupts of 8086.Comparison of 8-bit microprocessor and 16-bit microprocessor

Unit-II

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.
Programmable Interfacing Devices:8255 PPI-various modes of operation and interfacing to 8086. Interfacing key board and display controller- 8279, stepper motor and D/A and A/D converter interfacing, Interrupt structure of 8086, Vector interrupt table. Interrupt service routines. 8259 PIC architecture and interfacing cascading of interrupt controller and its importance.

Unit –III

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051,comparison of microprocessor and microcontroller.
8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

Unit-IV

I/O and Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.
Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, UART; External Communication Interfaces-RS232, USB.

Unit-V

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution.

Textbooks:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, 2nd Edn, TMH.
2. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed.

References:

1. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition 2006.
2. ARM System Developers guide, Andrew N Sloss, Dominic Symes, Chris Wright, Elsevier, 2012

DIGITAL SIGNAL PROCESSING

III B.Tech. II-Sem **L T P C**
Subject Code: 17EC3202PC **4 1 - 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO6	PO12	PO13
CO1	analyze discrete times signals in the time and frequency domains	3	3	2	3	3
CO2	implement DFT and FFT on time domain signals	3	3	2	3	3
CO3	design IIR filters using various techniques	3	3	2	3	3
CO4	design FIR filters using various techniques	3	3	2	3	3
CO5	illustrate Multirate Signal Processing	3	3	2	2	3

Unit-I

Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, Linear Shift Invariant Systems, Stability, and Causality, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems
Z-Transform: Review of Z-transforms, stability and causality, Response of an LTI system using Z-transform, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms, Transposed structures.

Unit-II

Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Circular convolution, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DFT and Z-Transform.
Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT, and FFT with General Radix-N.

Unit-III

IIR Digital Filters: Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

Unit-IV

FIR Digital Filters: Characteristics of FIR Digital Filters, Frequency Response, Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

Unit-V

Multirate Digital Signal Processing: Decimation by a factor D, interpolation by a factor I, sampling rate conversion by a rational factor I/D, Filter Design & Implementation for sampling rate conversion, Multi stage Implementation of sampling rate conversion.

Textbooks:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009.

References:

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008.
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007.
3. Digital Signal Processing – S.Salivahanan, A.Vallavaraj and C.Gnanapriya, TMH, 2009.

MICROWAVE ENGINEERING

III B.Tech. II Sem **L T P C**
Subject code: 17EC3203PC **4 - - 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO12	PO13
CO1	identify the need of microwaves and transmission line characteristics	3	2	2	3
CO2	analyze electromagnetic wave propagation and microwave components	3	3	2	3
CO3	explain the operation of various microwave tubes	3	2	2	3
CO4	determine measurement parameters using microwave equipments	3	3	2	3
CO5	develop microwave systems for various applications	3	3	2	3

Unit-I

Introduction to Microwaves: Microwave Spectrum. bands, advantages and applications.
Model of Microwave Transmission: Concept of mode, TE, TM and TEM modes, Impossibility of TEM mode, mode characteristics–Cut-off Frequencies, Phase & Group Velocities, Wavelengths, Impedance Relations, power transmission and Losses.Illustrative Problems.

Unit-II

Analysis of Microwave Transmission Lines: Rectangular Waveguides– solution of wave equations in rectangular coordinates, TE/TM mode analysis, expressions for fields, characteristic equation; Introduction to MMIC-Strip line, Micro strip line.
Passive Microwave Devices: Cavity Resonators, E plane, H plane&, Magic Tee, Directional Couplers and Attenuators; Ferrite Components – Faraday rotation, Gyrator, Isolator and Circulator.

Unit-III

Active Microwave Devices: Microwave tubes- conventionaltubes,limitations &losses;O-type Tubes-2 Cavity Klystron, Reflex Klystron and TWTStructure(Velocity Modulation Process and Applegate Diagram).

M-Type Tubes: Cylindrical Traveling Wave Magnetron, PI-Mode Operation; Principle of operation of Gunn Diode and IMPATT diode.

Unit-IV

Scattering Matrix: Significance, Properties; S Matrix Calculations for E plane, H plane& Magic Tee, Circulator and Isolator, Illustrative Problems.
Microwave Measurements: Description of Microwave Bench, Power (Bolometer), Attenuation, Frequency, Standing Wave and Impedance Measurements.

Unit-V

Microwave systems: Introduction to Radar, Satellite Communication, RFID and GPS.
Modern Trends in Microwaves Engineering: Effect of Microwaves on human body, Microwave Imaging, Medical, Civil and Military, EMI/ EMC.

Textbooks:

1. R.E. Collins, Microwave Circuits, TMH.
2. K.C. Gupta and I.J. Bahl, Microwave Circuits, Artech house.

References:

1. Pozar, Microwave Engineering, wiley publishers, 4th Third Edition, 2012.
2. M.L. Sisodia and G.S.Raghuvanshi, Microwave Circuits and Passive Devices, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Samuel Y. Liao, “Microwave Devices and Circuits”, PHI, 3rd Edition, 1994.
4. M. Kulkarni, “Microwave and Radar Engineering”, Umesh Publications1998

GLOBAL WARMING & CLIMATE CHANGE
(Open Elective – II)

III-B.Tech.-II-Sem. **L T P C**
Subject Code: 17CE3204OE **3 0 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO6	PO7	PO8	PO12
CO1	describe the various consequences of climate change	3	3	3	3	2
CO2	illustrate the methods of measurement of climate change	3	3	3	3	2
CO3	analyze the causes for climate change and its impacts	3	3	3	3	2
CO4	evaluate the impact of global warming and climate change	3	3	3	3	2
CO5	explain various mitigation techniques	3	3	3	3	2

Unit – I

Global warming and Greenhouse gases – GHGs trend, Global temperature trend, Global distribution of emissions, IPCC Sources of CO2 in the Land, Ocean and atmosphere. The Climate system – Sun, Atmosphere, Ocean, Ice and energy balance of the earth. History of climate change – glacial cycle , interglacial, interstadial events, year to decadal
Global Warming Potential: Introduction to the calculation of GWP, carbon emissions from fossil fuels and global carbon cycle, carbon intensity of fossil fuels, Effects of energy efficiency on carbon intensity, target CO2 levels.

Unit – II

The Kyoto Protocol, Climate change –Extreme weather events, The Measurement of Climate Change, Global warming and the hydrological cycle, Climate change impact on ecosystems, Agriculture, Possible remedies of global warming – Reducing Carbon Emissions, Energy use and Emission trading, Future Emissions and Energy Resources, Current and Future sources of Methane, Biological sources of Nitrous oxide, Role of Scientist and Human being.

Unit – III

The history of climate and the human species, human-caused climate change, Impacts Of Climate Change: Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions– Uncertainties in the Projected Impacts of Climate Change – Risk of Irreversible Changes.

Unit – IV

Weather and Climate – Climatic zones, continental & maritime climates; Climate change and variability – Natural changes and anthropogenic causes of climate change, Climate feedbacks – Ice-albedo, cloud - albedo and CO2 feedbacks; Present day Climate variability – El Nino and ENSO events. Climate Change Adaptation And Mitigation Measures: Adaptation Strategy/Options in various sectors – Water – Agriculture –- Infrastructure and Settlement including coastal zones – Human Health – Tourism – Transport – Energy – Key

Unit –V

Mitigation Technologies and Practices – Energy Supply – Transport – Buildings – Industry – Agriculture – Forestry - Carbon sequestration – Carbon capture and storage (CCS)- Waste (MSW & Bio waste, Biomedical, Industrial waste – International and Regional cooperation. Clean Technology And Energy: Clean Development Mechanism –Carbon Trading examples of future Clean Technology- Biodiesel – Natural Compost – Eco- Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power – Mitigation Efforts in India and Adaptation funding.

Textbooks:

1. Dash Sushil Kumar, "Climate Change – An Indian Perspective", Cambridge University Press India Pvt. Ltd, 2007.
2. Kuhn, T.S., 1962 and updates. The Structure of Scientific Revolutions
3. Contemporary Climatology, by Peter J. Robinson and Ann Henderson-Sellers.
4. Climate Change: A Multidisciplinary Approach, by William James Burroughs
5. Current trends in Global Environment by A.L. Bhatia (2005)

References:

1. Global Warming: A Very Short Introduction by Mark Maslin
2. Global Warming The Complete Briefing by John T Houghton
3. Intergovernmental Panel on Climate Change, (Cambridge University 2007)
4. Ruddiman, William F.2001. Earth's Climate: Past and Future
5. Henderson-Sellers, A., and P.J. Robinson, 1999. Contemporary Climatology (second edition). Prentice-Hall.
6. Houghton, J.T., 2001, (ed). Climate Change 2001, The Scientific Basis. 881pp.

FUNDAMENTALS OF ROBOTICS
(Open Elective – II)

III-B.Tech-II-Sem **L T P C**
Subject Code: 17ME3204OE **3 0 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO5	PO12
CO1	illustrate principles and functioning of the robot	3	2	2	2
CO2	perform kinematic analysis for end-effector positioning	3	3	3	2
CO3	integrate sensors for robot	3	3	3	2
CO4	design control laws for a robot	3	3	2	2
CO5	develop robot programming for various applications	3	3	3	2

Unit-I

Introduction to Robotics: Types and components of a robot, Classification of robots, classification with respect to geometrical configuration (anatomy), closed-loop and open- loop control systems. Social issues and safety.

Unit-II

Robot Kinematics: Kinematics systems, Definition of mechanisms and manipulators, Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, Homogeneous Coordinate representation, DH parameters.

Unit-III

Sensors and Vision System: Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc., Introduction to Cameras, Camera calibration, Geometry of Image formation, Euclidean / Similarity / Affine / Projective transformations Vision applications in robotics.
Robot Actuation Systems: Actuators: Electric, Hydraulic and Pneumatic; Transmission: Gears, Timing Belts and Bearings, Parameters for selection of actuators.

Unit –IV

Robot Control: Basics of control: Transfer functions, Control laws: P, PD, PID, Non-linear and advanced controls.

Unit-V

Control Hardware and Interfacing: Embedded systems: Architecture and integration with sensors, actuators, components, Programming for Robot Applications.

Textbooks:

1. Niku Saeed B., “Introduction to Robotics: Analysis, Systems, Applications”, PHI, New Delhi.
2. Mittal R.K. and Nagrath I.J., “Robotics and Control”, Tata McGraw Hill.

References:

1. Saha, S.K., “Introduction to Robotics, 2nd Edition, McGraw-Hill Higher Education, 2014.
2. Ghosal, A., “Robotics”, Oxford, New Delhi, 2006.

PRINCIPLES OF COMMUNICATION SYSTEMS
(Open Elective – II)

III -B.Tech.-II-Sem **L T P C**
Subject Code: 17EC3204OE **3 0 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12
CO1	outline the fundamentals of communication systems	3	2	2	2
CO2	analyze various analog modulation and demodulation schemes	3	3	3	2
CO3	explain sampling theorem, pulse modulation and multiplexing techniques	3	3	3	2
CO4	illustrate digital modulation schemes	3	3	2	2
CO5	develop source and channel coding techniques	3	3	3	2

Unit-I

Fundamentals of communication systems: Block diagram of communication system; types of communications-analog and digital; Noise–types of noise, sources of noise, calculation of noise in linear systems, and noise figure.

Unit-II

Methods of Modulation: Need for modulation; Types of modulation, generation and detection of AM, DSB-SC, SSB-SC. Angle modulation: frequency & phase modulations, Narrow band and Wide band FM, comparison of AM, FM & PM.

Unit-III

Pulse Modulations: Sampling theorem, Nyquist criteria, introduction to PAM, PWM and PPM.
Multiplexing techniques: TDM, FDM, asynchronous multiplexing.

Unit-IV

Digital Communication: Advantages; Working principle of PCM; comparison of PCM, DM, ADM, ADPCM; introduction to digital modulation techniques-ASK, FSK, PSK, DPSK, QPSK.

Unit-V

Information Theory: Concept of information; rate of information and entropy; Coding efficiency-Shanon-Fano and Huffman coding; introduction to error detection and correction codes.

Textbooks:

1. Communication Systems Analog and Digital – R.P. Singh & SD Sapre, TMH, 20th reprint, 2004.
2. Principles of Communications – H. Taub and D. Schilling, TMH, 2003.

References:

1. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
2. Communication Systems Engineering – John. G. Proakis and Masoud Salehi, PHI, 2nd Ed. 2004.

DATABASE MANAGEMENT SYSTEMS
(Open Elective – II)

III-B.Tech- II Sem **L T P C**
Subject Code: 17CS3204OE **3 0 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO5	PO12
CO1	design databases using E-R model	3	3	3	3	2
CO2	construct database using relational model	3	3	3	3	2
CO3	formulate SQL queries to interact with database	3	3	3	3	2
CO4	make use of transaction control commands	3	3	3	3	2
CO5	apply normalization on database to eliminate redundancy	3	3	3	3	2

Unit-I

Introduction to Database Systems: Introduction and applications of DBMS, Purpose of data base, History of database, Database architecture - Abstraction Levels, Data Independence, Database Languages, Database users and DBA.
Introduction to Database Design: Database Design Process, Data Models, ER Diagrams - Entities, Attributes, Relationships, Constraints, keys, Generalization, Specialization, Aggregation, Conceptual design with the E-R model for large Enterprise.

Unit-II

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

Unit-III

Part-A: SQL Basics: DDL, DML, DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, in operator.

Part-B: Functions: Aggregate functions, Built-in functions - numeric, date, string functions, set operations.

Unit-IV

Sub-queries: Introduction, correlated sub-queries, use of group by, having, order by, join and its types, Exist, Any, All, view and its types.
Transaction control commands: ACID properties, concurrency control, Commit, Rollback, save point, cursors, stored procedures, Triggers.

Unit-V

Normalization: Introduction, Normal forms - 1NF, 2NF, 3NF, BCNF, 4NF and 5NF, concept of De-normalization and practical problems based on these forms.

Textbooks:

1. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, 3rd Edition, TMH.
2. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, Database System Concepts, 6th Edn, TMH.

COMPUTER ORGANIZATION & OPERATING SYSTEMS

(Professional Elective –I)

III B.Tech II SEM **L T P C**
Subject Code: 17EC3205PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO12	PO13
CO1	outline the fundamentals of basic structure of computer	3	2	2	3
CO2	explain the concept micro programmed control	3	2	3	3
CO3	make use of input-output organization	3	3	3	3
CO4	distinguish various memories and pipelining operations	3	3	3	3
CO5	explore various concepts of operatingsystems	3	3	3	3

Unit – I

Basic Structure of Computer: Computer types, Functional Unit, Basic Operational Concepts, Bus Structures, Multiprocessor and Multi Computers, Data Representation, Fixed Point Representation, Floating Point representation.**Register Transfer Language and Micro Operations:** Register Transfer Language, Register Transfer Bus and Memory Transfer, Arithmetic Micro Operations, Logic Micro Operation, Shift Micro Operations, Arithmetic Logic Shift Unit, Instruction Codes, Computer Registers Computer Instructions – Instruction Cycles.

Unit – II

Micro Programmed Control: Control Memory, Address Sequencing, Micro program Examples, Design of Control Unit, Hard Wired Control, Micro programmed Control. **The Memory System:** Basic Concepts Of Semiconductor RAM Memories, Read-Only Memories, Virtual Memories Secondary Storage.

Unit-III

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP), Serial Communication, Introduction to Peripheral Components, Interconnect (PCI) Bus, Introduction to Standard Serial Communication Protocols like RS232, USB, IEEE 1394.

Unit – IV

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory. Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors. Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Inter processor arbitration, Inter processor communication, and synchronization.

UNIT – V

Operating Systems: Overview-Introduction-Operating system objectives, User view, System view, Operating system definition ,Computer System Organization, Computer System Architecture, OS Structure, OS Operations, Process Management, Memory Management, Storage Management, Protection and Security, Computing Environments. Operating System services, User and OS Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, OS Structure, Deadlock, File Management and Memory Management.

Text Books:

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, MGH.
2. Computer System Architecture, M. Moris Mano, Third Edition, Pearson.
3. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, 9th Edition, Wiley, 2016 India Edition

Reference Books:

1. Computer Organization and Architecture, William Stallings, 6th Edition, Pearson.

DATA COMMUNICATIONS

(Professional Elective – I)

III-B.Tech.-II-Sem **L T P C**

Subject Code: 17EC3206PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO12	PO13
CO1	explain the basic concept of data communications and networking	3	2	2	3
CO2	distinguish metallic cable transmission media & optical fiber transmission media	3	3	2	3
CO3	explore digital transmission ,multiplexing and T carriers & wireless communications systems	3	3	2	3
CO4	outline the telephone instruments and signals & cellular telephone systems	3	2	2	3
CO5	make use of data communications codes, error control, and data formats & data communications equipment	3	3	2	3

Unit - I

INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING: Standard Organizations for Data Communications, Layered Network Architecture, Open SystemsInterconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Networks, Alternate Protocol Suites.

SIGNALS, NOISE, MODULATION, AND DEMODULATION:Signal Analysis, Electrical Noise and Signal-to- Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and M-ary Encoding, Digital Modulation.

Unit - II

METALLIC CABLE TRANSMISSION MEDIA: Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves.

OPTICAL FIBER TRANSMISSION MEDIA: Advantages of Optical Fiber cables, Disadvantages of Optical Fiber Cables, Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, Optical Fiber construction, Propagation of Light Through an Optical fiber Cable, Optical Fiber Modes and Classifications, Optical Fiber Comparison, Losses in Optical Fiber Cables, Light sources, Light Detectors, Lasers.

Unit - III:

DIGITAL TRANSMISSION: Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage to- Quantization Noise Voltage Ratio, Linear Versus Nonlinear PCM Codes, Companding, PCM Line Speed, Delta Modulation PCM and Differential PCM.

MULTIPLEXING AND T CARRIERS:Time- Division Multiplexing, T1 Digital Carrier System, Digital Line Encoding, T Carrier systems, Frequency- Division Multiplexing, Wavelength- Division Multiplexing, Synchronous Optical Network.

WIRELESS COMMUNICATIONS SYSTEMS: Electromagnetic Polarization, Electromagnetic Radiation, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

Unit – IV

TELEPHONE INSTRUMENTS AND SIGNALS: The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

CELLULAR TELEPHONE SYSTEMS: First- Generation Analog Cellular Telephone, Personal Communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, Interim Standard, Global system for Mobile Communications.

Unit – V:

DATA COMMUNICATIONS CODES, ERROR CONTROL, AND DATA FORMATS:
Data Communications Character Codes, Bar Codes, Error Control, Error Detection and Correction, Character Synchronization.

DATA COMMUNICATIONS EQUIPMENT:
Digital Service Unit and Channel Service Unit, Voice- Band Data Communication Modems, Bell Systems-Compatible Voice- Band Modems, Voice- Band Modem Block Diagram, Voice- Band Modem Classifications, Asynchronous Voice-Band Modems, Synchronous Voice-Band Modems, Modem Synchronization, 56K Modems, Modem Control: The AT Command Set, Cable Modems.

Text Books:

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.
2. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.TMH.

Reference Books:

1. Data and Computer communications, 8/e, William Stallings, PHI.
2. Computer Communications and Networking Technologies, Gallow, Second Edition Thomson
3. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education.

ADVANCED DIGITAL DESIGN

(Professional Elective –I)

III-B.Tech.-II-Sem **L T P C**
Subject Code: 17EC3207PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO5	PO12	PO13
CO1	illustrate tabular & computer aided minimization procedures	3	2	2	3	3
CO2	explore algorithmic state machines	3	3	2	3	3
CO3	make use of fault diagnosis and tolerance	3	3	3	3	3
CO4	outline the fundamental of VHDL	3	2	3	3	3
CO5	write vhdl code for logic circuits	3	3	3	3	3

Unit- I:

TABULAR & COMPUTER AIDED MINIMIZATION PROCEDURES: variable K-map - Quine-Mc Cluskey Algorithm - The Dominance Algorithm-Cyclic Functions-Degree of Adjacency and Essential Prime Cubes-The CAMP Algorithm-Cube based Algorithm-Cubical operations.

Unit- II

ALGORITHMIC STATE MACHINES: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier

Unit- III

FAULT DIAGNOSIS AND TOLERANCE: Introduction-Fault Classes and Models-Fault Diagnosis and Testing-Test Generation-FaultTable method-Path sensitization Method-Boolean Difference Method-The Kohavi Algorithm-Fault Tolerance Techniques

Unit- IV

INTRODUCTION TO VHDL:VHDL Description of Combinational Circuits-VHDL models for Multiplexers-VHDL Modules-Four-Bit Full Adder-Signals and Constants-Arrays-VHDL Operators-Packages and Libraries-IEEE Standard Logic-Compilation and Simulation of VHDL Code.

Unit -V

VHDL FOR DIGITAL SYSTEM DESIGN:VHDL Code for a Serial Adder-VHDL Code for a Binary Multiplier-VHDL Code for a Binary Divider-VHDL Code for a Dice Game Simulator

Text Books:

1. Fundamentals of Logic Design, Charles H.Roth Jr, Thomson Learning 2004
2. Logic Design Theory, Nripendra N Biswas, Prentice Hall of India,2001

References:

1. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge.
2. Digital Design- Morris Mano, PHI, 3rd Edition.

TELECOMMUNICATION SWITCHING SYSTEMS AND NETWORKS

(Professional Elective –I)

III-B.Tech.-II-Sem **L T P C**
Subject Code: 17EC3208PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO6	PO12	PO13
CO1	explain the basic concept of switching systems	2	2	2	2	3
CO2	make use of switching networks	3	3	3	2	3
CO3	explore signaling	3	3	2	3	3
CO4	analyze packet switching	3	3	3	3	3
CO5	outline the networks	3	2	2	2	3

Unit –I

Switching Systems: Evolution of Telecommunications; Basics of a Switching System; Functions of a Switching System; Crossbar Switching-Principle of Crossbar Switching; Crossbar Switch Configurations; Cross-Point Technology; Crossbar Exchange Organization; A General Trucking; Electronic Switching; Digital Switching Systems. Telecommunications Traffic: Introduction; The Unit of Traffic; Congestion; Traffic Measurement; A Mathematical Model; Lost-Call Systems-Theory; Traffic Performance; Loss Systems in Tandem; Use of Traffic Tables; Queuing Systems-The Second Erlang Distribution; Probability of Delay; Finite Queue Capacity; Some Other Useful Results; Systems with a Single Server; Queues in Tandem; Delay Tables; Applications of Delay Formula.

UNIT -II

Switching Networks: Single Stage Networks; Gradings-Principle; Two Stage Networks; Three Stage Networks; Four Stage Networks. **Time Division Switching:** Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching; Combination Switching; Three Stage Combination Switching. Control of Switching Systems: Call Processing Functions-Sequence of Operations; Signal Exchanges; State Transition Diagrams; Common Control; Reliability; Availability and Security; Stored Program Control.

UNIT -III

Signaling: Introduction; Customer Line Signaling; Audio Frequency Junctions and Trunk Circuits; FDM Carrier Systems-Out band Signaling; in band (VF) Signaling; PCM Signaling; Inter Register Signaling; Common Channel Signaling Principles-General Signaling Networks; CCI I Signaling System Number 6; CCI i I Signaling System Number 7; The High Level Data Link Control Protocol; Signal Units; The Signaling Information Field.

UNIT -IV

Packet Switching: Introduction; Statistical Multiplexing; Local Area And Wide Area Networks-Bus Networks; Ring Networks; Comparison of Bus and Ring Networks; Optical Fiber Networks; Large Scale Networks-General; Data grams and Virtual Circuits; Routing; Flow Control; Standards; Frame Relay; Broadband Networks-General; The Asynchronous Transfer Mode; ATM Switches.

UNIT -V

Networks: Introduction; Analog Networks; Integrated Digital Networks; Integrated Services Digital Networks; Cellular Radio Networks; Intelligent Networks; Private Networks; Charging; Routing — General, Automatic Alternative Routing.

Text Books:

1. Telecommunications Switching and Traffic Networks, J. E Flood, Pearson Education, 2006.
2. Telecommunications Switching Systems and Networks, Tyagarajan Viswanathan, PHI, 2006.

References:

1. Digital Telephony, John C Bellamy ,N John Wiley International Student Edition,3rd Edition.
2. Data Communications and Networking, Behrouz A. Forouzan, TMH, 2nd Edition, 2002.
3. Introduction to Data Communication and Networking, Tomasi,Pearson Education, 1st Edition.

MICROPROCESSORS AND MICROCONTROLLERS LAB

III B.Tech. II Sem. **L T P C**
Course Code: 17EC3209PC **- - 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	interpret programs for various problems using 8086 microprocessor	3	3	3
CO2	develop interfacing between 8086 microprocessor and various peripherals	3	3	3
CO3	compile programs on Microcontroller based systems	3	3	3
CO4	interface 8051 ports with various peripherals	3	3	3
CO5	design Microprocessor and Microcontroller based systems	3	3	3

List of Experiments (Minimum of 14 experiments to be conducted):

1. Programs for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for8086.
3. Program for searching for a number or character in a string for8086
4. Program for code conversions for 8086
5. Program for counting for number of add and even numbers in an array for 8086
6. Program for string manipulations for8086.
7. Program for digital clock design using8086.
8. Interfacing ADC and DAC to8086.
9. Parallel communication between two microprocessors using 8255.
10. Serial communication between two microprocessor kits using 8251.
11. Interfacing to 8086 and programming to control stepper motor.
12. Programming using arithmetic, logical and bit manipulation instructions of8051.
13. Program and verify Timer/Counter in8051.
14. Program and verify Interrupt handling in8051.
15. UART Operation in8051.
16. Communication between 8051 kit and PC.
17. Interfacing LCD to8051.
18. Interfacing Matrix/Keyboard to8051.
19. Data Transfer from Peripheral to Memory through DMA controller8237/8257.

Micro-Projects: Student must submit a report on one of the following Micro–Projects before commencement of second internal examination.

1. Traffic light control
2. Digital clock
3. Display Controller
4. Digital Lock
5. Temperature Controller
6. A Bidirectional Visitors Counter
7. Water Level Controlling using Micro Controller
8. Electronic Voting Machine
9. Automated Street Lighting System
10. Access Control using RFID System

Reference:

1. Microprocessors and Microcontrollers Lab Manual, Department of ECE, CMRIT, Hyd.

DIGITAL SIGNAL PROCESSING LAB

III B.Tech.- II Sem **L T P C**
Course Code: 17EC3210PC **- - 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	classify various types of signals and perform linear operations on the signals	3	3	3
CO2	compute linear and circular convolution	3	3	3
CO3	analyze the principles of DIT FFT and DIF FFT algorithms	3	3	3
CO4	design digital IIR and FIR filter using various techniques	3	3	3
CO5	apply Multirate concepts in sampling rate conversion applications	3	3	3

LIST OF EXPERIMENTS

Part-A (Minimum **10** experiments to be conducted using software**):**

1. Generation of Sinusoidal waveform / signal based on recursive difference equations.
2. Impulse and step response of first order and second order systems.
3. Find frequency response of a given system given in (Transfer Function / Diff.Equation Form).
4. Find DFT / IDFT of given DT signal.
5. Find linear convolution using Overlap-add and Overlap-Save method.
6. Find circular convolution of given two sequences.
7. Implementation of FFT of given sequence.
8. Determination of Power Spectrum of a given signal(s).
9. Implementation of LP and HP IIR filter for a given sequence.
10. Implementation of BP and BS IIR filter for a given sequence.
11. Implementation of LP and HP FIR filter for a given sequence.
12. Implementation of BP and BS FIR filter for a given sequence.
13. Implementation of Decimation Process.
14. Implementation of Interpolation Process.
15. Implementation of I/D sampling rate converters.

Part-B (Minimum**6** experiments to be implemented on hardware**):**

1. Generation of Sine wave and square wave.
2. Find frequency response of a given system given in (Transfer Function/ Diff.Equation Form).
3. Find DFT of given DT signal.
4. Linear convolution of given two sequences.
5. Implementation of FFT of given sequence.
6. Implementation of LP and HP IIR/FIR filter for a given sequence.
7. Implementation of Decimation Process.
8. Implementation of Interpolatio
9. n Process.
10. Implementation of I/D sampling rate converters.

Micro-Projects: Student must submit a report on one of the following Micro–Projects before commencement of second internal examination.

1. Person Identification Based On Teeth Recognition
2. Digital Watermarking To Hide Text Messages
3. Heart Rate Measuring device using Fingertip
4. Traffic Signs Detection using MATLAB
5. Improved Speech Communication in Car
6. Signature Verification System
7. Bone Fracture Detection System
8. Object Tracker Based on Color
9. Diabetic Retinopathy Detection From Retinal Images
10. Defect Detection In Ceramic Tiles

Reference:

1.Digital Signal Processing Lab Manual, Department of ECE, CMRIT, Hyd.

MICROWAVE ENGINEERING LAB

III B.Tech. II Sem **L T P C**
Subject code: 17EC3211PC **- - 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	interpret the characteristics of microwave devices	3	3	3
CO2	determine scattering parameters of various microwave components	3	3	3
CO3	analyze various parameters of waveguide components	3	3	3
CO4	measure VSWR and antenna pattern	3	3	3
CO5	design a microwave communication link using microwave bench	3	3	3

LIST OF LAB EXPERIMENTS (Minimum 10 experiments to be conducted)

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Directional Coupler Characteristics.
4. VSWR Measurement.
5. Measurement of Waveguide Parameters.
6. Measurement of Impedance of a given Load.
7. Measurement of Scattering Parameters of E plane Tee.
8. Measurement of Scattering Parameters of H plane Tee.
9. Measurement of Scattering Parameters of Magic Tee.
10. Measurement of Scattering Parameters of Circulator.
11. Attenuation Measurement.
12. Microwave Frequency Measurement.
13. Antenna Pattern Measurements.

Micro-Projects: Student must submit a report on one of the following Micro–Projects before commencement of second internal examination.

1. Electronic tuning range of a Reflex Klystron
2. Directivity of a Directional Coupler
3. Transmission Coefficient of Various loads
4. Reflection Coefficient of a Matched Termination
5. Return loss of a SS Tuner
6. VSWR of a Horn antenna
7. Electronic tuning sensitivity of a Reflex klystron
8. Attenuation of a fixed attenuator
9. Properties of an E and H Plane TEE
10. Properties of a MAGIC TEE

Reference:

1. Microwave Engineering Lab Manual, Department of ECE, CMRIT, Hyd.

SOFT SKILLS

Mandatory Course (Non Credit)

III B.Tech. II Sem **L T P C**
Course Code: 17HS3212MC **- - 2 -**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	identify the need for self awareness and exhibit professional attitude	3	3
CO2	interpret and improve in personal and professional communication	3	3
CO3	develop leadership skills and enhance the employability	3	3
CO4	recognize the importance of decision making and change management to improve professional attributes	3	3
CO5	apply interview techniques for overall development	3	3

Unit -I

Awareness& Attitude: Who am I? – Roles we play in life - Introducing oneself – Plans for future – Strengths & Weaknesses – Hobbies
Definition of Discipline – Need for Discipline – Analysis of Discipline
Definition of Integrity – Need for Integrity – Role of Integrity in Success – Personal Integrity & Professional Integrity
Definition – Positive Attitude – Professional Attitude – Defeatist Attitude and Cynicism

Unit- II

People Skills: Relationships - Personal & Professional Relationships – Rapport Building – Personal Space
Definition of Motivation – Theories of Motivation – Self-motivation

Unit- III

Teamwork & Leadership: Definition of Team and Leadership Team Dynamics –Specialization and Teamwork – Rewards of Teamwork - Leading a Team Leadership Qualities – Leader vs Manager – Leadership Styles

UNIT IV

Decision Making & Change Management: Definitions – Theories of Decision Making – Hurdles in Decision Making
Definition – Change and Adaptability – Theories of Change Management

UNIT V

Preparation for Interviews: Body Language – Posture - Dressing and Grooming – Researching the Industry and the Organization - Types of Interviews –First Impressions – Dos and Don'ts of an Interview

Activities

1. Regular practice tests
2. Quiz, Crossword, Word-search and related activities
3. 5-minute presentations about concepts learnt
4. JAM and Picture Narration.
5. Mock Interviews

Text Books

1. For Grammar and Verbal Ability, we can propose Wren and Martin or Raymond Murphy Grammar books as the Text Book. It is proposed that we design a Course Book for "Soft Skills"

References

1. Soft Skills by Dr K.Alex , Sultan Chand And Co.
2. Practical Personality & Development by Janardana Krishna Pillalamarri, Scitech Publications (India) Pvt Ltd.

IV-B.TECH.-I-SEMESTER SYLLABUS

CELLULAR AND MOBILE COMMUNICATIONS

IVB.Tech.I Sem **L T P C**
Subject code: 17EC4101PC **4 - - 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO6	PO12	PO13
CO1	demonstrate the performance criteria of cellular systems	3	2	2	3	3
CO2	identify various types of interference and frequency planning	3	2	2	3	3
CO3	illustrate cell coverage, cell site and mobile antennas	3	2	2	3	3
CO4	summarize frequency management and channel assignment	3	2	2	3	3
CO5	classify various multiple access and spread spectrum techniques	3	2	2	3	3

Unit-I

Introduction to Cellular systems:Introduction to cellular mobile system, Generations of wireless mobile systems, Performance criteria, Basic cellular system, Hexagonal shaped cells, cellular geometry, concept of frequency reuse, trunking and grade of service, Improving capacity of cellular systems: Cell splitting, Sectoring, Micro cell concept, Handoff and dropped calls.

Unit-II

Interference and frequency planning:Introduction to Interference and system capacity, Co-channel Interference reduction factor, Desired C/I from a normal case in a Omni directional Antenna system, Design of directional Antenna system, Adjacent channel interference: Next channel and neighboring channel interference, Frequency management: Numbering, grouping of channels, channel types, channel assignment: fixed channel assignment, non-fixed channel assignment Interference in heterogeneous network, Effect of lowering the antenna height.

Unit-III

Cell Coverage for Signal and Traffic: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, and general formula for mobile propagation over water and flat open area, near and long distance propagation.

Cell Site and Mobile Antennas: Space Diversity Antennas, Umbrella Pattern Antennas, Minimum Separation of Cell Site Antennas, Mobile Antennas.

Unit-IV

Frequency Management and Channel Assignment: Numbering And Grouping, Setup Access And Paging Channels, Channel Assignments to Cell Sites and Mobile Units, Channel Sharing and Borrowing, Sectorization, Overlaid Cells, non Fixed Channel Assignment.

Unit-V

Multiple Access Techniques: FDMA, TDMA, CDMA, Time-division multiple access (TDMA), code division multiple access (CDMA), CDMA capacity, probability of bit error considerations, CDMA compared with TDMA.
Spread Spectrum Techniques: Direct sequence spread spectrum, Frequency Hopping Spread spectrum techniques.

Textbooks:

1. Mobile Cellular Telecommunications — W.C.Y. Lee, 2nd Edition, 1989, TMH.
2. Wireless Communications – Theodore. S. Rapport, Pearson Education, 2nd Edition, 2002

References:

1. Principles of Mobile Communications - Gordon L. Stuber, Springer International, 2nd Edn, 2001.
Modern Wireless Communications-Simon Haykin, Michael Moher,Pearson Education, 2005

VLSI DESIGN

IV-B. Tech.-I-Sem. **L T P C**
Subject Code: 17EC4102PC **4 1 - 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO7	PO12	PO13
CO1	interpret various MOS transistor fabrication techniques	3	2	3	3	3
CO2	illustrate operation and electrical characteristics of MOS transistor	3	2	2	3	3
CO3	discuss VLSI Design flow, Stick diagrams, layout, design rules	3	3	2	3	3
CO4	outline the concepts of MOS circuits	3	3	2	3	3
CO5	interpret scaling and various levels of CMOS testing	3	3	2	3	3

Unit-I

Introduction: Introduction to IC technology, Basic MOS transistors, Enhancement and depletion modes of transistor action. Fabrication process of NMOS, PMOS,CMOS and Bi-CMOS technology and comparison between CMOS and bipolar technologies.

Unit-II

Basic Electrical properties of MOS circuits: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds. CMOS Inverter analysis and design, Bi-CMOSInverters.MOS Transistor conductance and output conductance, MOS transistor figure of merit, Pass transistors, nMOS inverter , Determination of pull up to pull down ratio for an nMOS inverter driven by another nMOS inverter and for an nMOS inverter driven through one or more pass transistors, Alternate forms of pull up, CMOS inverter, BiCMOS Inverters.

Unit-III

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2μm CMOS Design rules for wires, Contacts and Transistors. LayoutDiagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

Unit-IV

Basic conceptsof MOS Circuits: Sheet resistance, Sheet resistance concept applied to MOS transistors and inverters, Area capacitance of layers , standard unit of capacitance, some area capacitance calculations, The delay unit, inverter delays, Driving large capacitance loads, Propagation delays, wiring capacitances, Fan-in and Fan-out characteristics, Choice of layers, CMOS steady state electrical behavior, CMOS dynamic electrical behavior.

Unit-V

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling.
CMOS Testing: Need for CMOS testing, design strategies for test Manufacturing test principles, Design for testability (DFT) - Adhoc testing, Scan design, Built in self-test (BIST).

Textbooks:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Dougles A. Pucknell, PHI, 2005.
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, DavidHarris, AyanBanerjee, 3rd Ed, Pearson, 2009.

References:

1. CMOS logic circuit Design - John.P. Uyemura, Springer, 2007.
2. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.

SATELLITE COMMUNICATIONS

IV -B.Tech.-I-Sem **L T P C**
Subject Code: 17EC4103PC **4 1 - 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO6	PO12	PO13
CO1	summarize orbital effects on satellite communications	3	2	3	2	3
CO2	interpret the subsystems of satellite	3	3	3	3	3
CO3	classify various multiple access and spread spectrum techniques	3	3	2	2	3
CO4	compare satellite subsystems with earth station technology	3	3	3	2	3
CO5	outline the satellite navigation and global positioning system	3	3	3	3	3

Unit-I

Introduction: Brief history of Satellite systems; Principles, architecture, advantages, disadvantages, applications and frequency bands used for satellite communication.

Orbital Mechanics and Launchers: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbital determination, Launches and Launch vehicles, Orbital effects in communication systems performance.

Unit–II

Satellite Subsystems: Attitude and Orbit control system, Telemetry, Tracking, Commanding and Monitoring, Power Systems, Communication Subsystems, Satellite antennas, Equipment reliability and Spacequalification.

Unit-III

Multiple Access: Frequency Division Multiple Access (FDMA), Intermodulation, calculation of C/N. Time Division Multiple Access (TDMA), Frame structure, Examples.

Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission andReception.

Unit-IV

Satellite Link Design: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, Uplink design, Design of satellite links for specified C/N, System design examples.

Earth Station Technology: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial Interface, Primary Power test methods.

Unit-V

Low Earth Orbit and Geo-Stationary Satellite Systems: Orbit considerations, Coverage and Frequency Consideration, Delay and Throughput considerations, Systems considerations, Operational NGSO ConstellationDesigns.

Satellite Navigation and Global Positioning System: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, GPS Receiver Operation, GPS C/A code accuracy, DifferentialGPS.

Textbooks:

1. Satellite Communications- Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition,2003.

References:

1. Satellite Communications: Design Principles- M. Richharia, B S publications, 2nd Edition, 2003.
2. Satellite Communication- D.C Agarwal, Khanna Publications, 5th Edition.

ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective – III)

IV-B.Tech.-I-Sem. **L T P C**
Subject Code: 17CE4104OE **3 0 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO6	PO7	PO10	PO12
CO1	identify the attributes to be considered for EIA	3	3	3	3
CO2	assess impact of deforestation	3	3	3	3
CO3	interpret impact prediction, significance of soil quality and mitigation	3	3	2	3
CO4	conduct environmental audit and prepare reports	3	3	2	3
CO5	illustrate environmental policies and provisions	3	3	3	3

Unit-I

Basic concept of EIA: Initial environmental Examination, Elements of EIA, factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters. E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

Unit-II

Assessment of impact of development activities on vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

Unit-III

Procurement of relevant soil quality, impact prediction, assessment of impact significance.
Identification and incorporation of mitigation measures for enhancement of soil quality.

Unit-IV

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report, Post Audit activities.

Unit-V

The Environmental Protection Act, The water Act, The Air (Prevention & Control of pollution Act.), Motor Act, Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.

Textbooks:

1. Environmental Pollution by R.K. Khitoliya S. Chand.
2. Environmental Impact Assessment, Barthwal, R. R. New Age International Publications.

References:

1. Larry Canter – Environmental Impact Assessment, TMH.
2. Suresh K. Dhaneja - Environmental Science and Engineering, S.K. Kataria & Sons Publication.
3. Bhatia, H. S. - Environmental Pollution and Control, Galgotia Publication, Pvt., Ltd., Delhi.

PRINCIPLES OF ENTREPRENEURSHIP
(Open Elective – III)

IV-B.Tech. I-Sem. **L T P C**
Subject Code: 17ME4104OE **3 0 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO7	PO8	PO9	PO11	PO12
CO1	illustrate concept & types of entrepreneurship	3	3	2	3	2
CO2	distinguish individual and corporate entrepreneurship	3	3	3	3	2
CO3	identify the process of launching new ventures	3	3	3	3	3
CO4	assess legal challenges of entrepreneurship	3	3	3	3	3
CO5	build entrepreneurial strategies	3	3	3	3	3

Unit-I: Entrepreneurship

The revolution impact of entrepreneurship- The evolution of entrepreneurship - Approaches to entrepreneurship- Process approach- Twenty first centaury trends in entrepreneurship.
Case: From candle seller to CEO (Arya Kumar P.No. 48).

Unit-II: Individual and corporate entrepreneurship

The entrepreneurial journey - Stress and the entrepreneur- the entrepreneurial ego- Entrepreneurial motivations - Corporate Entrepreneurial Mindset the nature of corporate entrepreneur.
Case: Globalizing Local Talent, (B. Janakiram, M. Rizwana, page 228).

Unit-III: Launching Entrepreneurial Ventures

Opportunities identification - entrepreneurial Imagination and Creativity - the nature of the creativity Process - Innovation and Entrepreneurship - Methods to initiate Ventures. Creating New Ventures - Acquiring an established entrepreneurial venture – Franchising - hybrid disadvantage of Franchising.
Case: creativity in start-ups (Arya Kumar Page 166).

Unit-IV: Legal challenges of Entrepreneurship

Intellectual Property Protection-Patents, Copyrights, Trademarks and Trade Secrets-Avoiding Pitfalls- Formulation of the entrepreneurial Plan- The challenges of new venture start-ups.
Case: Tata Motors – Nano (Arya Kumar P.No. 279).

Unit-V: Strategic perspectives in entrepreneurship

Strategic Planning-Strategic actions-strategic positioning-Business stabilization-Building the adaptive firms-understanding the growth stage-unique managerial concern of growing ventures.
Case: To Lease or Not: A Cash flow Question (David H.Holt, Page 452).

References:

1. Arya Kumar “Entrepreneurship- creating and leading an entrepreneurial org” Pearson 2012.
2. ‘Entrepreneurship: New Venture Creation’ David H Holt PHI, 2013.
3. Entrepreneurship: Text and Cases P. Narayana Reddy, Cengage, 2010.

PRINCIPLES OF EMBEDDED SYSTEMS
(Open Elective – III)

IV -B.Tech.-I-Sem **L T P C**
Subject Code: 17EC4104OE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO12
CO1	outline the basic concepts of embedded computing	3	3	2	2
CO2	illustrate the architecture of 8051 microcontroller	3	3	3	2
CO3	develop embedded programs using 8051 microcontroller	3	3	3	2
CO4	demonstrate 8051 microcontroller interface with peripherals	3	3	3	2
CO5	explain real time operating system concepts	3	3	3	3

Unit-I

Embedded computing: Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples.

Unit-II

The 8051 architecture: Introduction, 8051 micro controller hardware, input / output ports and circuits, external memory, counter and timers, serial data input / output, interrupts.

Unit-III

Basic assembly language programming concepts: The assembly language programming process, programming tools and techniques, programming the 8051.
Instructions set: Data transfer and logical instructions, arithmetic operations, decimal arithmetic. Jump and call instructions.

Unit – IV

Applications: Interfacing with keyboards, displays, D/A and A/D conversions, multiple interrupts, serial data communication.

Unit – V

Introduction to real - time operating systems: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

Textbooks:

1. Computers as Components - Principles of Embedded Computer System Design, Wayne Wolf, Elseveir.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.

References:

1. Microcontrollers, Raj kamal, Pearson Education.
2. An Embedded Software Primer, David E. Simon, Pearson Education.

WEB TECHNOLOGIES
(Open Elective – III)

IV – B.Tech. – I - Semester **L T P C**
Subject Code: 17CS4104OE **3 0 0 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO5	PO6	PO12
CO1	design web pages using HTML and JavaScript	3	3	3	3	3
CO2	develop web applications using PHP	3	3	3	2	3
CO3	make use of XML and DTD for web design	3	3	3	2	2
CO4	build web applications using servlets and session tracking	3	3	3	2	2
CO5	establish database connectivity using JSP and JDBC	3	3	3	2	2

Unit-I

Web: Introduction, Internet and web, web browsers, web servers, protocols.
HTML: Basics, elements, attributes, tags- list, tables, images, forms, frames, cascading style sheets.
Java Script: Introduction to scripting, control structures, conditional statements, arrays, functions, objects.

Unit-II

PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls, handling file uploads, connecting to database, executing simple queries, handling sessions and cookies, file handling.

Unit-III

XML: Basics of XML, Elements, Attributes, Name space, **Parsing:** DOM and SAX Parsers.
Introduction to DTD: internal and external DTD, Elements of DTD, DTD Limitations, XML Schema, Schema structure, XHTML.

Unit-IV

Servlets: Introduction, Lifecycle, Generic and HTTP servlet, passing parameters to servlet, HTTP servlet Request & Response interfaces, Deploying web Applications,
Session Tracking: Hidden form fields, cookies, URL- Rewriting, session.

Unit-V

JSP: Introduction, Difference Between servlets & JSP, Anatomy of JSP page, JSP elements: Directives, comments, Expressions, scriptlets, Declaration, Implicit JSP objects, using Action elements.
JDBC: Introduction, JDBC Drivers, Loading Driver, establishing connection, Executing SQL statement in JSP pages, MVC architecture

Text Books:

1. Web Technologies, Uttam K Roy, Oxford University Press.
2. The Complete Reference PHP- Steven Hozner, TMH.

References:

1. Java Server Pages-Hans Bergsten, SPD O'Reilly.
2. JavaScript, D. Flanagan O'Reilly, SPD.
3. Beginning Web Programming-Jon Dckett WROX.

COMPUTER NETWORKS

(Professional Elective – II)

IV – B.Tech. – I – Sem **L T P C**
Subject Code: 17EC4105PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO6	PO12	PO13
CO1	outline the basics of computer networks and various layers	3	2	2	3
CO2	demonstrate multiple access protocols	3	2	2	3
CO3	interpret network layer and routing algorithms	3	3	3	3
CO4	illustrate internetworking and various transport protocols	3	3	3	3
CO5	make use of various protocols of application layer	3	3	2	3

Unit-I

Overview of the Internet: Protocols and standards, Layering scenario, TCP/IP Protocol Suite, The OSI model, Internet history and administration, Comparison of the OSI and TCP/IP reference model.
Physical layer: Transmission Media, Guided Media, wireless transmission Media.
Data link layer: Design issues, CRC Codes, Elementary Data Link layer Protocols, sliding Window Protocol.

Unit-II

Multiple Access protocols-Aloha, CSMA, Collision free protocols, Ethernet –Physical layer, Ethernet Mac sub layer, Data link layer switching and use of bridges, learning bridges ,Spanning tree bridges, repeaters, hubs, bridges, switches ,routers and gateways.

Unit – III

Network layer: Network layer Design issues, store and forward packet switching connection less and connection oriented networks.

Routing Algorithms: Optimality principle, shortest path, flooding, distance vector routing, count to infinity problem, hierarchical routing, congestion control algorithms and admission control.

Unit – IV

Internetworking: Tunneling, internetwork Routing, Packet fragmentation, IPV4, IPV6 Protocol, IP addresses, CIDR, ICMP, ARP, RARP, DHCP.
Transport Layer: Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release.

Unit-V

The internet Transport protocols UD-RPC, Real time Transport protocols, The internet Transport protocols-Introduction to TCP, The TCP services model ,The TCP segment Header, The connection Establishment, The TCP Connection release, The TCP Connection management modeling, The TCP Sliding Window, The TCP Congestion Control.
Application Layer: Introduction, Providing services, Applications layer paradigms, HTTP, FTP,electronic mail, DNS,SSH.

Text Books:

1. Data Communications and Networking – Behrouz A Forouzan, Fourth Edition, TMH.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI

References:

1. Introduction to Data communication and Networking, Tamasi, Pearson Education
2. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W. Ross, 3rdEdition, Pearson.

WIRELESS COMMUNICATIONS AND NETWORKS

(Professional Elective – II)

IV – B.Tech. – I – Sem **L T P C**

Subject Code: 17EC4106PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO5	PO8	PO12	PO13
CO1	explain the basic concepts of cellular system design fundamentals	3	2	2	2	2	3
CO2	illustrate mobile radio propagation	3	2	2	2	2	3
CO3	analyze OFDM for wireless communication	3	3	3	3	2	3
CO4	discuss equalization and diversity	3	3	2	2	2	3
CO5	use of the existing and emerging Bluetooth and wireless standards	3	3	2	3	2	3

Unit -I:

THE CELLULAR CONCEPT-SYSTEM DESIGN FUNDAMENTALS: Introduction, Frequency Reuse, Channel Assignment Strategies, HandoffStrategies, Interference and system capacity –Co channel Interference and systemcapacity, Channel planning for Wireless Systems, Adjacent Channelinterference , Power Control for Reducing interference, Trunking andGrade of Service, Improving Coverage & Capacity in Cellular Systems.

Unit –II

MOBILE RADIO PROPAGATION: Free Space Propagation Model – Three Basic Propagation mechanism – Reflection, Diffraction and Scattering – Ground Reflection (Two Ray) model - Link Budget design using Path Loss model – Outdoor and Indoor Propagation models - Small scale multipath propagation –Parameters of mobile multipath channels – Types of small scale fading – Fading effects due to Multipath time delay spread and Fading effects due to Doppler spread - Rayleigh and Rician distribution.

Unit -III:

OFDM FOR WIRELESS COMMUNICATION: Overview of Linear Modulation Techniques– GMSK – Multicarrier Modulation –OFDM principle – Transceiver implementation, Cyclic prefix, Channel model and SNR performance, Inter carrier interference, PAPR. Frequency and Timing Offset Issues.

Unit -IV

EQUALIZATION AND DIVERSITY: Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non linear Equalization- DFE,MLSE, Algorithms for adaptive equalization, Diversity Techniques, RAKE Receiver.

UNIT -V:

BLUETOOTH AND IEEE 802.15: Overview, radio specification, baseband specification, link manager specification, logical link control and adaptation protocol, IEEE 02.15.

WIRELESS NETWORKS: Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE802.11,IEEE 802.11 Medium Access Control, Comparison of IEEE802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, Hiper Lan, WLL,WiMAX .

Text Books:

1. Wireless Communications, Principles, Practice – Theodore, S.Rappaport, 2nd Ed., 2002, PHI.
2. Advanced Wireless Communications-4G By. Savo G Glisic John Wiley & Sons Publication
3. Wireless Communications-Andrea Goldsmith, 2005 Cambridge University Press.
4. Mobile Cellular Communication – Gottapu Sasibhushana Rao, Pearson Education, 2012.

References:

1. Next Generation Wireless LANs by Eldad Perahia, Robert Stacey (2013)
2. Wireless Networks by Clint Smith and Daniel Collins (2014)
3. Wireless Digital Communications – Kamilo Feher, 1999, PHI.
4. Wireless Communication and Networking – William Stallings, 2003,PHI.

BIO MEDICAL INSTRUMENTATION

(Professional Elective – II)

IV B.Tech I Sem **L T P C**
SUBJECT CODE: 17EC4107PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO5	PO12	PO13
CO1	explain the concept of biomedical instrumentation	2	2	2	2	3
CO2	discuss bio potential electrodes and physiological transducers	3	3	3	3	3
CO3	analyze cardiac instrumentation	3	3	3	3	3
CO4	use operation theatre equipment	3	3	3	2	3
CO5	demonstrate the electrical safety of medical equipment	3	3	3	3	3

Unit-I

Components of Medical Instrumentation System: Static and Dynamic Characteristics of Medical Instruments, Bio signals and Characteristics, Problems encountered with Measurements from Human beings, Resting Potential Generation and Propagation of Action Potential.

Unit-II

Bio Potential Electrodes and Physiological Transducers: Electrode potential, Electrode equivalent circuit, Types of Electrodes: Skin Surface Electrodes, Needle Electrodes, Micro Electrodes. Biochemical Transducers.

Unit -III

Cardiac Instrumentation: Blood Pressure and Blood Flow Measurement, Specification of ECG Machine, Einthoven Triangle, Standard 12-Lead Configurations, Interpretation of ECG waveform with respect to Electro Mechanical Activity of the Heart.

Unit-IV

Operation Theatre Equipment: Spirometry, Anesthesia machine, Ventilators.Monitoring Equipment: Arrhythmia Monitor, Foetal Monitor, and Incubator.Medical Imaging Equipment: X-ray machine, Computed Tomography (CT), Ultrasound Imaging System

UNIT V

Electrical Safety of Medical Equipment:
Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Isolated Power Distribution System.

Text Books

1. Biomedical Instrumentation and Measurements - by Leslie Cromwell, F.J. Weibell, E.A. Pfeiffer, PHI.
2. Medical Instrumentation, Application and Design - by John G.Webster, John Wiley.
3. Dr. M. Arumugam, “Biomedical Instrumentation”, Anuradha publications, 2nd ed, 1994.

References

1. Principles of Applied Biomedical Instrumentation - by L.A. Geoddes and L.E. Baker, John Wiley and Sons.
2. Hand-book of Biomedical Instrumentation - by R.S. Khandpur, McGraw-Hill, 2003.
3. Biomedical Telemetry - by Mackay, Stuart R., John Wiley.

CODING THEORY AND TECHNIQUES

(Professional Elective – II)

IV -B.Tech.-I-SEM **L T P C**
Subject Code: 17EC4108PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO8	PO12	PO13
CO1	explain the basics of Coding for Reliable digital tTransmission and storage	3	3	3	2	3
CO2	discusscyclic codes	3	3	2	2	3
CO3	outline the concepts of convolution codes	3	3	2	2	3
CO4	analyze and perform Turbo codes	3	3	3	2	3
CO5	interpret the space time codes	3	3	3	2	3

Unit – I

Coding for Reliable Digital Transmission and storage: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.

Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system.

Unit - II

Cyclic Codes : Description, Generator and Parity-check Matrices, Encoding, Syndrome Computationand Error Detection, Decoding ,Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

Unit – III

Convolutional Codes: Encoding of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

Unit – IV

Turbo Codes:LDPC Codes- Codes based on sparse graphs, Decoding for binary erasure channel, Log-likelihood algebra, Brief propagation, Product codes, Iterative decoding of product codes, Concatenated convolutional codes- Parallel concatenation, The UMTS Turbo code, Serial concatenation, Parallel concatenation, Turbo decoding

UNIT - V

Space-Time Codes: Introduction, Digital modulation schemes, Diversity, Orthogonal space- Time Block codes, Alamouti's schemes, Extension to more than Two Transmit Antennas, Simulation Results, Spatial Multiplexing : General Concept, Iterative APP Preprocessing and Per-layer Decoding, Linear Multilayer Detection, Original BLAST Detection, QL Decomposition and Interface Cancellation, Performance of Multi – Layer Detection Schemes, Unified Description by Linear Dispersion Codes.

Text Books:

1. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J.Costello,Jr, PHI
2. Error Correcting Coding Theory-Man Young Rhee- 1989, McGraw-Hill

References:

1. Error Correcting Coding Theory-Man Young Rhee-1989,McGraw – Hill Publishing,
2. Digital Communications-Fundamental and Application - Bernard Sklar, PE.

CELLULAR AND MOBILE COMMUNICATIONS LAB

IV -B.Tech.-I-SEM **L T P C**
Subject code: 17EC4109PC **- - 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	design hexagonal cell, Frequency Reuse ,Cell splitting, Interference & Diversity Techniques	3	3	3
CO2	solve the Propagation Models & Path Loss Estimation, Antennas Multipath Fading and Channel Assignment	3	3	3
CO3	develop the Handoffs , Dropped Call Rates and rake receiver	3	3	3
CO4	analysis and design of 3G,GSM & CDMA	3	3	3
CO5	develop OFDM & Satellite Link	3	3	3

Note: The Programs shall be implemented in Software using MATLAB or equivalent software

List of Experiments (Minimum of 12 Experiments to be performed)

1. Create Hexagonal cell using matlab
2. Implementation of Frequency Reuse & Cell splitting
3. Design of Co-Channel Interference
4. Implementation of Non-Co-Channel Interference
5. Design of Diversity Techniques
6. Propagation Models and Path Loss Estimation in Cellular Mobile Communication
7. Design of Antennas
8. Multipath Fading in Cellular Mobile Communication
9. Implementation of Channel Assignment
10. Analysis of Handoffs & Dropped Call Rates
11. write mat lab program for rake receiver
12. Design of 3G cellular network
13. design GSM cellular network
14. design CDMA cellular network
15. Design of OFDM
16. Design of Satellite Link.

Reference:

1. Cellular and Mobile CommunicationsLab Manual, Department of ECE, CMRIT, Hyd.

VLSI DESIGN LAB

IV-B.Tech.-I-Sem. **L T P C**
Subject Code: 17EC4110PC **- - 3 2**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO14
CO1	test logic gates	3	3	3
CO2	design combinational circuits	3	3	3
CO3	develop sequential circuits	3	3	3
CO4	analyze finite state machines	3	3	3
CO5	construct CMOS circuit schematics and their layouts	3	3	3

List of Experiments *(*Any **six** experiments from each part are to be conducted):

Design and implementation of the following CMOS digital/analog circuits using **Cadence /Mentor Graphics / Synopsys /Equivalent** CAD tools:

E-CAD programs: Programming can be done using any complier. Down load the programs on FPGA/CPLD boards and performance testing may be done using pattern generator (32 channels) and logic analyzer apart from verification by simulation with any of the front end tools.

1. HDL code to realize all the logic gates.
2. Design of 2-to-4 decoder.
3. Design of 8-to-3 encoder (without and with priority).
4. Design of 8-to-1 multiplexer and 1-to-8 demultiplexer.
5. Design of 4 bit binary to gray code converter.
6. Design of 4 bit comparator.
7. Design of Full adder using 3 modeling styles.
8. Design of flip flops: SR, D, JK, T.
9. Design of 4-bit binary, BCD counters (synchronous / asynchronous reset).
10. Finite State Machine Design.

VLSI programs:Introduction to layout design rules - Layout, physical verification, placement & route forcomplex design, static timing analysis, IR drop analysis and crosstalk analysis of the following:

1. CMOS inverter.
2. CMOS NOR/ NAND gates.
3. CMOS XOR gates.
4. CMOS MUX gates.
5. CMOS half / full adder.
6. Static / Dynamic logic circuit (register cell).
7. Latch.
8. Pass transistor.
9. Layout of any combinational circuit (complex CMOS logic gate).
10. Analog Circuit simulation (AC analysis) – CS and CD amplifier.

Micro-Projects: Student must submit a report on one of the following Micro–Projects before commencement of second internal examination.

1. Design and Implementation of a Barrel Shifter.
2. Design of FIFO memory using Verilog.
3. Design of 7T SRAM cell.
4. Design 16 bit RISC processor.
5. Design Car parking system using Verilog.
6. Design a Ripple carry Adder.
7. Design a ring counter using Verilog.
8. Design a Alarm clock on FPGA using Verilog.
9. Design a multiplier using Carry look Ahead Adder
10. Design a 5 to 32 Decoder using Verilog.

Reference:

1. VLSI Design Lab Manual, Department of ECE, CMRIT, Hyd.

FOREIGN LANGUAGE: FRENCH
MANDATORY COURSE (NON-CREDIT)

IV-B.Tech.-I-Sem. **L T P C**
Subject Code: 17HS4112MC **3 0 0 0**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	identify the basic structure of French language, spelling and pronunciation	3	3
CO2	reproduce the grammatical structure for basic communication	3	3
CO3	recognize and use the grammatical structures for general comprehension	3	3
CO4	use the grammatical and lexical notions in formal and informal situations	3	3
CO5	apply the language skills in communicating effectively at a global platform	3	3

Unit-I: Introduction

At the airport: Savoir– faire: exchanging greetings, self introduction, introducing another, welcoming someone, identifying someone - Grammar: verbs _to be', _to call oneself', subject pronouns, interrogation.

Unit-II: Grammar

At the University: Savoir-faire: enquiring after one's welfare, taking leave, expressing appreciation - Grammar: definite & indefinite articles, gender of nouns, adjectives, present tense of regular verbs, to have, to learn, negation, irregular verbs

Unit-III: Conversation

At the café: Savoir –faire: speaking about one's likes, giving information, expressing admiration, asking information about someone - Grammar: Interrogative adjectives, irregular verbs, possessive and interrogative adjectives

Unit-IV: Proposal Writing & Formal Letters

At the beach: Savoir faire: proposing an outing, accepting/ refusing the proposal - Grammar: singular & plural, indefinite pronoun, demonstrative adjectives, negation, irregular verbs
A concert: Savoir –faire: inviting, accepting, expressing one's inability to accept an invitation

Unit- V: Regular & Irregular Verbs

Grammar: Present tense of more irregular verbs, contracted articles, future tense, interrogative adverbs, At Nalli's Savoir- faire: asking the price of an article, protesting against the price, Grammar: possessive adjectives, Exclamative adjectives, imperative tense

Reference:

1. Course Material: Synchronie I –Méthode de Français, Madanagobalane -Samita Publications, Chennai, 2007

FOREIGN LANGUAGE: GERMAN
MANDATORY COURSE (NON-CREDIT)

IV-B.Tech.-I-Sem. **L T P C**
Subject Code: 17HS4113MC **3 0 0 0**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO9	PO10
CO1	identify the basic structure of German language, spelling and pronunciation	3	3
CO2	reproduce the grammatical structure for self introduction	3	3
CO3	recognize and use the grammatical article structures for basic conversation	3	3
CO4	use the grammatical and verb structure for formal and informal situations	3	3
CO5	apply the language skills in communicating effectively at a global platform	3	3

Course structure:

A. German Language (speaking, reading, writing, grammar and test)
B. Life in Germany (shopping, restaurant, doctor, government, bank, post)
C. The German Way (introduction, doing business, conversation, meetings, dining)
D. Germany (Culture, Climate)

Unit-I: Pronounciation

Welcome: Introduction to the Language, Spelling and Pronunciation (The alphabets and numbers) Greetings, ordering, requesting, saying thank you - Grammar – **the article "the", conjugation** of verbs

Unit-II: Self Introduction

Shopping - Grammar – adjectives, endings before nouns, practice. Self introduction

Unit-III: Training

Addresses, Occupations, Studies – Grammar - **„to be', the definite/indefinite** articles, individual Training

Unit-IV: Oral

Leisure Time, Sports, Hobbies - Grammar – position of a verb in a main clause , oral practice

Unit-V: Narration

At a Restaurant, Food and Drink - Grammar – the personal pronoun in the Nominative and Accusative, Narrating an event

Resources:

1. Sprachkurs Deutsch 1 (Verlag Diesterweg), New Delhi Learning Centre

IV-B.TECH.-II-SEMESTER SYLLABUS

INTERNET OF THINGS

IV – B.Tech. – II – Sem **L T P C**
Subject Code: 17EC4201ES **4 1 - 4**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO6	PO7	PO12	PO13
CO1	explain IoT and its components	3	2	3	3	3	3
CO2	interface I/O devices, sensors and communication modules	3	2	3	3	3	3
CO3	design IoT methodology using python	3	3	3	3	3	3
CO4	solve IoT application frame work	3	3	3	3	3	3
CO5	develop IoT for real time applications	3	2	3	3	3	3

Unit-I: Fundamentals of IoT

Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT.

Unit-II: Elements of IoT

Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces; Software Components- Programming API's (using Python/Node.js/Arduino) for Communication; Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

Unit-III: Developing IoT

Introduction,IoT Design Methodology.Installing Python, Python Data Types & Data Structures.

Logical Design using Python: Control Flow, Functions, Modules, Packages, File Handling, Date/Time Operations, Classes, Python Packages.

Unit-IV: IoT Application

Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Logistics, Agriculture, Industry, Health & Life Style; Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices.

Unit-V: IoT Case Studies

IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation.

Textbook:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

References:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things -A hands -on approach", Universities Press, 2015, ISBN: 9788173719547
2. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
3. Marco Schwartz, "Internet of Things with the Arduino Yun", Packet Publishing, 2014.
4. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759.

DIGITAL SIGNAL PROCESSORS AND CONTROLLERS

(Professional Elective-III)

IV -B.Tech.-II-Sem **L T P C**
Subject Code: 17EC4202PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO5	PO12	PO13
CO1	illustrate DSP andarchitectures for programmable DSP	3	2	2	2	3
CO2	analyze programmable digital signal processors	3	3	2	2	3
CO3	explore the architecture of different ARM Processors	3	3	3	2	3
CO4	construct ASM level program using the instruction set	3	3	3	2	3
CO5	develop DSP and ARM processors applications	3	3	3	2	3

Unit-I

Introduction to Digital Signal Processing: Introduction, A digital Signal – Processing system, the sampling process, Discrete time sequences, Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation.

Architectures for Programmable DSP devices: Basic Architectural features, DSP computational building blocks, Bus Architecture and Memory, Data addressing capabilities, Address generation unit, programmability and program execution, speed issues, features for external interfacing.

Unit-II

Programmable Digital Signal Processors: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX processors, memory space of TMS320C54XX processors, program control, TMS320C54XX instructions and programming, On-Chip peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX processors.

Unit-III

Architecture of ARM Processors: Introduction to the architecture, Programmer's model- operation modes and states, registers, special registers, floating point registers, Behavior of the application program status register(APSR)-Integer status flags, Q status flag, GE bits, Memory system-Memory system features, memory map, stack memory, memory protection unit (MPU), Exceptions and Interrupts-what are exceptions?, nested vectored interrupt controller(NVIC), vector table, Fault handling, System control block (SCB), Debug, Reset and reset sequence.

Technical Details of ARM Processors: General information about Cortex-M3 and cortex M4 processors-Processor type, processor architecture, instruction set, block diagram, memory system, interrupt and exception support, Features of the cortex-M3 and Cortex-M4 Processors-Performance, code density, low power, memory system, memory protection unit, interrupt handling, OS support and system level features, Cortex-M4 specific features, Ease of use, Debug support, Scalability, Compatibility

UNIT-IV

Instruction SET: Background to the instruction set in ARM Cortex-M Processors, Comparison of the instruction set in ARM Cortex-M Processors, understanding the assembly language syntax, Use of a suffix in instructions, Unified assembly Language (UAL), Instruction set, Cortex-M4-specific instructions, Barrel shifter, Accessing special instructions and special registers in Programming.

Unit-V

Floating Point Operations: About Floating Point Data,Cortex-M4 Floating Point Unit (FPU)-overview, FP registers overview, CPACR register, Floating point register bank, FPSCR, FPU-FPCCR, FPU-FPCAR, FPU-FPDSCR, FPU-MVFR0, FPU-MVFR1.

ARM Cortex-M4 and DSP Applications: DSP on a microcontroller, Dot Product example, writing optimized DSP code for the Cortex-M4-Biquad filter, Fast Fourier transform, FIR filter.

Text Books:

1. Digital Signal Processing- Avtar Singh and S. Srinivasan, Thomson Publications,2004.
2. The Definitive Guide to ARM Cortex-M3 and Cortex-M4 Processors by Joseph Yiu, Elsevier Publications, Third edition.

References:

1. ARM System Developer's Guide Designing and Optimizing System Software by Andrew N. SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier Publications, 2004.

RADAR SYSTEMS

(Professional Elective-III)

IV -B.Tech.-II-Sem **L T P C**
Subject Code: 17EC4203PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO7	PO12	PO13
CO1	outline radar fundamentals andradar equation	3	2	2	2	3
CO2	explain various types of radars	3	2	2	2	3
CO3	summarize the working principle of CW-FM radar	3	2	2	2	3
CO4	illustrate target detection and tracking	3	2	2	2	3
CO5	classify various transmitters & receivers	3	3	3	2	3

Unit-I

Introduction: Radar Block Diagram and Operation, Simple form of Radar Equation, Radar Frequencies, Waveforms and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise and SNR, Integration of Radar Pulses, Transmitter Power, Radar Cross Section of simple Targets, PRF and Range Ambiguities, Modified Radar Range Equation, Illustrative Problems.

Unit-II

MTI and Pulse Doppler Radar: Introduction, Principle, MTI radar with - power amplifier transmitter and power oscillator transmitter, delay line cancellers – filter characteristics, blind speeds, double cancellation, staggered PRFs. range gated doppler filters. MTI radar parameters, limitations to MTI performance. MTI versus pulse doppler radar.

Unit-III

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics (Approaching / Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar.

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems

Unit-IV

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one and two coordinates), Phase Comparison Monopulse.Tracking in Range, Acquisition and Scanning Patterns.Comparison of Trackers.

Unit-V

Detection of Radar Signals in Noise : Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

Radar Receivers: Noise Figure and Noise Temperature. Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Applications, Advantages and Limitations.

Textbook:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Edn.

References:

1. Radar Principles, Technology, Applications-Byron Edde, Pearson Education.2004

ARTIFICIAL NEURAL NETWORKS

(Professional Elective-III)

IV -B.Tech.-II-Sem **L T P C**
Subject Code: 17EC4204PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO5	PO6	PO12	PO13
CO1	illustrate the functionalities of Neural Networks and Learning process	3	3	2	3	2	3
CO2	analyze the single-layer and multi-layer perceptrons	3	3	3	3	2	3
CO3	explain back propagation	3	3	3	3	2	3
CO4	interpret self-organization maps	3	3	3	3	2	3
CO5	outline neuro dynamics	3	2	3	3	3	3

Unit -I

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

UNIT -II

Single Layer Perceptrons: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron —Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment

Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

UNIT -III

Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT -IV

Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self Organization Map, SCM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification

UNIT -V

Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm Hopfield Models — Hopfield Models, Computer Experiment

Text Book

1. Neural Networks a Comprehensive Foundations, Simon Haykin, PHI edition.

References:

1. Artificial Neural Networks – B. Vegnanarayana Prentice Hall of India P Ltd 2005
2. Neural Networks in Computer Inteligance, Li Mm Fu TMH 2003
3. Neural Networks -James A Freeman David M S Kapura Pearson Education 2004.
4. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

TELEVISION ENGINEERING

(Professional Elective – III)

IV -B.Tech.-II-Sem. **L T P C**
Subject Code: 17EC4205PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO5	PO6	PO7	PO12	PO13
CO1	explain the fundamental concepts of television	3	2	2	3	2	3
CO2	outline monochrome television systems used worldwide and its compatibility	3	2	3	3	2	3
CO3	discuss formation of color picture and working of color picture tubes	3	3	3	3	2	3
CO4	demonstrate colour TV transmission and reception	3	3	3	3	3	3
CO5	analyze advanced television systems	3	3	3	3	3	3

UNIT-I

FUNDAMENTALS OF TELEVISION: Introduction to TV transmission and reception, synchronization, formation of picture, aspect ratio, picture resolution, brightness, image continuity, scanning- horizontal and vertical scanning, interlaced scanning-horizontal synchronization blanking standards & vertical synchronization blanking standards, video bandwidth, line and frame frequencies, composite video signal, colour signal generation, mixing of colours, luminance signal, colour difference signal, formation of chrominance signal, CCIR-B standards.

Unit-II

MONOCHROME TELEVISION TRANSMITTER & RECEIVER: Monochrome TV transmitter block diagram-TV signal propagation-interference-TV transmitting and receiving antennas, monochrome TV receiver block diagram- RF tuner-UHF,VHF tuners-video IF amplifier-video detector, inter carrier sound system, AGC noise cancellation.

Unit-III

ESSENTIALS OF COLOUR TV: Compatibility, colour perception, three colour theory- luminance, hue, saturation, colour TV cameras, values of luminance and colour difference signals, colour picture tubes- delta gun, precision-in-line, trintron colour picture tubes.

Unit- IV

COLOUR TV TRANSMISSION & RECEPTION: Colour TV transmitter block diagram, color TV receiver block diagram, colour burst signal, frequency interleaving, VSB transmission, modulation of color difference signals, positive and negative modulation,

COLOUR TELEVISION SYSTEMS: Colour TV systems-NTSC colour TV system, SECAM system, PAL colour TV system, Cancellation of phase errors-PAL-DColour system, block diagram of PAL encoder, block diagram of PALDecoder, LCD display-types of displays.

Unit- V

ADVANCED TELEVISION SYSTEMS: Television via satellites-Block diagram of television via satellite, Cable TV – VCR- Video Disc recording and playback, Tele Text broadcast receiver, DTH, digital TV – Transmission and reception, MATV, CATV and CCTV system, LED TV, HDTV and UHD TV, projection TV, Stereo sound in TV, 3D TV, EDTV.

Text Books:

1. Modern Television Practice – Principles, Technology and Service – R.R. Gulati, New Age International Publication, 2002.

References:

1. Colour Television Theory and Practice – S.P. Bali, TMH, 1994.
2. Television and Video Engineering - A.M. Dhake, 2nd Edition.
3. Basic Television and Video Systems – B. Grob and C.E. Herndon, McGraw Hill, 1999.

DATA ANALYTICS & MACHINE LEARNING

(Professional Elective – IV)

IV -B.Tech.-II-Sem **L T P C**
Subject Code:17EC4206PE **4 1 0 4**
Pre- requisites :

- Programming Language(preferably Java), SQL (queries and sub queries),
- A Course on "Statistical and Numerical Methods & "Data Warehousing and Data Mining"

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO1	PO2	PO3	PO5	PO12
CO1	explain basic concepts of Big Data	3	3	2	2	3
CO2	outline the functionalities of hadoop distributed file system	3	3	2	3	3
CO3	discuss the hadoop eco systems	3	3	3	3	3
CO4	elaborate machine learning process	3	3	3	3	3
CO5	analyze learning	3	3	3	3	3

Unit -I

INTRODUCTION TO BIG DATA : Introduction – distributed file system – Big Data Definition, Four Vs, Characteristic Features – Big Data Life Cycle – Big Data Applications –Big Data vs Traditional Data - Risks of Big Data - Structure of Big Data - Challenges of Conventional Systems - Web Data – Evolution of Analytic Scalability - Evolution of Analytic Processes, Tools and methods - Analysis vs Reporting - Modern Data Analytic Tools.

Unit- II

HDFS(Hadoop Distributed File System): The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Map Reduce Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features, Matrix-Vector Multiplication and Case Studies.

Unit III

Hadoop Eco Systems: Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Installing and Running PIG, Pig Latin-Structure, Expressions, Types, Functions, Macros, Schemas, User Defined Functions-Filter UDF, Eval UDF, Load UDF, Data Processing operators, parallelism and parameter substitution and Case Studies.

Unit - IV

Introduction to Machine Learning: Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

UNIT - V

Learning: Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm,
Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Computational learning theory – Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite and infinite Hypothesis Space.
Instance-Based Learning- Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression.

TextBooks

1. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
2. Richard Cotton, "Learning R – A Step-by-step Function Guide to Data Analysis, ,O'Reilly Media, 2013.
3. Machine Learning – Tom M. Mitchell, - MGH
4. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)

References:

1. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.
3. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.

DIGITAL IMAGE PROCESSING

(Professional Elective – IV)

IV B.Tech ECE II-Sem **L T P C**
Subject Code: 17EC4207PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO5	PO12	PO13
CO1	explain image fundamentals and transforms	3	2	2	3
CO2	utilize image enhancement and color image processing techniques	3	3	3	3
CO3	make use of image restoration techniques and wavelets	3	3	3	3
CO4	apply image segmentation and morphological image processing	3	3	3	3
CO5	analyze image compression techniques	3	3	3	3

Unit-I

Digital Image Fundamentals: Elements of visual perception, image sensing and acquisition, image Sampling and quantization; basic relationships between pixels–neighborhood,adjacency,Connectivity, distance measures.
Image Transforms: 2-D FFT, Walsh, Hadamard, Discrete Cosine, Haar, Slant and Hotelling Transforms,properties.

Unit-II

Image Enhancements and Filtering: Gray level transformations, histogram equalization and Specifications; pixel-domain smoothing filters – linear and order-statistics; pixel-domain sharpening filters – first and second derivative; frequency domain filters – low-pass and high-pass.
Color Image Processing: Color models–RGB, YUV, HSI; Color transformations– formulation, Color complements, color slicing, tone and color corrections; Color image smoothing and Sharpening; Color Segmentation.

Unit-III

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, LMS Filters, Constrained Least Squares Restoration, Interactive Restoration.

Wavelets and Multi-resolution image processing: Uncertainty principles of Fourier Transform, Time-frequency localization, continuous wavelet transforms, wavelet bases and multi-resolution Analysis, wavelets and Sub band filter banks, wavelet packets.

Unit-IV

Image Segmentation: Detection of discontinuities, edge linking and boundary detection; thresholding–global and adaptive; region-based segmentation.
Morphological Image Processing: Dilation-Structuring Element Decomposition; Erosion; Combining Dilation and Erosion; Opening and Closing, Hit or Miss Transformation.

Unit-V

Image Compression: Redundancy–inter-pixel and psycho-visual; Lossless compression –predictive, entropy; Lossy compression- predictive and transform coding; Still image compression standards – JPEG and JPEG-2000.

Textbooks:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, 3rd edition 2008, Pearson Education.

References:

1. Anil Kumar Jain, Fundamentals of Digital Image Processing, 2nd edition 2004, PHI.

RF CIRCUIT DESIGN

(Professional Elective – IV)

IV -B.Tech.-II-Sem **L T P C**
Subject Code: 17EC4208PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO5	PO12	PO13
CO1	illustrate RF circuits and transmission line theory	3	2	2	2	3
CO2	demonstrate the single port, multiport networks	3	3	3	3	3
CO3	outline the active RF component modeling	3	2	3	3	3
CO4	explain matching and biasing networks	3	2	3	3	3
CO5	analyze RF transistor amplifier and Oscillators	3	3	3	3	3

Unit – I

Introduction: Importance of RF Design-Dimensions and Units-Frequency Spectrum-RF Behavior of Passive Components: High Frequency Resistors, High Frequency Capacitors, High Frequency inductors.-Chip Components and Circuit Board Considerations: Chip Resistors, Chip Capacitors, and Surface Mount inductors.
Review of Transmission Lines: Types of Transmission Lines-Equivalent Circuit representation—R, L, C, G parameters of Different Line configurations— Terminated Lossless Transmission Lines-Special Terminations: Short Circuit, Open Circuit and Quarter 1Vave Transmission Lines— Sourced and Loaded Transmission Lines: Power Considerations, Input Impedance Matching,Return Loss and Insertion Loss.

Unit - II:

Single and Multi-Port Networks: The Smith Chart: Reflection Coefficient,Normalized Impedance-Impedance Transformation: Standing wave Ratio, Special Transformation Conditions-Admittance Transformation-Parallel and Series RL & RC Connections-Basic Definitions of Single and Multi-Port Networks-interconnecting Networks.RF Filter Design: Scattering Parameters: Definition, Meaning, Chair Scattering Matrix, Conversion between S- and Z-parameters, Signal FIow Chart Modeling, Generalization-Basic Resonator and Filter Configurations Low Pass, High Pass, Band Pass and Band Stop type Filters-Filter Implementation using Unit Element and Kuroda's Identities Transformations Coupled Filters.

Unit - III

Active RF Component Modeling: RF Diode Models: Nonlinear and Linear Models-Transistor Models: Large Signal and Small Signal BJT Models, Large Signal and Small Signal FET Models-Scattering Parameter, Device Characterization.

Unit – IV

Matching and Biasing Networks: Impedance Matching Using Discrete Components: Two Component Matching Networks, Forbidden Regions, Frequency Response and Quality Factor, T and P1 Matching Networks- Amplifier Classes of Operation and Biasing Networks: Classes of Operation and Efficiency of Amplifiers, Biasing Networks for BJT, Biasing Networks for FET.

Unit – V

RF Transistor Amplifier Design: Characteristics of Amplifiers- Amplifier Power Relations: RF Source, Transducer Power Gain, Additional Power Relations-Stability Considerations: Stability Circles, Unconditional Stability, And Stabilization Methods-Unilateral and Bilateral Design for Constant Gain- Noise Figure Circles- Constant VSWR Circles.
RF Oscillators and Mixers: Basic Oscillator Model: Negative Resistance Oscillator, Feedback Oscillator Design, Design steps, Quartz Oscillators- Fixed Frequency High Frequency Oscillator -

Basic Characteristics of Mixers: Concepts, Frequency Domain Considerations, Single Ended Mixer Design, Single and Double Balanced Mixers.

Text Books:

1. RF Circuit Design — Theory and Applications – Reinhold Ludwig, Pavel Bsetchko —Pearson Education India, 2000.
2. Radio Frequency and Microwave Communication Circuits — Analysis and Design – Devendra K.Misra — Wiley Student Edition — John Wiley & Sons, Inc.

References:

1. Radio Frequency and Microwave Electronics — Matthew M. Radmanesh — PEI.
2. RF Circuit Design — Christopher Bowick, Cheryl Aljuni and John Biyler, Elsevier Science, 2008.
3. Secrets of RF Circuit Design – Joseph J.Carr, TMH, 2000.
4. Design of RF and Microwave Amplifiers and Oscillators – Peter L.D. Abrif, Artech House, 2000.
5. The Design of CMOS Radio Frequency Integrated Circuits – Thomas H. Lee, 2/e –Cambridge University Press, 2004

ADHOC WIRELESS SENSOR NETWORKS

(Professional Elective – IV)

IV -B.Tech.-II-Sem **L T P C**
Subject Code: 17EC4209PE **3 - - 3**

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO2	PO3	PO6	PO12	PO13
CO1	explain basic concepts of Ad-hoc wireless networks	3	2	2	2	3
CO2	summarize the working and the performance of MAC layer Protocols	3	2	3	3	3
CO3	discuss operation of routing protocol	3	3	3	3	3
CO4	outline the performance of transport layer protocol	3	2	3	3	3
CO5	analyze wireless sensor network Architecture &Protocols	3	3	3	3	3

Unit - I

Wireless LANs and PANs: Introduction, Fundamentals of WLANS, IEEE 802.11 Standards, HIPERLAN Standard, Bluetooth, Home RF.

AD HOC wireless Networks: Introduction, Issues in Ad Hoc Wireless Networks.

Unit - II

MAC Protocols: Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Designgoals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

Unit - III:

Routing Protocols: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols.

Unit – IV

Transport Layer Protocols: Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks.

Unit – V:

Wireless Sensor Networks: Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, other Issues.

Text Books:

1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, 2004, PHI.
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control - Jagannathan Sarangapani, CRC Press.

References:

1. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh , 1st Ed. Pearson Education.
2. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.