

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

(Approved by AICTE | Accredited by NAAC | Affiliated to JNTUA)
Gudur, Nellore Dist - 524101, A.P (India)



OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM

BACHELOR OF TECHNOLOGY

ACADEMIC REGULATIONS UNDER AUTONOMOUS STATUS

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech Regular Four Year Degree Programme
(for the batches admitted from the academic year 2018 - 2019)

&

B.Tech (Lateral Entry Scheme)
(for the batches admitted from the academic year 2019 - 2020)

**FAILURE TO READ AND UNDERSTAND THE REGULATIONS
IS NOT AN EXCUSE**

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One best book is equal to hundred good friends, but one good friend is equal to a library.

All of us do not have equal talent, but all of us have an equal opportunity to develop our talents

“This is the way to success”

Dr.A.P.J.Abdul Kalam

VISION AND MISSION OF THE INSTITUTE

VISION

To make Audisankara College of Engineering & Technology a centre of academic excellence where 21st century innovative minds manage with novel ideas & spread out new technologies relevant in meeting the social needs with increased employment opportunities and changed life style.

MISSION

To provide the students with Technological direction and support, acclaimed in latest cutting edge technologies with a blend of academic concepts and practical nuances in hot areas of Engineering and Technology so that they develop all the resourcefulness, competence and confidence to take on the technological challenges of tomorrow.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

Academic Council: The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Autonomy: Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.

Academic Year: It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., (one odd + one even) and one supplementary semester.

AICTE: Means All India Council for Technical Education, New Delhi.

Autonomous Institute: Means an institute designated as autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (Jawaharlal Nehru Technological University, Ananthapuramu) and State Government.

Backlog Course: A course is considered to be a backlog course if the student has obtained a failure grade (F) in that course.

Basic Sciences: The courses offered in the areas of Mathematics, Physics, Chemistry, English etc., are considered to be foundational in nature.

Betterment: Betterment is a way that contributes towards improvement of the student's grade in any course(s). It can be done by either (a) re-appearing or (b) re-registering for the course.

Board of Studies (BOS): BOS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.

Branch: Means specialization in a program like B.Tech degree program in Mechanical Engineering, B.Tech degree program in Computer Science and Engineering etc.

Certificate Course: It is a course that makes a student gain hands-on expertise and skills required for holistic development in a specific area/field.

Choice Based Credit System: The credit based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

Compulsory course: Course required to be undertaken for the award of the degree as per the program.

Commission: Means University Grants Commission (UGC), New Delhi.

Continuous Internal Examination: It is an examination conducted towards sessional assessment.

Course: A course is a subject offered by a department for learning in a particular semester.

Course Outcomes: The essential skills that need to be acquired by every student through a course.

Credit: A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

Credit point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student over all the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff and other resources in the process of study for a degree.

Dropping from the Semester: A student who doesn't want to register for any semester can apply in writing in prescribed format before commencement of that semester.

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

Evaluation: Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal assessment and semester end examinations.

Grade: It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

Institute: Means AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY, Gudur, Nellore Dist, Andhra Pradesh unless indicated otherwise by the context.

Massive Open Online Course (MOOC): MOOC courses inculcate the habit of self learning. MOOC courses would be additional choices in all the elective group courses.

Pre-requisite: A course, the knowledge of which is required for registration into higher level course.

Core: The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

Professional Elective: It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

Program: Means, Bachelor of Technology (B.Tech) degree program / PG degree program: Master of Technology (M.Tech) / Master of Business Administration (MBA) / Master of Computer Applications (MCA).

Program Educational Objectives: The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

Project work: It is a design or research based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit based course and is to be planned carefully by the student.

Re-Appearing: A student can reappear only in the semester end examination for the theory component of a course, subject to the regulations contained herein.

Registration: Process of enrolling into a set of courses in a semester of a Program.

Regulations: The regulations, common to all B.Tech programs offered by Institute are designated as “ASCET Regulations R-16” and are binding on all the stakeholders.

Semester: It is a period of study consisting of 15 to 18 weeks of academic work equivalent to normally 90 working days. The odd Semester starts usually in July and even semester in December.

Semester End Examinations: It is an examination conducted for all courses offered in a semester at the end of the semester.

S/he: Means “she” and “he” both.

Student Outcomes: The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioral.

University: Means the Jawaharlal Nehru Technological University Anantapur, Ananthapuramu.

FOREWORD

The autonomy is conferred to AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY, (ASCET) Gudur, Nellore Dist, Andhra Pradesh by University Grants Commission (UGC), New Delhi based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like J N T University Anantapur (JNTUA), Ananthapuramu and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the institute and recommendations of the JNTUA to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the institute to order to produce a quality engineering graduate to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL



**AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
Gudur, Nellore Dist - 524101, A.P (India)**

ACADEMIC REGULATIONS

**B.Tech. Regular Four Year Degree Programme
(For the batches admitted from the academic year 2018 - 19)
&
B.Tech. (Lateral Entry Scheme)
(For the batches admitted from the academic year 2019 - 20)**

For pursuing four year undergraduate Bachelor Degree programme of study in Engineering (B.Tech) offered by AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY under Autonomous status and herein after referred to as ASCET.

1.0 CHOICE BASED CREDIT SYSTEM

The Indian Higher Education Institutions (HEI's) are changing from the conventional course structure to Choice Based Credit System (CBCS) along with introduction to semester system at first year itself. The semester system helps in accelerating the teaching-learning process and enables vertical and horizontal mobility in learning.

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

Choice Based Credit System (CBCS) is a flexible system of learning and provides choice for students to select from the prescribed elective courses. A course defines learning objectives and learning outcomes and comprises of lectures / tutorials / laboratory work / field work / project work / comprehensive Examination / seminars / assignments / alternative assessment tools / presentations / self-study etc. or a combination of some of these.

Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students.

The CBCS permits students to:

- Choose electives from a wide range of elective courses offered by the departments.
- Undergo additional courses of interest.
- Adopt an interdisciplinary approach in learning.
- Make the best use of expertise of the available faculty.

2.0 ELIGIBILITY FOR ADMISSION

The total seats available as per the approved intake are grouped into two categories viz. category A and Category B with a ratio of 70:30 as per the state government guidelines vide G.O No.52.

2.1 The admissions for category A and B seats shall be as per the guidelines of Andhra Pradesh State Council for Higher Education (APSCHE) in consonance with government reservation policy.

- Under Category A: 70% of the seats are filled through EAMCET counseling.
- Under Category B: 30% seats are filled based on 10+2 merits in compliance with guidelines of APSCHE.

2.2 Admission eligibility-Under Lateral Entry Scheme Students with diploma qualification have an option of direct admission into 2nd year B. Tech. (Lateral entry scheme). Under this scheme 10% seats of sanctioned intake will be available in each course as supernumerary seats. Admissions to this three year B Tech later entry Programme will be through ECET. The maximum period to complete B. Tech. under lateral entry scheme is six consecutive academic years from the date of joining.

3.0 DURATION OF PROGRAMME

The course duration for the award of the Degree in **Bachelor of Technology** will be four academic years, with two semesters in each year. However if a student is unable to complete the course within 4 years, he/ she can do so by giving more attempts but within 8 consecutive academic years from the date of admission.

Academic Calendar

For all the eight semesters a common academic calendar shall be followed in each semester by having sixteen weeks of instruction, one week for the conduct of practical exams and with three weeks for theory examinations and evaluation. Dates for registration, sessional and end semester examinations shall be notified in the academic calendar of every semester. The schedule for the conduct of all the curricular and co-curricular activities shall be notified in the planner.

4.0 MEDIUM OF INSTRUCTION

The medium of instruction shall be English for all courses, examinations, seminar presentations and project work. The curriculum will comprise courses of study as given in course structure, in accordance with the prescribed syllabi.

5.0 BRANCHES OF STUDY

- Civil Engineering (CE)
- Electrical & Electronics Engineering (EEE)
- Mechanical Engineering (ME)
- Electronics & Communication Engineering (ECE)
- Computer Science & Engineering (CSE)

6.0 TYPES OF COURSES

6.1 Foundation / Skill Course:

Foundation courses are the courses based upon the content leads to enhancement of skill and knowledge as well as value based and are aimed at man making education. Skill subjects are those areas in which one needs to develop a set of skills to learn anything at all. They are fundamental to learning any subject.

6.2 Core Course:

There may be a core course in every semester. This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

6.3 Elective Course:

Electives provide breadth of experience in respective branch and applications areas. Elective course is a course which can be chosen from a pool of courses. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline/domain
- Nurturing student's proficiency/skill.

An elective may be discipline centric (Professional Elective) focusing on those courses which add generic proficiency to the students or may be chosen from an unrelated discipline called as "Open Elective".

There are four professional elective groups; students can choose not more than two courses from each group. Overall, students can opt for four professional elective courses which suit their project work in consultation with the faculty advisor/mentor. Nevertheless, one course from each of the two open electives has to be selected.

6.4 Mandatory Course:

For mandatory courses like Induction Training, Environmental Sciences, Indian Constitution, Essence of Indian Traditional Knowledge, a student has to secure 40 marks out of 100 marks (i.e 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. For **Mandatory** courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

6.5 Activity Point Programme (APP):

For Activity Point Programme (APP) courses like Professional Society Activities, Communication Skills Practice, Soft Skills Practice, Quantitative Aptitude and Technical Aptitude, a student has to secure 40 marks out of 100 marks (i.e 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. For **APP** courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

6.6 NCC/ NSO and NSS Courses:

For the courses of NCC / NSO and NSS, a satisfactory participation certificate shall be issued to the student from the authorities concerned.

6.7 Mandatory/ Non-credit Courses Marks/Grade:

No marks or letter grade shall be allotted for all mandatory/non-credit courses.

7.0 SEMESTER STRUCTURE

Each academic year is divided into two semesters, TWO being MAIN SEMESTERS (one odd + one even). Main Semesters are for regular class work. However, the following cases are exempted:

- 7.1 Students admitted on transfer from JNTUA affiliated institutes, Universities and other institutes in the subjects in which they are required to earn credits so as to be on par with regular students as prescribed by concerned 'Board of Studies'.
- 7.2 Each main semester shall be of 21 weeks (Table 1) duration and this period includes time for registration of courses, course work, examination preparation and conduct of examinations.
- 7.3 Each main semester shall have a minimum of 90 working days; out of which number of contact days for teaching / practical are 75 and 15 days for conduct of exams and preparation.
- 7.4 The academic calendar shown in Table 1 is declared at the beginning of the academic year.

Table 1: Academic Calendar

FIRST SEMESTER (21 weeks)	I Spell Instruction Period	8 weeks	19 weeks
	I Mid Examinations	1 week	
	II Spell Instruction Period	8 weeks	
	II Mid Examinations	1 week	
	Preparation and Practical Examinations	1 week	
	Semester End Examinations	2 weeks	
Semester Break and Supplementary Examinations			2 weeks
SECOND SEMESTER (21 weeks)	I Spell Instruction Period	8 weeks	19 weeks
	I Mid Examinations	1 week	
	II Spell Instruction Period	8 weeks	
	II Mid Examinations	1 week	
	Preparation & Practical Examinations	1 week	
	Semester End Examinations	2 weeks	
Summer Vacation and Supplementary Examinations			8 weeks

8.0 REGISTRATION

- 8.1 Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar. It is absolutely compulsory for the student to register for courses in time. The registration will be organized departmentally under the supervision of the Head of the Department.

- 8.2 IN ABSENTIA registration will not be permitted under any circumstance.

8.3 At the time of registration, students should have cleared all the dues of Institute and Hostel in the previous semesters, paid the prescribed fees for the current semester and not been debarred from institute for a specified period on disciplinary or any other ground.

9.0 UNIQUE COURSE IDENTIFICATION CODE

Every course of the B.Tech program will be placed in one of the four groups of courses as listed in the Table 2. The various courses and their two-letter codes are given below;

Table 2: Group of Courses

S. No	Branch	Code
1	Civil Engineering	01
2	Electrical & Electronics Engineering	02
3	Mechanical Engineering	03
4	Electronics & Communication Engineering	04
5	Computer Science & Engineering	05

10.0 CURRICULUM AND COURSE STRUCTURE

The curriculum shall comprise Foundation/ Skill Courses, Core Courses, Elective Courses, Open Electives, Laboratory Courses, Technical Seminar, Term Paper, Communication Skills Practice, Soft Skills Practice, Professional Society Activities, Mini Project, Internship and Major Project and Comprehensive Viva-Voce. The list of elective courses may include subjects from allied disciplines also.

Contact Periods: Depending on the complexity and volume of the course, the number of contact periods per week will be assigned. Each Theory and Laboratory course carries credits based on the number of hours/week as follows:

- Contact classes (Theory): 1 credit per lecture hour per week.
- Tutorial Classes (Theory): 1 credit per 2 lecture hours per week.
- Laboratory Hours (Practical): 1 credit for 2 Practical hours.
- Full Semester Internship: 19 credits for 40 hours per week

10.1 Credit distribution for courses offered is shown in Table 3.

Table 3: Credit distribution

S. No	Course	Hours	Credits
1	Theory Course (Core/Foundation/Elective)	3	3
2	Theory Course (Core/Foundation/Elective)	4	4
3	Theory Course (Core/Foundation/Elective)	3	3
4	Open Elective Courses	2	2
5	Drawing Courses	1+4	3
6	MOOC Courses	3	3
7	Laboratory Courses	4	2
8	Laboratory Courses	2	1

9	Technical Seminar	2	1
10	Term Paper	2	1
11	Project Work Phase-I	4	2
12	Comprehensive Assessment	2	1
13	Project Work Phase-II	20	10
14	Mandatory Courses	2	0
15	Full Semester Internship	40	19
16	Professional Society Activities	2	0
17	Soft Skills Practice	2	0
18	Communication Skills Practice	2	0
19	Quantitative Aptitude	2	0
20	Technical Aptitude	2	0

10.2 Course Structure

Every program of study shall be designed to have 42 theory courses and 20 laboratory courses. Every course of the B.Tech program will be placed in one of the eight categories with minimum credits as listed in the Table 4. In addition, a student has to carry out a Project Work Phase-I, Project Work Phase-II and Comprehensive Assessment.

Table 4: Category Wise Distribution of Credits

S. No	Category	Subject Area and % of Credits	Average No. of Credits
1	Humanities and Social Sciences (HS), including Management.	HS (05% to 10%)	08
2	Basic Sciences (BS) including Mathematics, Physics and Chemistry.	BS (10% to 15%)	19
3	Engineering Sciences (ES), including Workshop, Drawing, Basics of Electrical / Electronics / Mechanical / Computer Engineering.	ES (10% to 15%)	20
4	Professional Subjects - Core (PC), relevant to the chosen specialization/branch.	PC (40% to 50%)	74
5	Professional Subjects - Electives (PE), relevant to the chosen specialization/branch.	PE (10% to 15%)	18
6	Open Subjects - Electives (OE), from other technical and/or emerging subject areas.	OE (01% to 5%)	06
7	Project Work and Comprehensive Viva-Voce, Mini Project and Internship	5% to 10%	13
8	Technical Seminar and Term Paper	CRT	02
TOTAL			160

10.3 For Four year regular programme (Non FSD):

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
B.Tech I Semester	5 Foundation	Induction Training + 3	20
B.Tech II Semester	5 Foundation	3	20
B.Tech III Semester	5 + 1 (2 Credit Course)	3 + Mandatory Course	20
B.Tech IV Semester	5 + 1 (2 Credit Course)	3 + Technical Seminar	21
B.Tech V Semester	5 + OE-I (2 Credit Course)	3 + Mandatory Course	20
B.Tech VI Semester	5 + OE-II (2 Credit Course)	3 + Term Paper	21
B.Tech VII Semester	4 + OE-III (2 Credit Course)	3 + Comprehensive Assessment + PW Phase-I	19
B.Tech VIII Semester	3	Project Work Phase-II	19
Total	42	20+TS+TP+ Project Work Phase-I + Comprehensive Assessment + Project Work Phase-II	160

10.4 For Four year regular programme (FSD):

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
B.Tech I Semester	5 Foundation	Induction Training + 3	20
B.Tech II Semester	5 Foundation	3	20
B.Tech III Semester	5 + 1 (2 Credit Course)	3 + Mandatory Course	20
B.Tech IV Semester	5 + 1 (2 Credit Course)	3 + Technical Seminar	21
B.Tech V Semester	5 + OE-I (2 Credit Course)	3 + Mandatory Course	20
B.Tech VI Semester	5 + OE-II (2 Credit Course)	3 + Term Paper	21
B.Tech VII Semester	4 + OE-III (2 Credit Course)	3 + Comprehensive Assessment + PW Phase-I	19
B.Tech VIII Semester	Full Semester Internship		19
Total	39	20+TS+TP+ Project Work Phase-I + Comprehensive Assessment + Full Semester Internship	160

10.5 For Three year lateral entry programme (Non FSI):

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
B.Tech III Semester	5 + 1 (2 Credit Course)	3 + Mandatory Course	20
B.Tech IV Semester	5 + 1 (2 Credit Course)	3 + Technical Seminar	21
B.Tech V Semester	5 + OE-I (2 Credit Course)	3 + Mandatory Course	20
B.Tech VI Semester	5 + OE-II (2 Credit Course)	3 + Term Paper	21
B.Tech VII Semester	4 + OE-III (2 Credit Course)	3 + Comprehensive Assessment + PW Phase-I	19
B.Tech VIII Semester	3	Project Work Phase-II	19
Total	32	14 + TS + TP + Project Work Phase-I + Comprehensive Assessment + Project Work Phase-II	120

10.6 For Three year lateral entry programme (FSI):

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
B.Tech III Semester	5 + 1 (2 Credit Course)	3 + Mandatory Course	20
B.Tech IV Semester	5 + 1 (2 Credit Course)	3 + Technical Seminar	21
B.Tech V Semester	5 + OE-I (2 Credit Course)	3 + Mandatory Course	20
B.Tech VI Semester	5 + OE-II (2 Credit Course)	3 + Term Paper	21
B.Tech VII Semester	4 + OE-III (2 Credit Course)	3 + Comprehensive Assessment + PW Phase-I	19
B.Tech VIII Semester	Full Semester Internship		19
Total	29	14 + TS + TP + Project Work Phase-I + Comprehensive Assessment + Full Semester Internship	120

10.7 Course wise break-up for Regular program:

Total Theory Courses - 42 (35 Foundation and Core + 6 Professional Electives + 3 Open Elective)	2 @ 4 credits each 35 @ 3 credits each 5 @ 2 credits each	123
Laboratory Courses – 20	2 @ 2 credits each 18 @ 1 credits each	22
Technical Seminar	1 @ 1 credit	01
Term Paper with self study report	1 @ 1 credit	01
Comprehensive Assessment	1 @ 1 credit	01
Project Work Phase-I	1 @ 2 credit	02
Project Work Phase-II/ Internship	1 @ 10 credits	10
TOTAL CREDITS		160

10.8 Course wise break-up for three year lateral entry program :

Total Theory Courses - 32 (35 Foundation and Core + 6 Professional Electives + 3 Open Elective)	27 @ 3 credits each 5 @ 2 credits each	91
Laboratory Courses – 14	14 @ 1 credit	14
Technical Seminar	1 @ 1 credit	01
Term Paper with self study report	1 @ 1 credit	01
Comprehensive Assessment	1 @ 1 credit	01
Project Work Phase-I	1 @ 2 credit	02
Project Work Phase-II/ Internship	1 @ 10 credits	10
TOTAL CREDITS		120

11.0 DIVISION OF MARKS FOR INTERNAL AND EXTERNAL ASSESSMENT

Name of the Course	Continuous Internal Assessment (CIA)	Semester End Examination (SEE)
Theory	30	70
Laboratory	25	50
Technical Seminar	50	-
Term Paper	50	-
Comprehensive Assessment	100	-
Project Work Phase-I	50	50
Project Work Phase-II/ Internship	60	140
Full Semester Internship	200	300

12.0 EVALUATION METHODOLOGY

The performance of a student in each semester shall be evaluated through Continuous Internal Assessment (CIA) and / or an Semester End Examination (SEE) conducted semester wise.

12.1 Theory Course:

The performance of a student in every theory course shall be evaluated for total of 100 marks each, of which the relative weightage for Continuous Internal Assessment and Semester End Examination shall be 30 marks and 70 marks respectively.

12.2 Practical Course:

The performance of a student in every practical course shall be evaluated for total of 75 marks each, of which the relative weightage for Continuous Internal Assessment and Semester End Examination shall be 25 marks and 50 marks respectively.

12.3 Internal Evaluation for Theory Course:

The total internal weightage for theory courses is 30 marks with the following distribution.

- 20 marks for Mid-Term Examination
- 10 marks for Assignment Test

While the first mid-term examination shall be conducted on the 50% of the syllabus (Unit-I, Unit-II & 50% of Unit-III), the second mid-term examination shall be conducted on the remaining 50% of the syllabus (50% of Unit III, Unit-IV & Unit-V).

10 marks are allocated for assignment test (as specified by the subject teacher concerned). The first assignment should be conducted after completion of Unit-I & Unit-II for 5 marks and the second assignment should be conducted after completion of Unit-III & Unit-IV for 5 marks. The final Assignment Test marks will be the addition of these two.

Two midterm examinations each for **20 marks** with the duration of 90 minutes each will be conducted for every theory course in a semester. The midterm examination marks shall be awarded giving a weightage of 80% in the midterm examination in which the student scores better performance and 20% in the remaining midterm examination.

The final mid-term marks obtain by the addition of these two (80% + 20%).

Example: If a student scores 23 marks and 24 marks in the first and second mid-term examinations respectively, then Weighted Average Marks = $24 \times 0.8 + 23 \times 0.2 = 23.8$, rounded to 24 Marks.

Note: The marks of any fraction shall be rounded off to the next higher mark.

12.4 Pattern of the midterm examination question paper is as follows:

- A total of two Sections (Section-I & Section-II)
- Section-I contains three one mark questions. One questions from each unit and a student has to be answered two questions (2X1=2 Marks)
- Section-II contains six questions are to be designed taking two questions from each unit (Unit wise – Either or type) of the three units.. (3X6=18 Marks)

Pattern of the Assignment Test is as follows:

- Five assignment questions are given in advance, out of which two questions given by the concerned teacher has to be answered during the assignment test
- Sum of Assignment Tests marks is considered.

Note: A student who is absent for any Mid-Term Examination/ Assignment Test, for any reason whatsoever, shall be deemed to have scored zero marks in that Mid-Term Examination/ Assignment Test and no make-up test shall be conducted.

12.5 Internal Evaluation for Practical Course:

For practical subjects there shall be a Continuous Internal Evaluation during the semester for 25 internal marks. Out of the 25 marks for internal evaluation, day-today assessment in the laboratory shall be evaluated for 10 marks and internal practical examination shall be evaluated for 15 marks conducted by the laboratory teacher concerned.

12.6 Internal Evaluation for Design/ Drawing Courses:

For the subject having design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing, production drawing and building drawing) the internal marks distribution shall be 10 marks for day-to-day performance and 20 marks for Mid-Term Examinations.

12.7 Internal Evaluation for Technical Seminar:

There shall be a Technical seminar presentation in B.Tech IV Semester. A Technical Seminar shall have two components, one chosen by the student from the course work as an extension and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar topics shall be made before a committee consisting of Head of the department, seminar supervisor and a senior faculty member. Each Technical Seminar shall be evaluated for 50 marks. Technical Seminar component-I for 25 marks and component-II for 25 marks making total 50 marks. **(Distribution of marks for 25:** 5 marks for report, 5 marks for subject content, 10 marks for presentation and 5 marks for queries).

12.8 Internal Evaluation for Term Paper:

The Term Paper is a self study report and shall be carried out either during B.Tech VI Semester along with other lab courses. Every student will take up this term paper individually and submit a report. The scope of the term paper could be an exhaustive literature review choosing any engineering concept with reference to standard research papers or an extension of the concept of earlier course work in consultation with the term paper supervisor. The term paper reports submitted by the individual students during the B.Tech VI Semester shall be evaluated for a total of 50 marks for continuous assessment, it shall be conducted by two Examiners, one of them being term paper supervisor as Examiner-1 and an Examiner-2 nominated by the Principal from the panel of experts recommended by HOD.

12.9 Project Work:

The Project work is spread over to two semesters having Project Work Phase-I and Project Work Phase-II. Project Work Phase-I is included in B.Tech VII Semester and Project Work Phase-II in B.Tech VIII Semester as detailed below:

A student has to select topic of his Project Work based on his interest and available

facilities, in the B.Tech VII semester which he will continue through B.Tech VIII semester also.

12.10 Internal Evaluation for Project Work Phase-I:

The object of Project Work Phase-I is to enable the student to take up investigative study in the broad field of his branch of Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the department on an individual basis or three/four students in a group under the guidance of a supervisor/guide. This is expected to provide a good initiation for the student(s) in R&D work.

The assignment normally includes:

- Survey and Study of published literature of on the assigned topic.
- Working out a preliminary approach to the problem relating to the assigned topic.
- Conducting preliminary analysis/ modeling/simulation/experiment/ design/ feasibility.
- Preparing a written report on the study conducted for presentation to the department.
- Final seminar presentation before Project Review Committee.

The supervisor/ guide will evaluate the execution of the project periodically.

Project Work Phase-I is allocated 100 marks with 2 credits. Out of 100, 25 marks are allocated for the supervisor/guide to be awarded based on periodical project reviews and submission of the report on the work done. 25 marks are allocated for the supervisor/guide and head of the department to be awarded based on seminar given by each student on the topic of the project. The other 50 marks shall be awarded on the basis of his presentation on the work done on his project by the Departmental committee comprising of Head of the Department, respective supervisor/ guide and two senior faculty of the department appointed by the Principal.

The candidate is declared to have passed in Project work Phase-I when he gets 40% marks given by the Departmental Committee and 50% marks overall.

12.11 Internal Evaluation for Project Work Phase-II:

The Project work Phase-II will be an extension of Phase-I project work. The object of Project work phase-II is to enable the student to extend further the investigative study taken up as the project in Phase-I under the guidance of the supervisor/ guide from the department.

The assignment normally includes:

- Preparing an action plan for conducting the investigation including the team work.
- In depth study of the topic assigned.
- Review and finalization of the approach to the problem relating to the assigned topic.
- Final development of product/process, testing, results, conclusions and further

direction.

- Preparing a paper for conference presentation/ publication in journal if possible.
- Preparing a dissertation in the standard format for being evaluated by the department.
- Final presentation of the work done before the Project Review Committee (PRC).

Project Work Phase-II is allocated 50 internal marks. Out of 50, 25 marks are allocated for the supervisor/guide and head of the department to be evaluated based on two seminars given by each student on the topic of the project. The other 25 marks shall be evaluated on the basis of his presentation on the work done on his project by the Departmental Committee comprising of Head of the Department, respective supervisor/guide and two senior faculty of the department appointed by the Principal.

12.12 Internal Evaluation for Full Semester Internship:

Internship course is 200 marks for continuous internal assessment and will be evaluated based on day to day assessment by concern industry.

Following are the evaluation guidelines:

- Profile and abstract –Student has to submit the industry profile and abstract of the project within four weeks from date of commencement of internship through mail or post.
Weightage: 40 Marks
- Seminar 1 - at 9th week from date of commencement of internship - weightage: 50 Marks
- Seminar 2 - Pre submission at 17th week from date of commencement of internship – Weightage: 50 Marks
- Internship Diary, weightage: 60 Marks

12.13 External Evaluation for Theory Course - Semester End Examination:

The Semester End Examination in each theory subject shall be conducted for 3 hours duration at the end of the semester for 70 marks.

Pattern of the Semester End Examination question paper is as follows:

- A total of two Sections (Section-I & Section-II)
- Section-I contains five two mark questions. One question from each unit and a student has to be answered all the five questions compulsory (5X2=10 Marks)
- Section-II contains ten questions are to be designed taking two questions from each unit (Unit Wise - Either or type) of the total five units. (5X12=60 Marks)

A student has to secure not less than a minimum of 35% of marks (25 marks) exclusively at the Semester End Examinations in each of the theory subjects in which the candidate had appeared. However, the candidate shall have to secure a minimum of 40% of marks (40 marks) in both external and internal components put together to become eligible for passing in the subject.

12.14 External Evaluation for Theory Course - Semester End Examination:

The Semester End Examination in each theory subject shall be conducted for 3 hours duration at the end of the semester for 70 marks.

Pattern of the Semester End Examination question paper is as follows:

- A total of two Sections (Section-I & Section-II)
- Section-I contains five two mark questions. One question from each unit and a student has to be answered all the five questions compulsory (5X2=10 Marks)
- Section-II contains ten questions are to be designed taking two questions from each unit (Unit Wise - Either or type) of the total five units. (5X12=60 Marks)

A student has to secure not less than a minimum of 35% of marks (25 marks) exclusively at the Semester End Examinations in each of the theory subjects in which the candidate had appeared. However, the candidate shall have to secure a minimum of 40% of marks (40 marks) in both external and internal components put together to become eligible for passing in the subject.

The emphasis on the questions is broadly based on the following criteria:

50 %	To test the objectiveness of the concept
30 %	To test the analytical skill of the concept
20 %	To test the application skill of the concept

12.15 External Evaluation for Practical Course:

Out of 50 marks **35** marks are allocated for experiment (procedure for conducting the experiment carries 15 marks & readings, calculation and result-20) and **10** marks for viva-voce examination with **5** marks for the record.

Each Semester External Lab Examination shall be evaluated by an Internal Examiner along with an External Examiner appointed by the Principal.

A candidate shall be declared to have passed in individual lab course if he secures a minimum of 50% aggregate marks (38 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 50% marks (25 marks) in the semester external examination.

12.16 External Evaluation for Project Work Phase-II:

The Semester End Examination for project work done during VII Semester and VIII Semester for 140 marks shall be conducted by a Project Review Committee (PRC). The committee comprises of an External Examiner appointed by the Principal, Head of the Department and Project Guide/Supervisor. The evaluation of project work shall be conducted at the end of the VIII Semester. The above committee evaluates the project work report with weightages of 50% of the marks (50 marks) awarded by external examiner, 20% of marks (20 marks) awarded by HOD & 30% of the marks (30 marks) by Project Guide/Supervisor respectively for a total of 100marks. Of the 40 marks for Presentation & Viva-Voce examination, HOD evaluates for 10 marks and external examiner for 30 marks. The evaluation of 140 marks is distributed as given below:

Distribution of Project Work Marks

Sl. No.	Criterion	Marks
1	Report	100
2	Presentation & Viva – Voce	40

A candidate shall be declared to have passed in project work phase-II if he secures a minimum of 50% aggregate marks (100 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 50% marks (70 marks) in the project work phase-II end examination.

12.17 External Evaluation of Full Semester Internship:

Full Semester Internship programme carries 19 credits. During Internship, student has to spend one full semester in an identified industry /firm / organization and has to carry out the internship as per the stipulated guidelines of that industry / firm / organization and the institute.

Following are the evaluation guidelines:

- Project Report, weightage: 60 Marks
- Final Presentation, weightage: 160 Marks
- Viva-voce, weightage: 80 Marks

The internship shall be evaluated for 500 marks out of which 200 marks for internal evaluation and 300 marks for external evaluation.

The external evaluation based on the report submitted and viva-voce exam for 300 marks by a committee comprising the HOD, Project supervisor and external examiner (Industry/ Academia). A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

FSI shall be open to all the branches in the VII semester. The selection procedure is:

- Choice of the students

CGPA (> 7.5) upto IV semester with no current arrears and maintains the CGPA of 7.5 till VI Semester

12.18 Massive Open Online Courses (MOOCs):

Meeting with the global requirements, to inculcate the habit of self learning and incompliance with UGC guidelines, MOOC (Massive Open Online Course) courses have been introduced as electives. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion for the course from the MOOCs providers

Regulations for MOOCs

- The respective departments shall give a list from NPTEL or any other standard providers, whose credentials are endorsed by the HOD.
- Each department shall appoint Coordinators/Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of the same.
- A student shall choose an online course (relevant to his/her programme of study) from the given list of MOOCs providers, as endorsed by the teacher concerned,

with the approval of the HOD.

- The details of MOOC(s) shall be displayed in Grade card of a student, provided he/she submits the proof of completion of it to the department concerned through the Coordinator/Mentor.
- Student can get certificate from SWAYAM/NPTEL or any other standard providers, whose credentials are endorsed by the HOD. The course work should not be less than 12 weeks or student may appear for end examination conducted by the Institute.
- There shall be one Mid Continuous Internal Examination (Quiz exam for 40 marks) after 9 weeks of the commencement of the course and semester end examination (Descriptive exam for 60 marks) shall be done along with the other regular courses.

Three credits will be awarded upon successful completion of each MOOC courses having minimum of 8 weeks duration.

13.0 GRADING PROCEDURE

Grades will be awarded to indicate the performance of students in each theory subject, laboratory / practicals, Technical Seminar, Term Paper, Project Work Phase-I, Comprehensive Assessment and Project Work Phase-II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 11 above, a corresponding letter grade shall be given.

- 13.1 As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	S (Superior)	10
80 and less than 90%	A (Excellent)	9
70 and less than 80%	B (Very Good)	8
60 and less than 70%	C (Good)	7
50 and less than 60%	D (Average)	6
40 and less than 50%	E (Pass)	5
Below 40%	F (FAIL)	0
Absent	AB	0

- 13.2 A student who has obtained an 'F' grade in any subject shall be deemed to have 'failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier

13.3 To a student who has not appeared for an examination in any subject, 'Ab' grade will be allocated in that subject, and he is deemed to have 'failed'. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier.

13.4 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

13.5 A student earns grade point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

Credit points (CP) = grade point (GP) x credits For a course

13.6 A student passes the subject/ course only when $GP \geq 5$ ('E' grade or above)

13.7 ➤ A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered.

➤ For Mandatory courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

13.8 Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

- i. The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \frac{\sum (C_i \times G_i)}{\sum C_i}$$

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

- ii. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.,

$$CGPA = \frac{\sum (C_i \times S_i)}{\sum C_i}$$

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

- iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- iv. While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.

Example: Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade Point	Credit Point
Course-I	3	S	10	3x10=30
Course-II	3	A	9	3x9=27
Course-III	3	B	8	3x8=24
Course-IV	3	D	6	3x6=18
Course-V	2	B	8	2x8=16
Course-VI	1	C	7	1x7=7
	15			122

$$\text{Thus, SGPA} = \frac{122}{15} = 8.13$$

Illustration for CGPA

I Semester	II Semester	III Semester	IV Semester
Credit: 20 SGPA: 8.13	Credit: 20 SGPA: 6.9	Credit: 20 SGPA: 7.3	Credit: 21 SGPA: 6.8
V Semester	VI Semester	VII Semester	VIII Semester
Credit: 20 SGPA: 8.2	Credit: 21 SGPA: 7.4	Credit: 19 SGPA: 7.2	Credit: 19 SGPA: 7.8

$$\text{Thus, CGPA} = \frac{(20 \times 8.13) + (20 \times 6.9) + (20 \times 7.3) + (21 \times 6.8) + (20 \times 8.2) + (21 \times 7.2) + (19 \times 7.2) + (19 \times 7.8)}{160} = 7.461$$

14.0 AWARD OF CLASS

14.1 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/she shall be placed in one of the following four classes:

CGPA ≥ 7.5	CGPA ≥ 6.5 and < 7.5	CGPA ≥ 5.0 and < 6.5	CGPA ≥ 4.0 and < 5.0	CGPA < 4.0
First Class with Distinction	First Class	Second Class	Pass Class	Fail

A student with final CGPA is < 4.00 will not be eligible for the Award of the Degree.

15.0 CONDUCT OF SEMESTER END EXAMINATIONS AND EVALUATION

15.1 Semester end examination shall be conducted by the Controller of Examinations (COE) by inviting Question Papers from the External Examiners

15.2 Question papers may be moderated for the coverage of syllabus, pattern of questions by a Semester End Examination Committee chaired by CoE and senior subject expert

before the commencement of semester end examinations. Internal Examiner shall prepare a detailed scheme of valuation.

- 15.3** The answer papers of semester end examination should be evaluated by the first examiner immediately after the completion of exam and the award sheet should be submitted to CoE in a sealed cover before the same papers are kept for second evaluation by external examiner.
- 15.4** In case of difference is more than 15% of marks, the answer paper shall be re-evaluated by a third examiner appointed by the Examination Committee and the marks awarded by third examiner is compared with first and second evaluation marks and higher marks of minimum difference pair will be considered as final marks.
- 15.5** CoE shall invite required number of external examiners to evaluate all the end-semester answer scripts on a prescribed date(s). Practical laboratory exams are conducted involving external examiners.
- 15.6** Examinations Control Committee shall consolidate the marks awarded by both the examiners and award grades.

16.0 SUPPLEMENTARY EXAMINATIONS

Apart from the regular End Examinations the institute may also schedule and conduct supplementary examinations for all subjects for the benefit of students with backlogs. Such students writing supplementary examinations as supplementary candidates may have to write more than one examination per day.

17.0 ATTENDANCE REQUIREMENTS AND DETENTION POLICY

- 17.1** A candidate shall put in a minimum required attendance of 75 % in that semester. Otherwise, s/he shall be declared detained and has to repeat semester.
- 17.2** For cases of medical issues, deficiency of attendance in a semester to the extent of 10% may be condoned by the College Academic Committee (CAC) on the recommendation of Head of the department if their attendance is between 75% and 65% in a semester, subjected to submission of medical certificates, medical case file and other needful documents to the concerned departments. The condonation is permitted maximum of two times during the entire course of study.
- 17.3** A prescribed fee shall be payable towards condonation of shortage of attendance.
- 17.4** A student shall not be promoted to the next semester unless he/she satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he/she shall not be eligible for readmission into the same class.
- 17.5** Any student against whom any disciplinary action by the institute is pending shall not be permitted to attend any SEE in that semester.

18.0 PROMOTION POLICIES

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 17.

18.1 A student shall be promoted from IV Semester to V Semester only if he/she acquires 24 credits (i.e 40% of total credits) that have been studied up to III Semester from the following examinations, irrespective of whether the candidates takes the end examinations or not as per the normal course of the study

B.Tech I Semester - one Regular and two Supplementary

B.Tech II Semester - one Regular and one Supplementary

B.Tech III Semester - one Regular only

18.2 A student shall be promoted from VI Semester to VII Semester only if he/she acquires 40 credits(i.e 40% of total credits) that have been studied up to V Semester from the following examinations, irrespective of whether the candidates takes the end examinations or not as per the normal course of the study

B.Tech I Semester - one Regular and four Supplementary

B.Tech II Semester - one Regular and three Supplementary

B.Tech III Semester - one Regular and two Supplementary

B.Tech IV Semester - one Regular and one Supplementary

B.Tech V Semester - one Regular only

18.3 A student shall be promoted from VI Semester to VII Semester only if he/she acquires 24 of the credits (i.e 40% of the credits) from the courses that have been studied up to V Semester from all the regular and supplementary examinations until V Semester.

➤ Two regular and one supplementary examinations of III Semester.

➤ One regular and one supplementary examinations of IV Semester.

➤ One regular examination of V semester.

18.4 A student shall register and put up minimum attendance in all 120 credits and earn all the 120 credits. Marks obtained in all 120 credits shall be considered for the calculation of aggregate percentage of marks obtained.

18.5 Students who fail to earn 120 credits as indicated in the course structure within six academic years from the year of their admission shall forfeit their seat in B.Tech. Course and their admission shall stand cancelled.

19.0 GRADUATION REQUIREMENTS

The following academic requirements shall be met for the award of the B.Tech degree.

19.1 Student shall register and acquire minimum attendance in all courses and secure 160 credits for regular program and 120 credits for lateral entry program.

19.2 A student of a regular program, who fails to earn 160 credits within eight consecutive academic years from the year of his/her admission with a minimum CGPA of 4.0, shall forfeit his/her degree and his/her admission stands cancelled.

19.3 A student of a lateral entry program who fails to earn 120 credits within six consecutive academic years from the year of his/her admission with a minimum CGPA of 4.0, shall forfeit his/her degree and his/her admission stands cancelled.

20.0 REEVALUATION

A student, who seeks the re-evaluation of the answer script, is directed to apply for the photocopy of his/her semester examination answer paper(s) in the theory course(s), within 5 working days from the declaration of results in the prescribed format with prescribed fee to the Controller of Examinations through the Head of the department. On receiving the photocopy, the student can consult with a competent member of faculty and seek the opinion for reevaluation. Based on the recommendations, the student can register for the reevaluation with prescribed fee. The Controller of Examinations shall arrange for the reevaluation and declare the results. Reevaluation is not permitted to the courses other than theory courses.

21.0 TEMPORARY BREAK OF STUDY FROM THE PROGRAMME

21.1 A candidate is normally not permitted to break the study. However, if a candidate intends to temporarily discontinue the program in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the program after the break from the commencement of the respective semester as and when it is offered, s/he shall apply to the Principal in advance. Such application shall be submitted before the commencement of the semester in question and forwarded through the Head of the department stating the reasons for such withdrawal together with supporting documents and endorsement of his / her parent / guardian.

21.2 The institute shall examine such an application and if it finds the case to be genuine, it may permit the student to rejoin. Such permission is accorded only to those who do not have any outstanding dues like tuition fee etc.

21.3 The total period for completion of the program reckoned from the commencement of the semester to which the candidate was first admitted shall not exceed the maximum period specified in clause 19.0. The maximum period includes the break period.

22.0 TERMINATION FROM THE PROGRAMME

The admission of a student to the program may be terminated and the student is asked to leave the institute in the following circumstances:

22.1 The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

22.2 A student shall not be permitted to study any semester more than three times during the entire Program of study.

22.3 The student fails to satisfy the norms of discipline specified by the institute from time to time.

23.0 WITH-HOLDING OF RESULTS

If the candidate has any dues not paid to the institute or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld and he/she will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

24.0 STUDENT TRANSFERS

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh from time to time.

25.0 GRADUATION DAY

The institute shall have its own annual Graduation Day for the award of Degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute. The college shall institute prizes and medals to meritorious students and award them annually at the Graduation Day. This will greatly encourage the students to strive for excellence in their academic work.

26.0 CONDUCT AND DISCIPLINE

- Students shall conduct themselves within and outside the premises of the Institute in a descent and dignified manner befitting the students of Audisankara College of Engineering & Technology.
- As per the order of the Honorable Supreme Court of India, ragging in any form is considered a criminal offence and is totally banned. Any form of ragging will be severely dealt with the following acts of omission and / or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures with regard to ragging.
 - (i) Lack of courtesy and decorum; indecent behavior anywhere within or outside the college campus.
 - (ii) Damage of college property or distribution of alcoholic drinks or any kind of narcotics to fellow students / citizens.
- Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.
- Mutilation or unauthorized possession of library books.
- Noisy and unruly behavior, disturbing studies of fellow students.
- Hacking in computer systems (such as entering into other person's areas without prior permission, manipulation and / or damage of computer hardware and software or any other cyber crime etc.
- Usage of camera /cell phones in the campus.
- Plagiarism of any nature.
- Any other act of gross indiscipline as decided by the college academic council from time to time.
- Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute/ hostel, debarring from examination, disallowing the use of certain facilities of the Institute, rustication for a specified period or even outright expulsion from the Institute, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.
- For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the chief Warden, the concern Head of the Department and the Principal respectively, shall have the authority to reprimand or impose fine.
- Cases of adoption of unfair means and/ or any malpractice in an examination shall be reported to the principal for taking appropriate corrective action.
- All cases of serious offence, possibly requiring punishment other than reprimand, shall be reported to the Academic council of the college.

- The Institute Level Standing Disciplinary Action Committee constituted by the academic council shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.
- The Principal shall deal with any problem, which is not covered under these rules and regulations.

27.0 GRIEVANCE REDRESSAL COMMITTEE

Grievance and Redressal Committee constituted by the Principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters. All the students must abide by the code and conduct rules prescribed by the college from time to time.

28.0 TRANSITORY REGULATIONS

required to do all the courses in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such courses in the earlier semester(s) s/he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

28.1 Four Year B.Tech Regular course:

A student who is following Jawaharlal Nehru Technological University Anantapur (JNTUA) curriculum and detained due to shortage of attendance at the end of the first semester shall join the autonomous batch of first semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUA curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUA for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUA regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

28.2 Three Year B.Tech program under Lateral Entry Scheme:

A student who is following JNTUA curriculum and detained due to shortage of attendance at the end of the first semester of second year shall join the autonomous batch of third semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with Lateral Entry regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUA curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of second year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUA for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUA regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

28.3 Transfer candidates (from non-autonomous college affiliated to JNTUA):

A student who is following JNTUA curriculum, transferred from other college to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in their place as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUA for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester under JNTUA regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

28.4 Transfer candidates (from an autonomous college affiliated to JNTUA):

A student who has secured the required credits upto previous semesters as per the regulations of other autonomous institutions shall also be permitted to be transferred to this institute. A student who is transferred from the other autonomous colleges to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students

from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester as per the regulations of the college from which he is transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

29.0 REVISION OF REGULATIONS AND CURRICULUM

The Institute from time to time may revise, amend or change the regulations, scheme of examinations and syllabi if found necessary and on approval by the Academic Council and the Governing Body shall come into force and shall be binding on the students, faculty, staff, all authorities of the Institute and others concerned.

**FAILURE TO READ AND UNDERSTAND
THE REGULATIONS IS NOT AN EXCUSE**

B.TECH - PROGRAM OUTCOMES (POS)

- PO-1** : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems (**Engineering Knowledge**).
- PO-2** : Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences (**Problem Analysis**).
- PO-3** : 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 (**Design/Development of Solutions**).
- PO-4** : 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 (**Conduct Investigations of Complex Problems**).
- PO-5** : 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 (**Modern Tool Usage**).
- PO-6** : 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 (**The Engineer and Society**).
- PO-7** : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development (**Environment and Sustainability**).
- PO-8** : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice (**Ethics**).
- PO-9** : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings (**Individual and Team Work**).
- PO-10** : 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 (**Communication**).
- PO-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.
- PO-12** : 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 (**Life-long learning**).

FREQUENTLY ASKED QUESTIONS AND ANSWERS ABOUT AUTONOMY

1. Who grants Autonomy? UGC, Govt., AICTE or University

In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy but only after concurrence from the respective state Government as well as UGC. The State Government has its own powers to grant autonomy directly to Govt. and Govt. aided Colleges.

2. Shall Audisankara College of Engineering & Technology award its own Degree?

No. Degree will be awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu with a mention of the name Audisankara College of Engineering & Technology on the Degree Certificate.

3. What is the difference between a Deemed to be University and an Autonomy College?

A Deemed to be University is fully autonomous to the extent of awarding its own Degree. A Deemed to be University is usually a Non-Affiliating version of a University and has similar responsibilities like any University. An Autonomous College enjoys Academic Autonomy alone. The University to which an autonomous college is affiliated will have checks on the performance of the autonomous college.

4. How will the Foreign Universities or other stake – holders know that we are an Autonomous College?

Autonomous status, once declared, shall be accepted by all the stake holders. The Govt. of Andhra Pradesh mentions autonomous status during the First Year admission procedure. Foreign Universities and Indian Industries will know our status through our website.

5. What is the change of Status for Students and Teachers if we become Autonomous?

An autonomous college carries a prestigious image. Autonomy is actually earned out of our continued past efforts on academic performances, our capability of self- governance and the kind of quality education we offer.

6. Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?

There is a built in mechanism in the autonomous working for this purpose. An Internal Committee called Academic Programme Evaluation Committee, which will keep a watch on the academics and keep its reports and recommendations every year. In addition the highest academic council also supervises the academic matters. The standards of our question papers, the regularity of academic calendar, attendance of students, speed and transparency of result declaration and such other parameters are involved in this process.

7 Will the students of Audisankara College of Engineering & Technology as an Autonomous College qualify for University Medals and Prizes for academic excellence?

No. Audisankara College of Engineering & Technology has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural on co-curricular organized by the University the students shall qualify.

8 Can Audisankara College of Engineering & Technology have its own Convocation?

No. Since the University awards the Degree the Convocation will be that of the University, but there will be Graduation Day at Audisankara College of Engineering & Technology.

9 Can Audisankara College of Engineering & Technology give a provisional degree certificate?

Since the examinations are conducted by Audisankara College of Engineering & Technology and the results are also declared Audisankara College of Engineering & Technology, the college sends a list of successful candidates with their final Grades and Grade Point Averages including CGPA to the University. Therefore with the prior permission of the University the college will be entitled to give the provisional certificate.

10 Will Academic Autonomy make a positive impact on the Placements or Employability?

Certainly. The number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment. Also the autonomous status is more responsive to the needs of the industry. As a result therefore, there will be a lot of scope for industry oriented skill development built-in into the system. The graduates from an autonomous college will therefore represent better employability.

11 What is the proportion of Internal and External Assessment as an Autonomous College?

Presently, it is 60 % external and 40% internal. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.

12 Is it possible to have complete Internal Assessment for Theory or Practicals?

Yes indeed. We define our own system. We have the freedom to keep the proportion of external and internal assessment component to choose.

13 Why Credit based Grade System?

The credit based grade system is an accepted standard of academic performance the world over in all Universities. The acceptability of our graduates in the world market shall improve.

14 What exactly is a Credit based Grade System?

The credit based grade system defines a much better statistical way of judging the academic performance. One Lecture Hour per week of Teaching Learning process is assigned One Credit. One hour of laboratory work is assigned half credit. Letter Grades like S,A+,A, B+,B,C,F etc. are assigned for a Range of Marks. (e.g. 90% and above is S, 80 to 89 % could

be A+ etc.) in Absolute Grading System while grades are awarded by statistical analysis in relative grading system. We thus dispense with sharp numerical boundaries. Secondly, the grades are associated with defined Grade Points in the scale of 1 to 10. Weighted Average of Grade Points is also defined Grade Points are weighted by Credits and averaged over total credits in a Semester. This process is repeated for all Semesters and a CGPA defines the Final Academic Performance

15 What are the norms for the number of Credits per Semester and total number of Credits for UG/PG programme?

These norms are usually defined by UGC or AICTE. Usually around 28 Credits per semester is the accepted norm.

16 What is a Semester Grade Point Average (SGPA)?

The performance of a student in a semester is indicated by a number called SGPA. The SGPA is the weighted average of the grade points obtained in all the courses registered by the student during the semester.

$$SGPA = \frac{\sum_{i=1}^n (C_i G_i)}{\sum_{i=1}^n C_i}$$

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 and i represent the number of courses in which a student registered in the concerned semester. SGPA is rounded to two decimal places.

17 What is a Cumulative Grade Point Average (CGPA)?

An up-to-date assessment of overall performance of a student from the time of his first registration is obtained by calculating a number called CGPA, which is weighted average of the grade points obtained in all the courses registered by the students since he entered the Institute.

$$CGPA = \frac{\sum_{j=1}^m (C_j S_j)}{\sum_{j=1}^m C_j}$$

Where, S_j is the SGPA of the j^{th} semester and C_j is the total number of credits upto the semester and m represent the number of semesters completed in which a student registered upto the semester. CGPA is rounded to two decimal places.

18 Is there any Software available for calculating Grade point averages and converting the same into Grades?

Yes, the institute has its own MIS software for calculation of SGPA, CGPA, etc.

19 Will the teacher be required to do the job of calculating SGPAs etc. and convert the same into Grades?

No. The teacher has to give marks obtained out of whatever maximum marks as it is. Rest is all done by the computer.

20 Will there be any Revaluation or Re-Examination System?

No. There will double valuation of answer scripts. There will be a makeup Examination after a reasonable preparation time after the End Semester Examination for specific cases mentioned in the Rules and Regulations. In addition to this, there shall be a ‘summer term’ (compressed term) followed by the End Semester Exam, to save the precious time of students.

21 How fast Syllabi can be and should be changed?

Autonomy allows us the freedom to change the syllabi as often as we need.

22 Will the Degree be awarded on the basis of only final year performance?

No. The CGPA will reflect the average performance of all the semester taken together.

23 What are Statutory Academic Bodies?

Governing Body, Academic Council, Examination Committee and Board of Studies are the different statutory bodies. The participation of external members in every body is compulsory. The institute has nominated professors from IIT, NIT, University (the officers of the rank of Pro-vice Chancellor, Deans and Controller of Examinations) and also the reputed industrialist and industry experts on these bodies.

24 Who takes Decisions on Academic matters?

The Governing Body of institute is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like Boards of Studies. Decisions taken at the Board of Studies level are to be ratified at the Academic Council and Governing Body.

25 What is the role of Examination committee?

The Examinations Committee is responsible for the smooth conduct of internal, End Semester and makeup Examinations. All matters involving the conduct of examinations spot valuations, tabulations preparation of Grade Cards etc, fall within the duties of the Examination Committee.

26 Is there any mechanism for Grievance Redressal?

The institute has grievance redressal committee, headed by Dean - Student affairs and Dean - IQAC.

27 How many attempts are permitted for obtaining a Degree?

All such matters are defined in Rules & Regulation

28 Who declares the result?

The result declaration process is also defined. After tabulation work wherein the SGPA, CGPA and final Grades are ready, the entire result is reviewed by the Moderation Committee. Any unusual deviations or gross level discrepancies are deliberated and removed. The entire result is discussed in the Examinations and Result Committee for its approval. The result is then declared on the institute notice boards as well put on the web site and Students Corner. It is eventually sent to the University.

29 Who will keep the Student Academic Records, University or Audisankara College of Engineering & Technology?

It is the responsibility of the Dean, Academics of the Autonomous College to keep and preserve all the records.

30 What is our relationship with the JNT University?

We remain an affiliated college of the JNT University. The University has the right to nominate its members on the academic bodies of the college.

31 Shall we require University approval if we want to start any New Courses?

Yes, It is expected that approvals or such other matters from an autonomous college will receive priority.

32 Shall we get autonomy for PG and Doctoral Programmes also?

Yes, presently our PG programmes also enjoying autonomous status.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

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

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Controller of Examinations /Additional 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 COE 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 COE 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 Institute premises or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

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



**AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)**

Gudur, Nellore Dist - 524101, A.P (India)

B.Tech I Semester – Electronics & Communication Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	18MD101	Induction Training – 3 weeks (Mandatory Course)-	-	-	-	-	-	-	-
2	18BS101	Mathematics-I	3	1	0	30	70	100	4
3	18BS105	Engineering Chemistry	3	0	0	30	70	100	3
4	18BS104	English	3	0	0	30	70	100	3
5	18ME102	Engineering Graphics	1	0	4	30	70	100	3
6	18CS101	Programming for Problem Solving	3	0	0	30	70	100	3
7	18BS108	Chemistry Lab	0	0	2	25	50	75	1
8	18BS109	English Lab	0	0	2	25	50	75	1
9	18CS102	Programming for Problem Solving Lab	0	0	4	25	50	75	2
Total			13	1	12	225	500	725	20

B.Tech II Semester – Electronics & Communication Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	18BS201	Mathematics-II	3	1	0	30	70	100	4
2	18BS106	Engineering Physics	3	0	0	30	70	100	3
3	18ME103	Basic Mechanical and Civil Engineering	3	0	0	30	70	100	3
4	18EE201	Circuit Theory	3	0	0	30	70	100	3
5	18CS202	Data Structures	3	0	0	30	70	100	3
6	18BS107	Physics Lab	0	0	2	25	50	75	1
7	18ME104	Workshop Practice	0	0	2	25	50	75	1
8	18CS204	Data Structures Lab	0	0	4	25	50	75	2
Total			15	1	8	225	500	725	20

B.Tech III Semester – Electronics & Communication Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	18BS301	Complex Analysis	3	1	0	30	70	100	3
2	18EE304	Electrical Technology	3	0	0	30	70	100	3
3	18EC301	Electronic Devices and Circuits	3	0	0	30	70	100	3
4	18EC302	Probability Theory and Stochastic Processes	3	0	0	30	70	100	3
5	18EC303	Signals and Systems	3	0	0	30	70	100	3
6	18BS303	Managerial Economics and Financial Analysis	2	0	0	30	70	100	2
7	18EE307	Electrical Technology Lab	0	0	2	25	50	75	1
8	18EC306	Electronic Devices and Circuits Lab	0	0	2	25	50	75	1
9	18EC307	Signals and Systems Lab	0	0	2	25	50	75	1
Non-Credit Courses									
10	18AS301	Professional Society Activities-I	2	0	0	0	0	0	0
11	18AS302	Soft Skills Practice	0	0	2	0	0	0	0
12	18MD301	Environmental Sciences (Mandatory Course)	2	0	0	0	0	0	0
Total			21	1	8	255	570	825	20

B.Tech IV Semester – Electronics & Communication Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	18EC401	Switching Theory and Logic Design	3	1	0	30	70	100	3
2	18EC402	Pulse and Digital Circuits	3	0	0	30	70	100	3
3	18EC403	Analog Circuit Analysis	3	0	0	30	70	100	3
4	18EC404	Electromagnetic Theory and Transmission Lines	3	0	0	30	70	100	3
5	18EC405	Analog Communication	3	0	0	30	70	100	3
6	18ME306	Management Science	2	0	0	30	70	100	2
7	18EC407	Analog Circuit Analysis Lab	0	0	2	25	50	75	1
8	18EC408	Analog Communication Lab	0	0	2	25	50	75	1
9	18EC409	Pulse and Digital Circuits Lab	0	0	2	25	50	75	1
10	18EC410	Technical Seminar	0	2	0	50	-	50	1
Non-Credit Courses									
11	18AS401	Professional Society Activities-II	2	0	0	0	0	0	0
12	18AS402	Communication Skills Practice	2	0	0	0	0	0	0
Total			21	3	6	305	570	875	21

B.Tech V Semester – Electronics & Communication Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	18EC501	Linear Integrated Circuits and Applications	3	1	0	30	70	100	3
2	18EC502	Digital IC System Design	3	0	0	30	70	100	3
3	18EC503	Linear Control Systems	3	0	0	30	70	100	3
4	18EC504	Digital Communication	3	0	0	30	70	100	3
5	18EC505	Microprocessors and Microcontrollers	3	0	0	30	70	100	3
6	Open Elective-I		2	0	0	30	70	100	2
7	18EC511	Linear & Digital IC Applications Lab	0	0	2	25	50	75	1
8	18EC512	Digital Communication Lab	0	0	2	25	50	75	1
9	18EC513	Microprocessors and Microcontrollers Lab	0	0	2	25	50	75	1
Non-Credit Courses									
10	18AS501	Professional Society Activities-III	2	0	0	0	0	0	0
11	18AS502	Quantitative Aptitude	2	0	0	0	0	0	0
12	18MD501	Indian Constitution (Mandatory Course)	2	0	0	0	0	0	0
Total			23	1	6	255	570	825	20

B.Tech VI Semester – Electronics & Communication Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	18EC601	VLSI Design	3	1	0	30	70	100	3
2	18EC602	Antennas and Wave Propagation	3	0	0	30	70	100	3
3	18EC603	Embedded Systems	3	0	0	30	70	100	3
4	18EC604	Digital Signal Processing	3	0	0	30	70	100	3
Elective-I									
5	18EC605	Digital Television	3	0	0	30	70	100	3
	18EC606	Computer Networks							
	18EC607	Electronic Measurements and Instrumentation							
	18EC608	Available MOOCs/ 12 week NPTEL courses suggested by the department							
6	Open Elective-II		2	0	0	30	70	100	2
7	18EC612	DSP Lab	0	0	2	25	50	75	1
8	18EC613	Embedded Systems Lab	0	0	2	25	50	75	1
9	18EC614	VLSI Design Lab	0	0	2	25	50	75	1
10	18EC615	Term Paper	0	2	0	50	-	50	1
Non-Credit Courses									
11	18AS601	Professional Society Activities-IV	2	0	0	0	0	0	0
12	18AS602	Technical Aptitude	2	0	0	0	0	0	0
Total			21	3	6	305	570	875	21

B.Tech VII Semester – Electronics & Communication Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	18EC701	Internet of Things (IOT)	3	1	0	30	70	100	3
2	18EC702	Microwave Engineering	3	0	0	30	70	100	3
3	Open Elective-III		2	0	0	30	70	100	2
Elective-II									
4	18EC707	DSP Processors and Architectures	3	0	0	30	70	100	3
	18EC708	Wireless Communications and Networks							
	18EC709	Neural Network and Fuzzy Logic							
	18EC710	Available MOOCs							
Elective-III									
5	18EC711	Optical Communications	3	0	0	30	70	100	3
	18EC712	Digital Design through HDL							
	18EC713	Image and video Processing							
	18EC714	Available MOOCs/ 12 week NPTEL courses suggested by the department							
6	18EC715	Internet of Things (IOT) Lab	0	0	2	25	50	75	1
7	18EC716	Microwave Engineering Lab	0	0	2	25	50	75	1
8	18EC717	Project Work Phase-I	0	0	4	50	50	100	2
9	18EC718	Comprehensive Assessment	0	0	2	100	-	100	1
Non-Credit Course									
10	18MD701	Essence of Indian Traditional Knowledge (Mandatory Course)	2	0	0	0	0	0	0
Total			16	1	10	350	500	850	19

B.Tech VIII Semester – Electronics & Communication Engineering (NFSI)

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
Elective-IV									
1	18EC801	Cellular and Mobile Communication	3	1	0	30	70	100	3
	18EC802	Virtual Instrumentation							
	18EC803	ASIC Design							
	18EC804	Available MOOCs							
Elective-V									
2	18EC805	Satellite Communications	3	0	0	30	70	100	3
	18EC806	Micro Electro Mechanical Systems							
	18EC807	Software Defined Radio							
	18EC808	Available MOOCs							
Elective-VI									
3	18EC809	Radar Engineering	3	0	0	30	70	100	3
	18EC810	Robotics and Automation							
	18EC811	Multimedia Communications							
	18EC812	Available MOOCs/ 12 week NPTEL courses suggested by the department							
4	18EC813	Project Work Phase-II	0	0	20	60	140	200	10
Total			9	1	20	150	350	500	19

B.Tech VIII Semester – Electronics & Communication Engineering (FSI)

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	CIA	SEE	T	
1	18EC814	Full Semester Internship	0	0	40	200	300	500	19

OPEN ELECTIVE – I

Course Code	Course Title
18CE506	Disaster Management
18CE507	Global Information System
18CE508	Green Buildings and Energy Conservations
18EE505	Power Quality
18EE506	Energy Auditing and Demand Side Management
18EE507	Power Plant Engineering
18ME506	Additive Manufacturing
18ME507	Gas Dynamics and Jet Propulsion
18ME508	Hydraulics and Pneumatics Systems
18EC506	Principles of Modern Communication Systems
18EC507	Nano Electronics
18EC508	Micro Controller Applications
18CS505	OOPs through Java
18CS506	Advanced Data Structures
18CS507	Webpage Design

OPEN ELECTIVE – II

Course Code	Course Title
18CE609	Industrial Waste Water Engineering
18CE610	Impact of Climate Change in Water Resource
18CE611	Research Methodology
18EE608	Electrical Materials
18EE609	Illumination Engineering
18ME609	Energy Conversion Management
18ME610	Six Sigma
18ME611	Total Quality Management
18EC609	Biomedical Electronics
18EC610	Consumer Electronics
18EC611	Display Systems
18CS601	Python Programming
18CS609	Artificial Intelligence
18CS610	Software Engineering

OPEN ELECTIVE-III

Course Code	Course Title
18CE703	Project Safety Management
18CE704	Global Warming And Climate Change

18CE705	Human Ethics and Values
18EE703	Industrial Automation and Control
18EE704	Energy Conservation
18EE705	Optimization Techniques
18ME703	Smart Materials
18ME704	Micro- Electromechanical Systems [MEMS]
18ME705	Advanced Internal Combustion Engines.
18EC703	Fundamentals Of Image Processing
18EC704	Biomedical Instrumentation
18EC705	Fundamentals Of Embedded Systems
18EC706	Wavelet Transforms
18CS703	R Programming
18CS704	Machine Learning
18CS705	Data Warehousing And Data Mining



**AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)**

Gudur, Nellore Dist - 524101, A.P (India)

MATHEMATICS-I

B.Tech I Semester: Common to CE, ME, EEE, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18BS101	H&S	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	4	30	70	100
Contact Classes:75		Tutorial Classes: 5		Practical Classes: Nil		Total Classes:80		
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. Finding maxima and minima of function of two and three variables. 2. Methods of solving the differential equations of first and higher order. 3. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations. 4. Methods of finding solutions for integral and differential equations with initial conditions. 								
UNIT-I	PARTIAL DIFFERENTIATION AND APPLICATIONS						Classes:15	
Partial differentiation; Total derivative; Jacobian; Functional dependence and independence, Taylor's theorem & Machlaurin's theorem (without proof) for function of two variables; Maxima and Minima of functions of two and three variables-method of Lagrange's method of undetermined multipliers.								
UNIT-II	ORDINARY DIFFERENTIAL EQUATIONS						Classes:15	
Exact- Integrating factors, Linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay. Second and higher order linear differential equations with constant coefficients: Non-homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomial in x , $e^{ax} v(x)$ and $xv(x)$; Method of variation of parameters.								
UNIT-III	MATRICES						Classes:15	
Matrices: Types of Matrices-Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian, Orthogonal & Unitary Matrices (Definitions only); Rank of a matrix by Echelon form and Normal form, solutions of system of linear equations.								
UNIT-IV	EIGENVALUES AND EIGENVECTORS						Classes:15	
Eigenvalues and Eigenvectors and their properties: Cayley-Hamilton theorem (without proof); Finding the inverse and power of a matrix using Cayley-Hamilton theorem.								
UNIT-V	LAPLACE TRANSFORMS						Classes:15	
Laplace transforms of elementary functions – Properties - Transforms of derivatives, integrals– Unit step function-Dirac delta function- Periodic function. Inverse laplace transforms by Partial fractions – Properties - Convolution theorem – Application of laplace transforms to ordinary differential equations of first and second order with initial conditions.								
Text Books:								
<ol style="list-style-type: none"> 1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers. 2. T.K.V. Iyengar, B. Krishna Gandhi and Others, Engineering Mathematics (Vol – I & II) – S. Chand & Company. 								
Reference Books:								
<ol style="list-style-type: none"> 1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi 								

Publications.

2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill.

Web References:

1. www.mathplanet.com
2. www.mathworld.com

E-Text Books:

1. Baidyanath Patra –“**An Introduction to Integral Transforms**”.
2. W W L Chen-“**Multivariable and Vector Analysis**”.

Outcomes:

At the end of the course students able to

1. Expand various algebraic, trigonometric and hyperbolic functions in Fourier series in different intervals
2. Solve various boundary value problems using Fourier transforms
3. Evaluate the multiple integrals and apply the concept to find areas and volumes
4. Evaluate the line, surface and volume integrals and converting them from one form to another

ENGINEERING CHEMISTRY

B.Tech I Semester: Common to EEE & ECE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18BS105	H&S	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: 5	Practical Classes: Nil			Total Classes: 65			
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer. 2. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the students to understand the technology based on them. 3. To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry. 4. To impart the knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways. 								
UNIT-I	MOLECULAR STRUCTURE AND THEORIES OF BONDING:						Classes:18	
Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N ₂ , O ₂ and F ₂ molecules. π molecular orbitals of butadiene, benzene and Aromaticity. Crystal Field Theory (CFT): Salient features of CFT – The energy level diagrams for transition metal ions with respect to Tetrahedral, Octahedral and square planar geometries.								
UNIT-II	ELECTROCHEMISTRY AND CORROSION SCIENCE						Classes:15	
Theories of Electrolytes, Conductance, Equivalent conductance, Molecular conductance, application of conductance, Conductometric Titration –acid vs. base. Electrochemical cell: single and Standard electrode potential. Battery Technology: Ni-Cad cell, Lithium Cells, Fuel Cells, Hydrogen – Oxygen fuel cell, Methanol-oxygen fuel. Corrosion-definition, examples, effects- Mechanism of Dry and wet corrosion. Factor Influencing corrosion, corrosion control methods-sacrificial anode, impressed current, Cathodic Protective Coatings: - Metal Coatings; Hot dipping, Metal Cladding, Cementation.								
UNIT-III	WATER TECHNOLOGY						Classes:15	
Water Technology-I: Sources and impurities of water, Hardness of Water, Units Of Hardness, Estimation of Hardness, Dissolved oxygen, Alkalinity and chlorides, Boiler troubles –Scales, sludge's, caustic embrittlement and boiler corrosion-causes, disadvantages and prevention, internal conditioning methods-phosphate, calgon and sodium aluminate-External treatment methods- ion-exchange methods process . Water Technology-II: water treatment for drinking purpose-disinfection and concept of break point chlorination –Desalination of brackish water-Principle and Process of electro-dialysis and reverse osmosis.								
UNIT-IV	STEREOCHEMISTRY						Classes:12	
Introduction to representation of 3-dimensional structures, structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and absolute configuration.								
UNIT-V	REACTION MECHANISM						Classes:15	
Substitution reaction: Nucleophilic substitution reactions: Mechanism of S _N 1, S _N 2 reactions. Electrophilic and nucleophilic addition reactions: Markownikoff and anti Markownikoff's								

additions. Grignard additions on carbonyl compounds.

Text Books:

1. Engineering Chemistry by P.C. Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
2. University Chemistry, by B.M. Mahan, Pearson IV Edition
3. Engineering Chemistry (NPTEL Web – book), by B.L. Tembe, Kamaluddin and M.S. Krishnan
4. Advanced Physical Chemistry by Gurdepraj
5. Essential Physical chemistry by B.S.Bhal & Arun Bhal and J.D.Tuli , S.Chand Company
6. Organic Spectroscopy by Jag Mohan
7. Engineering chemistry by Sashichawala

Reference Books:

1. Physical Chemistry, by P.W. Atkins
2. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition.
3. Organic chemistry by Jerry March

Web References:

1. www.physical_chemistry.com
2. <https://en.wikiboos.org>

E-Text Books:

1. Engineering chemistry. Jp Publications.
2. Engineering chemistry. Jain & Jain publications.

Outcomes:

At the end of the course students able to

1. The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.
2. The required skills to get clear concepts on water treatment methods.
3. The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.
4. The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.

ENGLISH

B.Tech I Semester: Common to CE, ME,CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18BS104	H&S	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60		Tutorial Classes:		Practical Classes:		Total Classes:60		
				Nil				
OBJECTIVES:								
<ol style="list-style-type: none"> 1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills. 2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus. 3. Develop study skills and communication skills in formal and informal situations. 4. Acquire fundamental and functional knowledge of English language, grammar and communication skills. 								
UNIT-I	“THE ROAD NOT TAKEN” , “WHERE THE MIND IS WITHOUT FEAR”						Classes:15	
Introduction of the Poets, Background information of the poems, Literary terms, Setting of the poems, Question and answers.								
UNIT-II	“THE EYES ARE NOT HERE” , “THE EYES ARE NOT HERE”						Classes:15	
Introduction of the authors, Character analysis of the stories, Background information, Literary terms, Question and answers.								
UNIT-III	“THE OPEN WINDOW” , “THE LOST CHILD”						Classes:15	
Introduction of the authors, Character analysis of the stories, Background information, Literary terms, Question and answers.								
UNIT-IV	“THE ROMANCE OF A BUSY BROKER” , REPORT WRITING						Classes:15	
Introduction of the author, Character analysis of the story, Background information, Literary terms, Question and answers.... Types of reports, Formats of Reports & Parts of a Formal report.								
UNIT-V	“ FORMAL LETTERS” , GRAMMAR						Classes:15	
Format of Formal letters, Different styles, Exercises of Complaint Letters and Exercises of English Grammar.								
Text Books:								
<ol style="list-style-type: none"> 1. Vibrant English, Orient Black Swan. 								
Reference Books:								
<ol style="list-style-type: none"> 1. Swan, M. (2016). Practical English Usage. Oxford University Press. 2. Kumar, S and Lata, P. (2018). Communication Skills. Oxfore University Press. 3. Wood, F.T. (2007). Remedial English Grammar. Macmillan. 4. Oxford Dictionary of Thesaurus , Third edition. 								
Web References:								
<ol style="list-style-type: none"> 1. www.grammarbook.com 2. www.grammarbytes.com 3. https://en.wikipedia.org/wiki/Category:Short_story_collections_by_R._K._Narayan 5. https://archive.org/stream/TheLostChild-English-MulkRajAnand/lostchild_djvu.txt 								

6. www.english-for-students.com/Where-The-Mind-Is-Without-Fear.html
7. Exercises in Spoken English. Parts I – III. CIEFL, Hyderabad. Oxford University Press.

E-Text Books:

1. Fundamentals of English Grammar
2. Oxford English Grammar Course

Outcomes:

At the end of the course students able to

1. Use English Language effectively that demonstrates an understanding of the basic components of grammar.
2. Comprehend and explain different phrases in prose and poetry and respond appropriately.
3. Learned the technique of presenting stories with perplexing twist endings
4. Acquire basic proficiency in English, writing official letters including Job Applications and Technical Reports.
5. Apply ethical principles and learn to commit to professional ethics.
6. Inculcated an attitude of evaluating the right path in their lives through varied experiences of eminent people.

ENGINEERING GRAPHICS

B.Tech I Semester: Common to CE, ME, EEE, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18ME102	Core	L	T	P	C	CI A	SEE	TOTAL
		1	-	4	3	30	70	100
Contact Classes: 12		Tutorial Classes:		Practical Classes: 48		Total Classes:60		
OBJECTIVES:								
The course should enable the students to :								
I. Convey visual perception information regarding relative locations of objects through an orthographic/isometric view. II. Analyze a drawing and bring out any inconsistencies to put forth inferences graphically. III. Create feasible designs of simple objects with drawing tools and/or free-hand. IV. Get training in the transformation of the imagined data to present as drawings so that the communication skill will be increased especially in technical subjects.								
UNIT-I	INTRODUCTION TO ENGINEERING DRAWING						Classes:12	
Lettering-Geometrical Constructions-Construction of Polygons. Conic Sections- Ellipse-Parabola-Hyperbola general methods and a rectangular hyperbola								
UNIT-II	PROJECTIONS OF POINTS, STRAIGHT LINES						Classes:12	
Points: Introduction to Orthographic Projections, Describing of quadrants, First and Third angle projection – Position of points in four quadrants. Straight Lines: Lines parallel to both the principal planes, perpendicular to one plane and parallel to another plane, lines inclined to one plane, lines inclined to both the planes.								
UNIT-III	PROJECTION OF PLANES						Classes:12	
Projection of regular plane surfaces, planes parallel to one plane, plane perpendicular to one plane , planes inclined to one plane and inclined to both the planes.								
UNIT-IV	PROJECTION OF SOLIDS						Classes:12	
Positions of regular solids(prism, cylinder, pyramid, and cone) – Projection of Solids – Axis parallel to both the Principal planes, Axis perpendicular to one plane and parallel to another plane, Axis inclined to one plane, inclined to both the planes.								
UNIT-V	ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS						Classes:12	
Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines.								
Text Books:								
1. N.D. Bhat, Engineering Drawing, Charotar Publishers, 52nd Revised and Enlarged: 2013 2. K.L. Narayana, P. Kanniah, Engineering Drawing, Publisher, Scitech								
Reference Books:								
1. Venugopal, K., A Textbook of Engineering Graphics, New age Publishers,2009 2. Venkata Reddy, Engineering Drawing, B.S.Publishers, 2009 3. Basant Agrawal, C M Agrawal ,Engineering Drawing, 2013 4. V.RameshBabu, Engineering Drawing .2009								
Web References:								
1. https://nptel.ac.in/courses/112103019/ 2. http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html								

E-Text Books:

1. http://web.iitd.ac.in/~achawla/public_html/201/lectures/sp46.pdf

2. https://books.google.co.in/books/about/Engineering_Drawing.html?id=_hdOU8kRb2AC

Outcomes:

At the end of the course students able to

1. Impart the training in multi-view representations and its conversion into pictorial views and the reverse also
2. Ability to understand the different standards in technical drawing and to help in reaching future engineering positions especially in research and design
3. To get a clear idea about isometric projection

PROGRAMMING FOR PROBLEM SOLVING

B. Tech I Semester: Common to CE, ME, EEE, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18CS101	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60		Tutorial Classes: -		Practical Classes: Nil		Total Classes:60		
OBJECTIVES:								
<p>The course should enable the students to :</p> <ol style="list-style-type: none"> 1. Provide exposure to problem-solving through programming. 2. Train the student to the basic concepts of the C-programming language. 3. Design programs involving decision structures, loops for problem solving 4. Learn string handling and string manipulation operations 5. Know about derived data types like structures and unions. 6. To learn problem solving techniques. 								
UNIT-I	INTRODUCTION TO COMPUTERS AND C						Classes:12	
<p>Introduction to Computers: Definition of a Computer, Block diagram of a Computer, Types of Programming Languages, Algorithms, Flow-charts.</p> <p>Introduction to C: History of C, General form of a C Program, C-Tokens, Data types, Operators and Expressions, Formatted Input and Output.</p>								
UNIT-II	DECISION MAKING, LOOPING AND JUMP STATEMENTS						Classes:12	
<p>Decision Making – Branching: if, if-else, Nested if, Ladder if and switch statement.</p> <p>Looping: While statement, do-while statement, for statement.</p> <p>Jump Statements: break, continue, goto.</p>								
UNIT-III	ARRAYS AND FUNCTIONS						Classes:12	
<p>Arrays: Introduction, Declaration, Initialization and Accessing of 1-Dimensional and 2-dimensional arrays.</p> <p>Functions: Introduction, Categories of a function, Recursive functions, Storage Classes: auto, extern, static and register.</p>								
UNIT-IV	POINTERS AND STRINGS						Classes:12	
<p>Pointers: Definition, Declaration, initialization & accessing of a pointer variable, Pointers to Pointers, Array of Pointers, Parameter Passing methods.</p> <p>Strings: Declaring and initializing String variables, String handling functions.</p>								
UNIT-V	STRUCTURES, UNIONS AND FILES						Classes:12	
<p>Structures and Unions: Introduction, Declaration and Initialization of Structure, Structure within Structure, Array of Structures, Pointer to Structure, Union.</p> <p>Files: Introduction, Basic operations of files.</p>								
Text Books:								
<ol style="list-style-type: none"> 1. E. Balagurusamy, “Programming with ANSI-C”, Fourth Edition,2008, Tata McGraw Hill. 2. Byron S Gottfried “Programming with C” Second edition, Tata McGrawhill, 2007 3. ISRD Group, “Programming and Problem Solving Using C”, Tata McGraw Hill, 2008. 								
Reference Books:								
<ol style="list-style-type: none"> 1. R.G. Dromey, “How to solve it by Computer”, Pearson Education, 2008. 2. Kanetkar Y, “Let us C”, BPB Publications, 2007. 3. Hanly J R &Koffman E.B, “Problem Solving and Programm design in C”, PearsonEducation, 2009. 								
Web References:								

1. <https://www.toptal.com/c/the-ultimate-list-of-resources-to-learn-c-and-c-plus-plus>
2. <https://hackr.io/tutorials/learn-c>

Outcomes:

At the end of the course students able to

1. Understand the fundamentals of C programming.
2. Read, understand and trace the execution of programs written in C language.
3. Choose the loops and decision-making statements to solve the problem.
4. Implement different Operations on arrays.
5. Use functions to solve the given problem.
6. Understand pointers, structures and unions.
7. Implement file Operations in C programming for a given application.

CHEMISTRY LAB

B.Tech I Semester: Common to CE, ME, EEE, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18BS108	H&S	L	T	P	C	CIA	SEE	TOTAL
		0	0	2	1	25	50	75
Contact Classes:60	Tutorial Classes:	Practical Classes:			Total Classes: 30			
		Nil						
OBJECTIVES:								
<ol style="list-style-type: none"> 1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose. 2. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique. 								
EXPERIMENT 1	Determination of total hardness of water by complexometric method using EDTA						Classes:03	
To estimate various hardness such as temporary, permanent and total hardness etc.								
EXPERIMENT 2	Determination of dissolved oxygen in the given water samples by using Winkler's method						Classes:03	
To estimate dissolved oxygen in various water samples using iodo-metric method.								
EXPERIMENT 3	Determination of alkalinity of water in the given water samples						Classes:03	
To estimate various alkalinity in the given water sample.								
EXPERIMENT 4	Determination of chloride content of water by Argentometry						Classes:03	
To estimate presence of chlorine in the given various water samples.								
EXPERIMENT 5	Estimation of the strength of HCl by Conductometry titrations						Classes:03	
To determine the strength of strong acid by using conductometric titration methods								
EXPERIMENT 6	Estimation of Acetic acid by Conductometric titrations						Classes:03	
To determine the strength of weak acid by using conductometric titration methods.								
EXPERIMENT 7	Determination of surface tension of a given liquid using stalagmometer						Classes:03	
To determine the surface tension of given liquid samples using stalagmometer								
EXPERIMENT 8	Determination of partition coefficient of acetic acid between n-butanol and water.						Classes:03	
To determine the partition coefficient of acetic acid between n-butanol and water.								
EXPERIMENT 9	Thin layer chromatography calculation of R_f values. Eg ortho and para nitro phenols						Classes:03	
To determine the R_f value of the following compounds								
EXPERIMENT 10	Synthesis of Aspirin						Classes:03	
To prepare the aspirin compound in the laboratory.								
Reference Books:								
<ol style="list-style-type: none"> 1. Text book on Experiments and calculations in Engineering Chemistry – S.S Dara 2. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand &Co., Delhi) 								
Web References:								
<ol style="list-style-type: none"> 1. www2.chem.uic.edu 2. https://people.ok.ubc.ca/ 								

3. <http://www.elsevier.com/books/experiments>.

E-Text Books:

1. A Text book of Physical chemistry by Puri, Sharma, Pathania, Kaur.
2. Conceptual Physical chemistry by prabhat kumar.

Outcomes:

At the end of the course students able to

1. Determination of parameters like hardness and chloride content in water.
2. Calculation of R_f values of some organic molecules by TLC technique

ENGLISH LAB

B.Tech I Semester: Common to CE, ME, EEE, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18BS109	H&S	L	T	P	C	CIA	SEE	TOTAL
		0	0	3	1	25	50	75
Contact Classes:60	Tutorial Classes:	Practical Classes:			Total Classes: 36			
Nil								
OBJECTIVES:								
<ol style="list-style-type: none"> 1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning. 2. To sensitize students to the nuances of English speech sounds, word accent and intonation. 3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking. 4. To improve the fluency of the students in spoken English and neutralize their mother tongue influence. 								
ACTIVITY-I	Introduction to Phonetics, Vowels, Diphthongs and Consonants.						Classes:15	
Introduction of the sounds, Vowels, Consonants, Place of Articulation and Manner of Articulation								
ACTIVITY-II	Stress & Intonation						Classes:03	
Stress, Primary Stress, Secondary Stress, Syllable, Falling Tone, Rising Tone, Falling-Rising Tone								
ACTIVITY-III	Just a Minute (JAM)						Classes:06	
Explanation of Impromptu speech, Rules to be followed, Dos and Don'ts.								
ACTIVITY-IV	Situational Dialogues						Classes:06	
Explanation of different types of Dialogues, Dos and Don'ts								
ACTIVITY-V	Group Discussion						Classes:06	
Explanation of various Group Discussions, Dos and Don'ts								
Reference Books:								
<ol style="list-style-type: none"> 1. Daniel Jones, English Pronouncing Dictionary, Current Edition with CD. 2. R.K.Bansal and J. B. Harrison, Spoken English, Orient Longman 2006 Edn. 3. Krishna Mohan & NP Singh, Speaking English Effectively (Macmillan) 4. Meenakshi Raman & Sangeeta Sharma, Technical Communication, Oxford University Press 2009. 5. K R Lakshminarayan and T. Murugavel, Managing Soft Skills, Sci-Tech Publication, 2010. 								
Web References:								
<ol style="list-style-type: none"> 1. www.grammarbook.com 2. www.grammarbytes.com 								
E-Text Books:								
<ol style="list-style-type: none"> 1. A Complete Kit for Group Discussion 2. English Conversation Practice 								
Outcomes:								
At the end of the course students able to								
<ol style="list-style-type: none"> 1. Better understanding of nuances of English language through audio-visual experience and 								

group activities.

2. Neutralization of accent for intelligibility.
3. Speaking skills with clarity and confidence which in turn enhances their employability skills.

PROGRAMMING FOR PROBLEM SOLVING LAB

B. Tech I Semester: Common to CE, ME, EEE, ECE & CSE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18CS102	Core	L	T	P	C	CIA	SEE	Total
		-	-	4	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
OBJECTIVES:								
<p>The course should enable the students to:</p> <ol style="list-style-type: none"> 1. To develop primary programming skills upto the higher end in order solve the different programming logics... 2. To write different type of logics at the end of the sessions. After learning the C course, the student can able get all the fundamental knowledge in all the languages. 3. To Understand the student can able to attend any MNC Company interview and can solve the technical rounds both theoretically and Practically 4. To Provide lot of logical examples to make as good as. 								
LIST OF EXPERIMENTS								
Expt. 1	Expressions							
Programs on Expressions.								
Expt. 2	Operators							
Programs on Operators.								
Expt. 3	Decision Control Statements							
Programs on decision control statements.								
Expt. 4	Loop Statements							
Programs on loop statements.								
Expt. 5	Nested Loops							
Programs on Nested Loops.								
Expt. 6	Arrays							
Programs using arrays.								
Expt.7	Functions							
Programs to implement on functions.								
Expt. 8	Recursion							
Programs using recursion.								
Expt. 9	String Handling Functions							
Programs to implement string handling functions.								
Expt. 10	Pointers							

Programs to implement on pointers.	
Expt. 11	Structures
Programs to implement on structures.	
Expt. 12	Files
Programs on files.	
Reference Books:	
<ol style="list-style-type: none"> 1. E. Balagurusamy, "Programming with ANSI-C", Fourth Edition, 2008, Tata McGraw Hill. 2. Byron S Gottfried "Programming with C" Second edition, Tata McGrawhill, 2007 3. ISRD Group, "Programming and Problem Solving Using C", Tata McGraw Hill, 2008.. 	
Course Home Page:	
SOFTWARE AND HARDWARE REQUIREMENTS FOR STUDENTS:	
SOFTWARE: Dev C++, Turbo C	
HARDWARE: Desktop Computers	
Course Outcome:	
At the end of the course, a student will be able to:	
<ol style="list-style-type: none"> 1. To Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming. 2. To Use of conditional expressions and looping statements and to solve problems associated with conditions and repetitions. 3. To Know the Functions involving the idea of modularity. 	

MATHEMATICS-II

B.Tech II Semester: Common to CE, ME, EEE, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18BS201	H&S	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	4	30	70	100
Contact Classes:75	Tutorial Classes: 5	Practical Classes:			Total Classes:80			
Nil								
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> Expansion of various functions as Fourier series and Fourier transforms Evaluation of multiple integrals and their applications Physical quantities involved in engineering field related to vector valued functions The basic properties of vector valued functions and their applications to line, surface and volume integrals 								
UNIT-I	FOURIER SERIES						Classes:10	
Euler formulae (without proof) – Expansion of functions as a Fourier series –Change of interval – Even and odd functions – Half range series – Complex form of Fourier series.								
UNIT-II	FOURIER TRANSFORMATIONS						Classes:12	
Fourier integral theorem (without proof) – Fourier transformations – Properties - Sine and Cosine transformations - Inverse fourier transformations – Convolution – Parseval’s identity.								
UNIT-III	Z-TRANSFORMATIONS						Classes:13	
Z – Transforms of elementary functions – Properties – Shifting theorems– Initial and Final value theorems - Inverse Z – transforms by convolution and partial fractions – Applications to first and second order difference equations.								
UNIT-IV	MULTIPLE INTEGRALS						Classes:20	
Evaluation of double integrals (cartesian and polar coordinates); change of order of integration (only cartesian form); Evaluation of triple integrals: Change of variables for double (cartesian to polar) and triple integrals (cartesian to spherical and cylindrical polar coordinates).								
UNIT-V	VECTOR CALCULUS						Classes:20	
Vector differentiation: Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Scalar potential functions. Solenoidal and Irrotational vectors. Vector integration: Line, Surface and Volume integrals. Theorems of Green’s, Gauss’s and Stoke’s (without proofs) and their applications.								
Text Books:								
<ol style="list-style-type: none"> B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers. T.K.V. Iyengar, B. Krishna Gandhi and Others, Engineering Mathematics (Vol – I & II) – S. Chand & Company. 								
Reference Books:								
<ol style="list-style-type: none"> N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill. 								
Web References:								
<ol style="list-style-type: none"> www.mathplanet.com www.mathworld.com 								

E-Text Books:

1. Baidyanath Patra-“An introduction to integral transforms”.
2. Michael Corral –“**Vector Calculus**”.

Outcomes:

At the end of the course students able to

1. Find the extreme values of functions of two variables with/without constraints.\
2. Solve higher differential equation and apply the concept of differential equation to real world problems.
3. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
4. Solutions for integral and differential equations with initial conditions by Laplace transforms.

ENGINEERING PHYSICS

B.Tech II Semester: Common to EEE & ECE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18BS106	H&S	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: 5	Practical Classes:			Total Classes: 65			
Nil								
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques. 2. Students will be able to demonstrate competency and understanding of the concepts found in Quantum Mechanics, Fiber optics and lasers, Semiconductor physics and a broad base of knowledge in physics. 3. The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics. 4. To study applications in engineering like memory devices, transformer 								
UNIT-I	WAVE OPTICS AND FIBER OPTICS						Classes:18	
<p>Interference: Huygens's principle, Superposition principle, Interference in thin film, Newton's rings and its applications</p> <p>Diffraction: Types of Diffraction, Fraunhofer diffraction due to a single slit, Diffraction grating.</p> <p>Fiber Optics: Introduction, Optical fiber as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Types of Optical fibers: Step and Graded index fibers, Applications of optical fibers.</p>								
UNIT-II	ELECTROMAGNETIC THEORY						Classes:15	
Explanation and physical significance of divergence and curl, electric polarizations and displacements, dielectric sphere in uniform electric field, explanation and physical significance of scalar and vector fields, ferro, para and dia magnetic materials, displacement current, Maxwell's equations and significance.								
UNIT-III	QUANTUM MECHANICS						Classes:15	
Introduction to quantum physics, Wave-particle duality, de-Broglie's hypothesis, Davisson and Germer experiment, Matter Waves, Heisenberg's Uncertainty principle, Schrodinger's time independent wave equation, Physical Significance of Wave function, Particle in one dimensional box.								
UNIT-IV	SEMICONDUCTORS						Classes:12	
Semiconductors: Introduction, Origin of bands, Classification of metals based on band gap, Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on temperature, Drift and Diffusion, Einstein relation, Hall effect.								
UNIT-V	LASERS AND NANOPHYSICS						Classes:15	
<p>Lasers: Characteristics of Laser, Principle of Laser, Population Inversion, Pumping Mechanism, Types of Lasers: Ruby laser, He-Ne laser, Applications of laser.</p> <p>Nanophysics: Basic principles of nanomaterials, Synthesis of nanomaterials: Ball milling, Sol-Gel methods, Properties of nanomaterials: physical, optical, thermal, and magnetic properties, Applications of nanomaterials.</p>								
Text Books:								

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learning.
2. K.Thyagarajan, Engineering Physics ,McGraw Hill Education 2015
3. Dr.S.L.Guptha,Jaiprakash nath publications-Meerut
4. D.J.Griffiths-Introduction to electrodynamics

Reference Books:

1. Richard Robinett, Quantum Mechanics
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc. (1995).
3. Engineering Physics .S.Chand&Company Pvt.Ltd

Web References:

- 1 www.physics.org.com
- 2 <https://en.wikibooks.org>

E-Text Books:

1. quantum mechanics- **Weng cho chew**
2. Electromagnetism – **Iggy Megoven**
3. Physics of atomic and molecules –prof K Heyne

Outcomes:

At the end of the course students able to

1. The student would be able to learn the fundamental concepts on Quantum behavior of matter in its micro state.
2. Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications

BASICS MECHANICAL AND CIVIL ENGINEERING

B.Tech II Semester: Common to EEE, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18ME103	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: - Nil	Practical Classes: Nil			Total Classes: 60			
OBJECTIVES:								
The course should enable the students to :								
I. Gain knowledge on force systems and their applications								
II. Understand the fundamental concepts of civil engineering								
III. Understand the fundamental concepts of mechanical engineering								
UNIT-I	INTRODUCTION TO CIVIL ENGINEERING						Classes:12	
<p>General Introduction to Civil Engineering - Various disciplines of Civil engineering, Relevance of Civil engineering in the overall infrastructural development of the country. Introduction to types of buildings as per NBC; Selection of site for buildings. Components of a residential building and their functions. Introduction to industrial buildings – office / factory / software development office / power house /electronic equipment service centre (any one related to the branch of study).</p> <p>Note: Students have to visit one such building and submit an assignment about the features of any one of the listed building related to their branch (Not included for exam). Building materials - Bricks, cement blocks - Properties and specifications. Cement – OPC, properties, grades; other types of cement and its uses (in brief).Cement mortar – constituents, preparation. Concrete – PCC and RCC – grades. Steel - Use of steel in building construction, types and market forms.</p>								
UNIT-II	SURVEYING						Classes:12	
<p>Surveying - Principles and objectives of surveying; Horizontal measurements – instruments used – tape, types of tapes; Ranging (direct ranging only) – instruments used for ranging. Leveling - Definitions, principles, Instruments (brief discussion only) -Level field book - Reduction of levels - problems on leveling (height of collimation only).</p>								
UNIT-III	MODERN SURVEYING INSTRUMENTS						Classes:12	
<p>Modern surveying instruments – Electronic distance meter, digital level, total station, GPS (Brief discussion only).</p> <p>Basics of Engineering Mechanics: Basic Concepts of Engineering Mechanics: Characteristics of a force – various types of force systems – Resultant – Composition and resolution of forces – Principles of moments of force – Couples.</p>								
UNIT-IV	RESULTANT OF FORCE SYSTEM						Classes:12	
<p>Resultants of Force System: Resultants of different types of force systems.</p> <p>Equilibrium of Forces: Free body diagrams – Equations of equilibrium for different force systems</p> <p>Moment of Inertia: Definition – Parallel Axis Theorem and Perpendicular Axis Theorem — Radius of Gyration – Moment of Inertia of simple areas</p>								
UNIT-V	SIMPLE STRESS AND STRAINS						Classes:12	
<p>Simple Stresses And Strains: Concept of stress and strain, stress and strain diagram for mild steel, Elasticity and plasticity – Types of stresses and strains – Hooke’s law– Factor of safety- Poisson’s ratio and volumetric strain – Elastic moduli and the relationship between them.</p>								
Text Books:								
1. A Textbook of Engineering Mechanics,3rd Edition, Bhavikatti S S , New Age International, 2016								
2. Engineering Mechanics, Dr. R. K. Bansal, 4th Edition, Laxmi Publications, 2011								

3. S.S.BHAVIKATTI, Basic Civil Engineering, New age international publishers
4. Rangwala, Essentials of Civil Engineering, Charotar Publishing House.

Reference Books:

1. Engineering Mechanics, D.S. Kumar, 3rd Edition, S.K. KATARIA & SONS
2. Singer's Engineering Mechanics: Statics and Dynamics, 3rd Edition, K. Vijaya Kumar Reddy, J. Suresh Kumar, B.S. Publications, 2011.
3. Anurag A. Kandya, Elements of Civil Engineering, Charotar Publishing house

Web References:

1. ronney.usc.edu/AME101/AME101-LectureNotes.pdf
2. <https://nptel.ac.in/courses/122104015/>

E-Text Books:

1. <https://books.google.co.in/books?isbn=9339224760>
2. <https://books.google.co.in/books?isbn=8125908374>
3. <https://books.google.co.in/books?isbn=8126518782>

Outcomes:

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

1. Determine the effect of force and motion in course of carrying out the design functions of engineering
2. Identify structures and properties of different materials
3. Illustrate the uses of various building materials
4. Explain the method of construction of different components of a building
5. Understand the concept of surveying and its application
6. Understand the concept of simple stresses and strains

CIRCUIT THEORY

B.Tech II Semester: Electrical & Electronics Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EE201	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: 0	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
<ol style="list-style-type: none"> 1. To provide a methodical approach to problem solving. 2. To learn a number of powerful engineering circuit analysis techniques such as nodal analysis, mesh analysis, theorems, source transformation and several methods of simplifying networks. 3. To understand the concept of graphical solution to electrical network 4. To understand frequency response in electrical circuits 5. To develop a clear understanding of the important parameters of a magnetic circuit. 6. To analyze various types of filters and attenuators. 7. Different types of two-port network analysis using network parameters, with different types of connections. 								
UNIT-I	ELECTRIC CIRCUITS& SINGLE PHASE AC CIRCUITS						Classes:12	
<p>Electric Circuits: Review of basics of Electrical circuits and Star-Delta Transformations, Source Transformations, Kirchhoff's laws, Mesh and Super mesh analysis. Node and super node analysis, power & energy calculations.</p> <p>Single Phase AC Circuits: Review of AC circuits, Phasor representation of alternating quantities- Mathematical representation of Phasors–Behavior of pure resistor, Inductor and capacitor in ac circuits. Series RL circuit, RC circuit and RLC circuit – Parallel AC circuits - , instantaneous power, average power, calculation of average power for periodic non-sinusoidal wave forms. Complex Power, Comparison of. Power Terminology.</p>								
UNIT-II	NETWORK THEOREMS (APPLICATION TO DC & AC NETWORKS)						Classes:12	
<p>Network Theorems (Application To DC & AC Networks): Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum power transfer theorem, Reciprocity theorem, Millman's theorem, Tellegen's theorem and Compensation Theorem.</p>								
UNIT-III	SERIES AND PARALLEL RESONANCE						Classes:12	
<p>Series and Parallel Resonance: Series Resonance, Impedance and Phase angle of a Series Resonant circuit, Voltages and Currents in a Series Resonant circuit, Bandwidth of an RLC circuit, The Quality factor (Q) and its effect on Bandwidth, Magnification in Series Resonance. Parallel Resonance, Resonant frequency for a tank circuit, Variation of Impedance with frequency, Q factor of Parallel Resonance, Magnification in Parallel Resonance, Reactance curves in Parallel Resonance.</p>								
UNIT-IV	COUPLED CIRCUITS						Classes:12	
<p>Coupled Circuits: Introduction, Conductively coupled circuits and mutual Impedance, Mutual Inductance, Dot convention, Coefficient of Coupling, Ideal Transformer, Series connection of coupled Inductors, Parallel connection of coupled coils.</p>								
UNIT-V	NETWORK TOPOLOGY						Classes:12	
<p>Network Topology: Graph of a Network, Definitions associated with graph, formation of incidence matrix, loop matrix and cut - set matrices. Relationship between Branch Voltage Matrix, Twig Voltage matrix and Node voltage matrix. Relationship between branch current Matrix and Loop current matrix, Duality.</p>								
Text Books:								

1. Ravish R Singh, "Network Analysis and Synthesis", Tata McGraw Hill, 1st edition, 2011.
2. A. Sudhakar and Shyammohan S. Palli, "Circuits & Networks Analysis and Synthesis", 3rd ed., Tata McGraw-Hill, New Delhi, 2007

Reference Books:

1. W.H. Hayt, J.E. Kemmerly and S.M. Durbin, Engineering Circuit Analysis, 8th Edition, Tata McGraw-Hill, New Delhi, 2012
2. Charles K. Alexander, Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 5th Edition, McGraw-Hill, 2012.

Web References:

1. <https://www.researchgate.net>
2. <https://www.aar.faculty.asu.edu/classes>
3. <https://www.facstaff.bucknell.edu/>
4. <https://www.electrical4u.com>

E-Text Books:

1. <https://www.jntubook.com/>
2. <https://www.freeengineeringbooks.com>

Outcomes:

1. Analyze DC circuits using different methods.
2. Analyze AC circuits and apply appropriate Network theorem for solving electric Circuits
3. Understand series and parallel resonance concepts and analyze coupled circuits.
4. Understand magnetically coupled circuits
5. Formulate network matrices using network topology and understand the concept of duality.

DATA STRUCTURES

B. Tech II Semester: Common to EEE, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18CS202	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60		Tutorial Classes: -		Practical Classes: Nil		Total Classes:60		
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. Demonstrate familiarity with major algorithms and data structures. 2. Choose the appropriate data structure and algorithm design method for a specified application. 3. Determine which algorithm or data structure to use in different scenarios. 4. To improve the logical ability. 								
UNIT-I	INTRODUCTION TO ALGORITHMS AND DATA STRUCTURES						Classes:12	
Algorithms: Definition, Properties, Performance Analysis-Space Complexity, Time Complexity, Asymptotic Notations.								
Data structures: Introduction, Data Structures types, Data Structure Operations.								
UNIT-II	STACKS AND QUEUES						Classes:12	
Stacks: Introduction, Stack Operations, Applications: Infix to Postfix Conversion, Evaluation of Postfix Expression.								
Queues: Introduction, Operations on queues, Circular queues, Priority queues.								
UNIT-III	LINKED LISTS AND APPLICATIONS						Classes:12	
Linked lists: Introduction, Singly linked lists, Circular linked lists, Doubly linked lists, Multiply linked lists, Applications: Polynomial Representation.								
Implementation of Stack and Queue using linked list.								
UNIT-IV	SORTING AND SEARCHING						Classes:12	
Sorting: Introduction, Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, Heap Sort.								
Searching: Introduction, Linear search, Binary search, Fibonacci search.								
UNIT-V	TREES AND BINARY TREES						Classes:12	
Trees: Introduction, Definition and basic terminologies, Representation of trees.								
Binary Trees: Basic Terminologies and Types, Binary Tree Traversals, Binary Search Trees.								
Text Books:								
<ol style="list-style-type: none"> 1. G.A.V PAI, Data Structures and Algorithms, Concepts, Techniques and Applications, Volume1, 1stEdition, Tata McGraw-Hill, 2008. 2. Richard F. Gilberg& Behrouz A. Forouzan, Data Structures, Pseudo code Approach with C, 2ndEdition, Cengage Learning India Edition, 2007. 								
Reference Books:								
<ol style="list-style-type: none"> 1. Langsam,M. J. Augenstein, A. M. Tanenbaum, Datastructures using C and C++, 2nd Edition, PHI Education, 2008. 2. Sartaj Sahni, Ellis Horowitz, Fundamentals of at Structures in C, 2nd Edition, Orientblackswan, 2010. 								
Web References:								

1. <https://www.geeksforgeeks.org/data-structures/>
2. <https://www.programiz.com/dsa>
3. <https://www.w3schools.in/data-structures-tutorial/intro/>

Outcomes:

At the end of the course students able to

1. Apply Concepts of Stacks, Queues, Linked Lists.
2. Develop Programs for Searching and Sorting, Trees.
3. Interpret concepts of trees.
4. Develop programs for Sorting and Searching.

PHYSICS LAB

B.Tech II Semester: Common to CE, ME, EEE, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18BS107	H&S	L	T	P	C	CIA	SEE	TOTAL
		0	0	2	1	25	50	75
Contact Classes:30	Tutorial Classes:	Practical Classes:			Total Classes: 30			
		Nil						
COURSE OBJECTIVES								
<ol style="list-style-type: none"> To make the students gain practical knowledge to co-relate with the theoretical studies To achieve perfectness in experimental skills and the study of practical applications will bring more confidence and ability To develop and fabricate engineering and technical equipments. 								
EXPERMENT 1	To determine the frequency of a vibrating bar or turning fork using Melde's arrangement						Classes:03	
EXPERMENT 2	To determine the rigidity modulus of the material of the given wire using torsional pendulum						Classes:03	
EXPERMENT 3	To determine the radius of curvature of the lens by forming Newton's rings.						Classes:03	
EXPERMENT 4	To determine the wavelength of laser light.						Classes:03	
EXPERMENT 5	To determine the dispersive power of prism by using spectrometer						Classes:03	
EXPERMENT 6	To determine quality factor and resonant frequency of LCR circuit.						Classes:03	
EXPERMENT 7	Determine particle size by using laser sources						Classes:03	
EXPERMENT 8	To determine the Numerical aperture of a given fiber						Classes:03	
EXPERMENT 9	Determination of magnetic field along axis of a current carrying coil.						Classes:03	
EXPERMENT10	To determine the time constant of R-C circuit						Classes:03	
Any eight experiments may be performed in a semester								
Reference Books:								
<ol style="list-style-type: none"> Manual cum Record for Engineering Physics Lab-1&2, by Prof. Sri M. Rama Rao, Acme Learning. Physics lab Manual-Department of H&S, ASCET (Autonomous) 								
Web References:								
<ol style="list-style-type: none"> www.physics.org.com https://en.wikiboos.org 								
E-Text Books:								
<ol style="list-style-type: none"> Classical mechanics by Radovan dermi Physics of atomic and molecuLs-prof K Heyne 								
Outcomes:								
At the end of the course students able to								
<ol style="list-style-type: none"> Understand principle, concept, working and application of new technology and 								

comparison of results with theoretical calculations

2. Develop procedures and observational skills as data is taken and gain a fundamental understanding of simple and complex apparatus used in the experiment.

WORKSHOP PRACTICE

B.Tech II Semester: Common to CE, ME, EEE, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18ME104	Core	L	T	P	C	CIA	SEE	Total
		-	-	3	1	30	70	100
Contact Classes: Nil		Tutorial Classes: - Nil		Practical Classes: 54		Total Classes:54		
OBJECTIVES:								
The course should enable the students to :								
I. To familiarize with the basic manufacturing processes and to study the various tools and equipment used, hands-on training is given in different sections.								
II. Essentially student should know the labor involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work.								
LIST OF EXPERIMENTS								
Expt. 1	CARPENTRY SHOP							
1 Cross Lap Joint 2 Mortise and Tenon Joint								
Expt. 2	FITTING SHOP							
1 Square Fitting 2 V- Fitting								
Expt. 3	SHEET METAL SHOP							
1 3-Sided Tray (Trapezoidal Tray) 2 Cylinder (Circular Tin)								
Expt. 4	HOUSE WIRING							
1 Wiring for two lamps (bulbs) with independent switch controls with or without looping 2 Wiring for stair case lamp								
Expt. 5	FOUNDRY							
1 Single Piece Pattern 2 Double Piece Pattern								
Expt. 6	WELDING							
1 Lap Joint 2 T – Joint								
Expt.7	TRADES FOR DEMONSTRATION							
1 Machine Shop (Lathe Machine, Grinding Machine and Drilling Machine) 2 Metal Cutting 3 Plumbing								

Reference Books:

1. Engineering Work shop practice, V. Ramesh Babu, VRB Publishers Private Limited, 2009
2. Work shop Manual, P.Kannaiah and K.L.Narayana, SciTech Publishers, 2009

Web References:

1. Engineering workshop Lab manual, Department of Mechanical Engineering, GMRIT Rajam
2. Workshop Practice Manual, K. Venkata Reddy, BS Publications

Course Outcome:

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

1. Utilize workshop tools for engineering practice
2. Analyze and find out suitable method of fabrication of a given simple component.
3. Employ skills acquired to provide quick fixes for routine domestic and/or industrial problems.
4. Appreciate the hard work and intuitive knowledge of the manual workers.

DATA STRUCTURES LAB

B. Tech II Semester: Common to EEE, ECE & CSE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18CS204	Core	-	-	4	2	25	50	75
		Contact Classes: Nil		Tutorial Classes: Nil		Practical Classes: 45		Total Classes: 45
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. To develop skills to design and analyze simple linear and nonlinear data structures 2. To Strengthen the ability to identify and apply the suitable data structure for the given real-world problem 3. To Gain knowledge in practical applications of data structures 4. To make the student write ADTS for all data structures. 								
LIST OF EXPERIMENTS								
Expt. 1	Stack							
Write C program to implement the stack using arrays.								
Expt. 2	Queue							
Write C program to implement the Queue using arrays.								
Expt. 3	Postfix Evaluation							
Write C program to Evaluation a postfix expression.								
Expt. 4	Singly Linked list							
Write C program to implement the Singly linked list.								
Expt. 5	Bubble Sort							
Write C programs to implement Bubble Sort Algorithm.								
Expt. 6	Selection Sort							
Write C programs Selection Sort Algorithm.								
Expt.7	Insertion sort							
Write C programs to implement Insertion Sort Algorithm.								
Expt. 8	Merge Sort							
Write C programs to implement Merge Sort Algorithm.								
Expt. 9	Quick Sort							
Write C programs to implement Quick Sort Algorithm.								
Expt. 10	Linear Search							
Write C programs to implement Linear Search Algorithm.								
Expt. 11	Binary Search							
Write C programs to implement Binary Search Algorithm.								
Expt. 12	Binary Tree							

Write a C program to implement binary tree using Arrays.

Reference Books:

1. G.A.V PAI, Data Structures and Algorithms, Concepts, Techniques and Applications, Volume1, 1stEdition, Tata McGraw-Hill, 2008.
2. Richard F. Gilberg& Behrouz A. Forouzan, Data Structures, Pseudo code Approach with C, 2ndEdition, Cengage Learning India Edition, 2007.
3. Langsam,M. J. Augenstein, A. M. Tanenbaum, Datastructures using C and C++, 2nd Edition, PHI Education, 2008.
4. Sartaj Sahni, Ellis Horowitz, Fundamentals of at Structures in C, 2nd Edition, Orientblackswan, 2010.

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR STUDENTS:

SOFTWARE: Dev C++, Turbo C

HARDWARE: Desktop Computers

Course Outcome:

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

1. Implement Stacks and Queues Using Arrays.
2. Develop Programs for Searching and Sorting Algorithms
3. Develop Programs Using Concepts of Trees.
4. Choose appropriate data structure as applied to specified problem definition.

COMPLEX ANALYSIS

B.Tech III Semester: Common to EEE & ECE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18BS301	Core	L	T	P	C	CIA	SEE	TOTAL
		3	1	-	3	30	70	100
Contact Classes:50		Tutorial Classes:10		Practical Classes:Nil		Total Classes:60		
OBJECTIVES:								
The course should enable the students to:								
I. understand the concept of improper integrals through Gamma and Beta functions								
II. understand the differentiation and Integration with reference to complex variables								
III. evaluate definite integrals involving complex variables in a simpler means by applying the integral theorem of complex variables								
IV. expand the functions in power series and compute residues								
V. understand the conformal mappings and their importance in Engineering domain								
UNIT-I	Special Functions						Classes:20	
Gamma and Beta functions – their properties – Evaluation of Improper integrals. Bessel functions – properties – Recurrence relations – Orthogonality. Legendre polynomials – Properties – Rodrigue’s formula – Recurrence Relations – Orthogonality.								
UNIT-II	Functions of a Complex Variables						Classes:10	
Functions of a complex variable –Definition of continuity – Differentiability – Analyticity – Properties – Cauchy – Riemann equations in cartesian and polar co-ordinates. Harmonic and Conjugate Harmonic function – Milne – Thomson method.								
UNIT-III	Complex Integration & Complex Power Series						Classes:10	
Complex Integration: Line integral – Evaluation along a path and by indefinite integration – Cauchy’s integral theorem – Cauchy’s integral formula.								
Complex Power series: Radius of convergence – Taylor’s and Laurent’s series.								
UNIT-IV	Calculus of Residues						Classes:10	
Singular and Isolated singular points – poles of order ‘m’ – Essential singularity (definitions only)								
Evaluation of residues – Residue theorem – Evaluation of integrals of the type								
Improper real integral (a) $\int_{-\alpha}^{\alpha} f(x)dx$, (b) $\int_0^{2\pi} f(\cos \theta, \sin \theta)d\theta$, (c) $\int_{-\alpha}^{\alpha} e^{imx} f(x)dx$.								
UNIT-V	Conformal Mapping						Classes:10	
Basic transformations-translation, rotation, magnification and inversion –Bilinear transformations - Fixed points – Cross ratio – Determination of bilinear Transformation mapping three given points - Conformal Mapping – Special transformations e^z , z^2 , $\sin z$, $\cos z$.								
Text Books:								
1. B. S. Grewal , Higher Engineering Mathematics, Khanna Publications.								
2. T.K.V. Iyengar, B. Krishna Gandhi and Others , Engineering Mathematics (Vol – III) -S. Chand & Company								
Reference Books:								
1. J. W. Brown & R. V. Churchill , Complex Variables and Applications -McGraw Hill Education								
2. B.V. Ramana , A Text Book of Engineering Mathematics- Tata McGraw Hill Publications								
3. Complex Variables – 2nd Edition - Schaum Outline Series - McGraw Hill Companies								
4. R.K Jain & S.R.K Iyengar , Advanced Engineering Mathematics – Narosa Book distributors pvt ltd								
Web References:								

1. <http://mathworld.wolfram.com/CauchyIntegralTheorem.html>
2. <http://freeusermanuals.com/backend/web/manuals/1519124893conjugate%20harmonic.pdf>

E-Text Books:

1. <http://web.math.ku.dk/noter/filer/koman-12.pdf>
2. <http://www.maths.lth.se/matematiklu/personal/olofsson/CompHT06.pdf>

Outcomes:

1. solve the improper integrals using Beta and Gama functions
2. apply the concept of C - R equations to solve problems on complex differentiation related to potential functions using Milne – Thompson Method
3. solve the problems on Complex Integration
4. solve problems on Laurent series – Residue theorem which is applicable in signal processing and communications
5. solve problems on bilinear transformation which is useful to convert analog transfer functions into digital transfer functions for digital system design in digital signal processing.

ELECTRICAL TECHNOLOGY

B.Tech III Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EE304	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: 0	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
<ol style="list-style-type: none"> To know the basic principle of DC generators and motors To know the basic principle of single phase transformers. To understand the basic principle of three-phase induction motor and alternators. To understand the basic principle of special motors and electrical instruments 								
UNIT-I	D.C GENERATORS AND DC MOTORS						Classes:12	
Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators, DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne’s test – Speed control of DC shunt motor – Flux and Armature voltage control methods								
UNIT-II	TRANSFORMERS & PERFORMANCE						Classes:12	
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 – predetermination of efficiency and regulation (simple problems).								
UNIT-III	THREE PHASE INDUCTION MOTOR						Classes:12	
Principle of operation of three-phase induction motors – Slip ring and Squirrel cage motors – Slip-Torque characteristics – Efficiency calculation – Starting methods.								
UNIT-IV	ALTERNATORS						Classes:12	
Alternators – Constructional features – Principle of operation – Types – EMF Equation – Distribution and Coil span factors – Predetermination of regulation by Synchronous Impedance Method – OC and SC tests.								
UNIT-V	SPECIAL MOTORS & ELECTRICAL INSTRUMENTS						Classes:12	
Principle of operation – Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics, Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters and Voltmeters).								
Text Books:								
<ol style="list-style-type: none"> Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ. Basic Electrical Engineering – T.K. Nagasarkar and M. S. Sukhija, Oxford University Press, 2005 								
Reference Books:								
<ol style="list-style-type: none"> Principles of Electrical Engineering – V.K Mehta, S. Chand Publications. Theory and Problems of basic electrical engineering – I.J. Nagarath and D.P Kothari, PHI Publications 								
Web References:								
<ol style="list-style-type: none"> https://www.researchgate.net https://www.aar.faculty.asu.edu/classes https://www.facstaff.bucknell.edu/ https://www.electrical4u.com https://www.iare.ac.in 								
E-Text Books:								

1. <https://www.jntubook.com/>
2. <https://www.freeengineeringbooks.com>

Outcomes:

1. To analyze the performance of dc generators and motors.
2. To analyze the performance of transformers.
3. To learn the in-depth knowledge on three phase induction motors.
4. To analyze the performance of special motors and electrical instruments in real time applications.

ELECTRONIC DEVICES AND CIRCUITS

B.Tech III Semester: Common to ECE & EEE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC301	Core	L	T	P	C	CIA	SEE	TOTAL
		3	-	-	3	30	70	100
Contact Classes:60	Tutorial Classes: -		Practical Classes: Nil		Total Classes:60			
OBJECTIVES:								
The course should enable the students to:								
I. Know the formation and properties of semiconductor materials & Understand the operation of diode								
II. Understand various types of rectifiers and Understand the importance of regulators								
III. Explain the operation of transistor and Know the need for biasing of transistor & Explain the operation of transistor as amplifier								
UNIT-I	Junction Diode Characteristics						Classes:20	
Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.								
Special Semiconductor Diodes: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, Photo diode, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT. Construction, operation and characteristics of all the diodes is required to be considered.								
UNIT-II	Rectifiers and Filters						Classes:10	
Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, L- section filter, P- section filter, Multiple L- section and Multiple P section filter ,comparison of various filter circuits in terms of ripple factors.								
UNIT-III	BJT						Classes:10	
Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.								
FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.								
UNIT-IV	Transistor Biasing and Thermal Stabilization						Classes:10	
Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in V_{BE} , I_c , and β , Stability factors, (S, S', S''), Bias compensation, Thermal runaway, Thermal stability. FET Biasing- methods and stabilization.								
UNIT-V	BJT						Classes:10	
Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.								
FET Amplifiers: Small Signal Model, Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers. MOSFET Characteristics in Enhancement and Depletion mode, Basic Concepts of MOS Amplifiers								
Text Books:								
1. J. Millman, C. Halkias, "Electronic Devices and Circuits", Tata Mc-Graw Hill, Second Edition,2010								
2. David A.Bell, "Electronic Devices and Circuits", Fifth Edition, Oxford University Press, 2009								
3. Salivahanan, Kumar, Vallavaraj, "Electronic Devices and Circuits", Tata Mc-Graw Hill,								

Reference Books:

1. Jacob Millman, C. Halkies, C.D.Parikh, “Integrated Electronics”, Tata Mc-Graw Hill,2009
2. R.L. Boylestad and Louis Nashelsky,“Electronic Devices and Circuits”,PearsonPublications,,9thEdition,2006

Web References:

- 1.<http://www.circuitstoday.com/understanding-the-pn-junction>
- 2.<https://www.elprocus.com/difference-between-bjt-and-fet/>
3. <http://www.rfwireless-world.com/Terminology/CB-vs-CE-vs-CC-transistor-configurations.html>

E-Text Books:

1. <https://archive.org/details/ElectronicDevicesCircuits>
2. <https://www.scribd.com/doc/281044230/EDC-BAKSHI-pdf>

Outcomes:

1. Explain the properties of semiconductor materials in the formation of PN
2. Classify the V-I characteristics of CB, CE &CC configurations.
3. Design various biasing circuits to achieve the required stability in transistor amplifiers
4. Illustrate the operation of FETs and special diodes for different applications
5. Design half wave, full wave rectifiers with and without filters for different applications
6. Explain the BJT and FET amplifiers.

PROBABILITY THEORY AND STOCHASTIC PROCESSES

B.Tech III Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC302	Core	L	T	P	C	CIA	SEE	TOTAL
		3	-	-	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to:								
I. Solve problems related to conditional and joint probability								
II. Solve problems based on density functions and cumulative density functions								
III. Solve problems on mean, variance and standard deviations of random signals								
IV. Solve problems on joint and conditional distribution functions								
UNIT-I							Classes:15	
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, Bays' Theorem, Independent Events: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous, Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Raleigh, Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties.								
UNIT-II							Classes:15	
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. 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-III							Classes:10	
The Random 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, (N-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 Functions, Gaussian Random Processes, Poisson Random Process.								
UNIT-IV							Classes:10	
The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.								
UNIT-V	Random Signal Response of Linear Systems						Classes:10	
System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross- Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties.								
Text Books:								

1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", TMH, 4th Edition, 2001
2. Athanasios Papoulis and S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", PHI, 4th Edition, 2002.

Reference Books:

1. R.P. Singh and S.D. Sapre, "Communication Systems Analog & Digital", TMH, 1995.
2. Henry Stark and John W. Woods, "Probability and Random Processes with Application to Signal Processing", Pearson Education, 3rd Edition.
3. George R. Cooper, Clave D. MC Gillem, "Probability Methods of Signal and System Analysis", Oxford, 3rd Edition, 1999

Web References:

1. http://sphweb.bumc.bu.edu/otlt/MPH-Modules/BS/BS704_Probability/BS704_Probability3.html
2. <https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/probability-basic-concepts-mathematical-probability>
3. https://web.sonoma.edu/users/f/farahman/sonoma/courses/ces540/lectures/Chapter6_Dig_Random_Proc.pdf

E-Text Books:

1. <http://www.math.harvard.edu/~knill/books/KnillProbability.pdf>
2. <http://sarantsev.faculty.pstat.ucsb.edu/mydocs/notes.pdf>

Outcomes:

1. Describe the basics of probability
2. Explain the mathematical concepts of probability
3. Examine random variables and multiple random variables
4. Solve the operations on mean and variance
5. Discuss the concepts of random process
6. Compare correlation and covariance

SIGNALS AND SYSTEMS

B.Tech III Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC303	Core	L	T	P	C	CIA	SEE	TOTAL
		3	-	-	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to:								
I. Differentiate between continuous and discrete time signals								
II. Know Fourier representation of signal								
III. Emphasize on Fourier spectrum of signal								
IV. Know the Ideal characteristics of filters								
UNIT-I	SIGNALS & SYSTEMS						Classes:10	
Definition and classification of Signal and Systems (Continuous time and Discrete time), Elementary signals such as Dirac delta, unit step, ramp, sinusoidal and exponential and operations on signals. Analogy between vectors and signals-orthogonality-Mean Square error-Fourier series: Trigonometric & Exponential and concept of discrete spectrum								
UNIT-II	CONTINUOUS TIME FOURIER TRANSFORM						Classes:15	
Definition, Computation and properties of Fourier Transform for different types of signals. Statement and proof of sampling theorem of low pass signals, Nyquist rate.								
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								
UNIT-III	CONVOLUTION & CORRELATION						Classes:15	
Convolution and Correlation, autocorrelation and cross correlation, energy density spectrum, Parseval's theorem, power density spectrum, relation between autocorrelation and spectral density function, relation between convolution and correlation.								
LAPLACE TRANSFORM: Definition-ROC-Properties-Inverse Laplace transforms-the S-plane and BIBO stability-Transfer Functions-System Response to standard signals-Solution of Differential equations with initial conditions.								
UNIT-IV	DISCRETE TIME FOURIER TRANSFORM						Classes:10	
Definition, Computation and properties Of Fourier Transform for different types of signals.								
UNIT-V	The Z–TRANSFORM						Classes:10	
Derivation and definition-ROC-Properties-Linearity, time shifting, change of scale, Z-domain differentiation, differencing, accumulation, convolution in discrete time, initial and final value theorems-Poles and Zeros in Z-plane-The inverse Z-Transform-System analysis-Transfer function-BIBO stability-System Response to standard signals- Solution of difference equations with initial conditions								
Text Books:								
1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab , Signals and Systems, PHI, 2 nd Edition, 2009								
2. Simon Haykin and Van Veen, Signals & Systems, Wiley, 2 nd Edition, 2007.								
3. B.P. Lathi, Signals, Systems & Communications, BS Publications, 1 st edition 2008.								
Reference Books:								
1. Michel J. Robert, Fundamentals of Signals and Systems, MGH International Edition, 2008.								
2. M.J.Roberts, Signals and Systems Analysis using Transform method and MATLAB, TMH, 1 st edition, 2007.								
Web References:								

1. http://www.site.uottawa.ca/~jpyao/courses/ELG3120_files/ch1.pdf
2. <http://mathworld.wolfram.com/FourierSeries.html>
3. https://en.wikipedia.org/wiki/Laplace_transform

E-Text Books:

1. <http://www.eng.ucy.ac.cy/cpitris/courses/ece623/notes/SignalsAndSystems.pdf>
2. <http://www.alphace.ac.in/downloads/notes/ece/10ec44.pdf>

Outcomes:

1. Classify the mathematical description and representation of continuous and discrete time signals and systems.
2. Understand and resolve the signals in frequency domain using Fourier series
3. Understand and resolve the signals in frequency domain using Fourier transforms, LTI Systems.
4. Understand different types of Sampling and Convolution & correlation methods, Sampling.
5. Analyze the system in s- domain.
6. Analyze the system in z- domain.

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

B.Tech III Semester: Common to CE, EEE, ME, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18BS303	Core	L	T	P	C	CIA	SEE	TOTAL
		2	-	-	2	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to:								
I. To create knowledge over economic aspects								
II. To understand modern principles and methods of microeconomics of real-world business problems.								
III. To master the knowledge over the basic tools of micro economics and real world business problems.								
IV. To understand various accounting concepts and its applications in managerial decision-making.								
UNIT-I						Classes:20		
Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics– Demand Analysis: Determinants, Law of Demand and its exceptions. Elasticity of Demand: Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, methods, (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)								
UNIT-II						Classes:10		
Theory of Production: Production Function – Isoquants and Iso-costs, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts, types of costs, (BEA)-Determination of Break-Even Point (simple problems) Market: Types of competition, Price-Output Determination in case of Perfect Competition and Monopoly, Monopolistic competition. Methods of Pricing: Cost, competition, strategy based pricing								
UNIT-III						Classes:10		
Business Types: Business, features, Sole Proprietorships, Partnerships, Joint Stock Companies, Public Enterprises and their types. Capital and Capital Budgeting: Capital and its significance, Types and sources of raising finance. Nature and scope of Capital Budgeting, Features, Methods: Payback Method, Accounting Rate of Return Method (ARR) and Net Present Value Method (simple problems)								
UNIT-IV						Classes:10		
Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts. (Simple Problems)								
UNIT-V						Classes:10		
Financial Analysis through Ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS), (Simple Problems).								
Text Books:								
1. Managerial Economics and Financial Analysis, J.V.Prabhakar Rao, Maruthi Publications, 2011								
2. Managerial Economics and Financial Analysis, N. Appa Rao. & P. Vijaya Kumar, Cengage Publications, New Delhi, 2011								
Reference Books:								
1. Managerial Economics and Financial Analysis, A R Aryasri, TMH, 2011								
2. Managerial Economics, Suma damodaran, Oxford, 2011								

Web References:

1. <http://www.economicdiscussion.net/production-function/least-cost-and-maximum-output-combinations-of-input/23264>
2. <https://www.iearnlot.com/capital-budgeting-nature-importance-and-limitations/>

E-Text Books:

1. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_MEFA_Lecture_Notes_1.pdf
2. https://mrcet.com/downloads/digital_notes/EEE/MEFA%20DIGITAL%20NOTES.pdf

Outcomes:

1. To introduce micro as well as macro, economic concepts that are useful in business decision making.
2. To help students better recognize the application of modern principles and methods of microeconomics to real-world business problems in different contexts.
3. To master the basic tools of microeconomics: supply and demand analysis; firms' production and pricing decisions, market equilibrium and market structure analysis.
4. The objective of this course is to acquaint the students regarding various accounting concepts and its application in managerial decision making.

ELECTRICAL TECHNOLOGY LABORATORY

B.Tech III Semester – Electronics and communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18EE307	Core	L	T	P	C	CIA	SEE	Total
		-	-	2	1	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil		Practical Classes: 39			Total Classes: 39		
OBJECTIVES:								
1. The significance of the Electrical Engineering Lab is renowned in the various fields of engineering applications.								
2. To explain the fundamental aspects of Electrical Circuits and machines in practical.								
LIST OF EXPERIMENTS								
Expt. 1	Verification of KCL & KVL.							
To verify KCL & KVL								
Expt. 2	Series & Parallel resonance-Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.							
To study Series & Parallel resonance-Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.								
Expt. 3	Time response of first order RC/RL network for periodic non sinusoidal input-Time constant and steady state error determination.							
To determine Time response of first order RC/RL network for periodic non sinusoidal input-Time constant and steady state error determination.								
Expt. 4	Two port network parameters-Z, Y, ABCD and h-Parameters.							
To determine Two port network parameters-Z, Y, ABCD and h-Parameters								
Expt. 5	Verification of Superposition and Reciprocity theorems.							
To verify Superposition and Reciprocity theorems								
Expt. 6	Verification of Maximum Power Transfer theorem.							
To verify Maximum Power Transfer theorem.								
Expt.7	Experimental verification of Thevenin's and Norton's theorems.							
To verify Thevenin's and Norton's theorems								
Expt. 8	Magnetization characteristics of D.C. Shunt Generator.							
To plot Magnetization characteristics of D.C. Shunt Generator.								
Expt. 9	Swinburne's Test on a DC Shunt Motor.							
To determine efficiency of DC Shunt Motor.								
Expt. 10	Brake test on DC a Shunt Motor.							
To determine efficiency of DC Shunt Motor.								

Expt. 11	OC & SC Tests on a 1-ϕ Transformer.
To determine efficiency 1- ϕ Transformer	
Expt. 12	Load test on a 1- ϕ Transformer
To determine efficiency 1- ϕ Transformer	
Reference Books:	
1. Electric Circuits, (Schaum's Outline Series) - McGraw-Hill Education 2. Charles K. Alexander, Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 5th Edition, McGraw-Hill, 2012.	
Web References:	
1. https://www.electrical4u.com 2. https://www.researchgate.net	
Course Home Page:	
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS:	
HARDWARE: Theorem kits	
Course Outcome:	
1. Verify network theorems for different electrical circuits. 2. Find efficiency of dc shunt motor by conducting suitable tests 3. Find efficiency of single phase transformer	

ELECTRONIC DEVICES AND CIRCUITS LABORATORY

B.Tech III Semester: Common to ECE & EEE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18EC306	Core	L	T	P	C	CIA	SEE	Total
		-	-	2	1	25	50	75
Contact Classes: Nil		Tutorial Classes: Nil		Practical Classes: 68		Total Classes: 68		
OBJECTIVES:								
<p>The course should enable the students to:</p> <ol style="list-style-type: none"> Know the usage of electronic equipment Know the testing of components Understand the PN diode operation in forward and reverse bias Know the characteristics of Half and Full wave rectifier with and without filters Know how to connect transistor in CB, CE configurations 								
LIST OF EXPERIMENTS								
Part A: (Only for viva-voce Examination)								
<p>ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):</p> <ol style="list-style-type: none"> Identification, Specification, testing of R,L,C components (color codes), Potentiometers (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Board, PCB's. Identification, Specification, testing of Active devices: Diodes, BJT, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT. Study and operation of: <ol style="list-style-type: none"> Multimeters (Analog and Digital) Function Generator Regulated Power Supplies CRO 								
Part B: (For Laboratory Examination – Minimum of 12 experiments)								
Expt. 1	Forward and Reverse Bias V-I characteristics of PN junction Diode							
To verify Forward and Reverse Bias V-I characteristics of PN junction Diode								
Expt. 2	Zener diode V-I characteristics and Zener diode as voltage regulator							
To verify Zener diode V-I characteristics and Zener diode as voltage regulator								
Expt. 3	Half Wave rectifier, with and without filters							
To verify Half Wave rectifier, with and without filters								
Expt. 4	Full wave rectifier with and without filters							
To verify Full wave rectifier with and without filters								
Expt. 5	Input and output Characteristics of a BJT in CE configuration and calculation of h-parameters							
To verify Input and output Characteristics of a BJT in CE configuration and calculation of h-parameters								

Expt. 6	Input and output Characteristics of a BJT in CB configuration and calculation of h-parameters
To verify Input and output Characteristics of a BJT in CB configuration and calculation of h-parameters	
Expt.7	FET characteristics in CS configuration
To verify FET characteristics in CS configuration	
Expt. 8	Design of self bias circuit
To verify self bias circuit	
Expt. 9	Frequency response of CE Amplifier
To verify Frequency response of CE Amplifier	
Expt. 10	Frequency response of CC Amplifier.
To verify Frequency response of CC Amplifier.	
Expt. 11	Frequency response of CS FET Amplifier
To verify Frequency response of CS FET Amplifier	
Expt. 12	SCR characteristics
To verify SCR characteristics	
Expt. 13	UJT characteristics
To verify UJT characteristics	
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:	
HARDWARE: RESISTORS, CAPACITORS, UJTs, BJTs,SCRs, FET, BREADBOARDS(12)	
Course Outcome:	
At the end of the course, a student will be able to:	
<ol style="list-style-type: none"> 1. Know active and passive components and its applications 2. Study the usage of measuring instruments and power supplies 3. Plot and analyze the V-I characteristics of PN-junction diode & zener diode and applications 4. Plot and analyze the V-I characteristics of different configurations of BJT & FET 	

SIGNALS AND SYSTEMS LAB

B.Tech III Semester: Electronics and communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18EC307	Core	L	T	P	C	CIA	SEE	Total
		-	-	2	1	25	50	75
Contact Classes: Nil		Tutorial Classes: Nil		Practical Classes: 68		Total Classes: 68		
OBJECTIVES:								
The course should enable the students to:								
I. Differentiate between continuous and discrete timesignals								
II. Know Fourier representation of signals								
III. Know the Ideal characteristics of filters								
IV. Know the Significance of Sampling								
LIST OF EXPERIMENTS								
Expt. 1	Write a program to generate the discrete sequences (i) unit step (ii) unit impulse (iii) ramp (iv) Periodic sinusoidal sequences. Plot all the sequences.							
To generate the discrete sequences (i) unit step (ii) unit impulse (iii) ramp (iv) Periodic sinusoidal sequences. Plot all the sequences.								
Expt. 2	Find the Fourier transform of a square pulse .Plot its amplitude and phase spectrum.							
To Find the Fourier transform of a square pulse .Plot its amplitude and phase spectrum.								
Expt. 3	Write a program to convolve two discrete time sequences. Plot all the sequences. Verify the result by analytical calculation.							
To Write a program to convolve two discrete time sequences. Plot all the sequences. Verify the result by analytical calculation.								
Expt. 4	Write a program to find the trigonometric Fourier series coefficients of a Rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with Appropriate weightings.							
To Write a program to find the trigonometric Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with Appropriate weightings.								
Expt. 5	Write a program to find the trigonometric and exponential Fourier series coefficients of a Periodic rectangular signal. Plot the discrete spectrum of the signal.							
To Write a program to find the trigonometric and exponential Fourier series coefficients of a Periodic rectangular signal. Plot the discrete spectrum of the signal.								
Expt. 6	Generate a discrete time sequence by sampling a continuous time signal. Show that with Sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.							
To Generate a discrete time sequence by sampling a continuous time signal. Show that with Sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.								
Expt.7	The signal $x(t)$ is defined as below. The signal is sampled at a sampling rate of 1000 Samples per second. Find the power content and power spectral density for any signal.							
To The signal $x(t)$ is defined as below. The signal is sampled at a sampling rate of 1000 Samples per second. Find the power content and power spectral density for any signal.								

Expt. 8	Write a program to find the magnitude and phase response of first order low pass and high Pass filter. Plot the responses in logarithmic scale
To Write a program to find the magnitude and phase response of first order low pass and high Pass filter. Plot the responses in logarithmic scale	
Expt. 9	Write a program to find the response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
To Write a program to find the response of a low pass filter and high pass filter, when a speech signal is passed through these filters.	
Expt. 10	Write a program to find the autocorrelation and cross correlation of sequences
To Write a program to find the autocorrelation and cross correlation of sequences	
Expt. 11	Generate a uniformly distributed length 1000 random sequence in the range (0,1). Plot the Histogram and the probability function for the sequence. Compute the mean and variance
To Generate a uniformly distributed length 1000 random sequence in the range (0,1). Plot the Histogram and the probability function for the sequence. Compute the mean and variance	
Expt. 12	Generate a Gaussian distributed length 1000 random sequence. Compute the mean and Variance of the random signal by a suitable method
To Generate a Gaussian distributed length 1000 random sequence. Compute the mean and Variance of the random signal by a suitable method	
Expt. 13	Write a program to generate a random sinusoidal signal and plot four possible realizations Of the random signal.
To Write a program to generate a random sinusoidal signal and plot four possible realizations Of the random signal.	
Expt. 14	Generate a discrete time sequence of N=1000 i.i.d uniformly distributed random numbers in the interval (-0.5,-0.5) and compute the autocorrelation of the sequence.
To Generate a discrete time sequence of N=1000 i.i.d uniformly distributed random numbers in the interval (-0.5,-0.5) and compute the autocorrelation of the sequence.	
Expt. 15	Obtain and plot the power spectrum of the output process when a white random process is passed through a filter with specific impulse response.
To Obtain and plot the power spectrum of the output process when a white random process is passed through a filter with specific impulse response.	
<p>SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS: SOFTWARE:MATLAB R2015a, Wplsoft software and LabVIEW HARDWARE:Desktop Computers (36nos)</p>	
<p>Course Outcome: At the end of the course, a student will be able to:</p> <ol style="list-style-type: none"> 1. Understand basics of MATLAB syntax, functions and programming. 2. Generate and characterize various continuous and discrete time signals. 3. Perform the basic operations on the signals. 4. Design and analyze linear time-invariant (LTI) systems and compute its response. 	

PROFESSIONAL SOCIETY ACTIVITIES-I

B.Tech III Semester: Common to CE, EEE, ME, ECE & CSE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18AS301	-	L	T	P	C	CIA	SEE	Total
		2	0	0	0	-	-	-
Contact Classes: 12	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 12			
<p>OBJECTIVES: The course should enable the students to:</p> <ol style="list-style-type: none"> 1. Improve communication skills 2. Develop leadership qualities <p>Professional Society Activities (PSA) course is aimed at enhancing the self-learning, communication, managerial skills of the students by engaging them in various Co & Extra Curricular activities during their course of study. Activities in each of the department shall be designed and conducted by the Professional Society Executive Committee whose composition is:</p> <ol style="list-style-type: none"> 1. Faculty Mentors- 2 No. 2. Student Chairman: 1 No.- Final year Student 3. Student General Secretary: 1 No.- Third year Student 4. Treasurer: 1 No.- Third year Student <p>Student Members: 2 No's from each class PSA related activities would be of the following nature but not limited to:</p>								
Activity#1	Just A Minute							
Activity#2	Technical Quiz							
Activity#3	Open House- Lab Demo							
Activity#4	Technical Paper Presentation- Preliminary							
Activity#5	Technical Paper Presentation- Final							
Activity#6	Poster Presentation							
Activity#7	Collage- A theme based event							
Activity#8	Debate Competition							
Activity#9	Group Discussion Competition							
Activity#10	Mock Interviews							
Activity#11	Model Exhibition							
Activity#12	Valedictory Function							

SOFT SKILLS PRACTICE

B.Tech III Semester: Common to CE, EEE, ME, ECE & CSE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18AS302	Core	-	-	2	-	-	-	-
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 28			Total Classes: 28			
OBJECTIVES:								
To give each student a realistic prospective o work & work expectation to help formulate problem solving skills.								
LIST OF ACTIVITIES								
Activity. 1	<u>Introduction - What are Soft Skills?</u>							
Importance of Soft Skills – Selling your soft skills – Attributes regarded as Soft Skills – Soft skills – Social soft skills – Thinking soft skills – Negotiating – Exhibiting your soft skills – Identifying your soft skills – improving your soft skills – will formal training enhance your soft skills – soft skills training – Train yourself – practicing soft skill – Measuring Attitude. <i>Activity: Measure your Soft Skill.</i>								
Activity. 2	<u>Know Thyself / Self-Discovery</u>							
Introduction – Importance of knowing yourself – Process of knowing yourself – SWOT analysis – Benefits of SWOT analysis – using of SWOT analysis – SWOT analysis grid – Questions to complete the grid. <i>Activity: Know yourself.</i>								
Activity. 3	<u>Developing Positive Attitude</u>							
Introduction – Meaning – Features of Attitude – Attitude and behavior – Formation of attitudes – change of attitudes – what can you do to change attitude ? Ways of changing attitude in a person – Attitude in a work place – The power of positive attitude – Developing positive attitude – Obstacles in developing positive attitude – Staying positive – Examples of positive attitude – positive attitude and its result – staying negative – examples of negative attitude – Overcoming negative attitude – Negative attitude and its results. <i>Activity: Measure your attitude.</i>								
Activity. 4	<u>Forming Values</u>							
Introduction – Meaning – What is a value? – A core of Values – Values relating to educations Values relating to self and others – Values relating to Civic responsibilities – Values and attitudes -Importance of values – Formation of values – Types of Values – Terminal and Instrumental Values – Power of Values – Personal Values – Cultural Values – Values – some examples. <i>Activity: Identity your values.</i>								
Activity. 5	<u>Improving Perceptions</u>							
Introduction – Meaning – Factors influencing Perception – Perceptual process – Improving perception – Perception and its application in organizations.								

<i>Activity: Test your Perception.</i>	
Activity. 6	<u>Career Planning</u>
Introduction – Benefits of career planning – Guidelines for choosing a career – Myths about choosing a career – Tips for successful career planning – Developing career goals – Final thoughts on career planning – Things one should know while starting career and during his career. <i>Activity: Test your career interests.</i>	
Activity. 7	<u>Art of Listening</u>
Introduction –What is Listening? – Two ears, one mouth – Benefits of active listening – kinds of listening – Factors that hamper listening – Common poor listening habits – Advantages of active listening – Listening tips. <i>Activity: Test your listening skills.</i>	
Activity. 8	<u>Art of Reading</u>
Introduction – Reading is a Cognitive process – Good readers are what they read – Benefits of reading – Different types of reading – Tips for effective reading – The SQ3R Technique – Different stages of reading – Rates of reading – Determining a students’ reading rate – Adjusting reading rate – Activities for increasing reading rate – Problems with reading – Becoming an effective reader. <i>Activity: Test your reading skills.</i>	
Activity. 9	<u>Body Language</u>
Introduction – Body talk – Voluntary and involuntary body language – Forms of body language – Parts of body language – Origin of body language in building interpersonal relations – Reasons to study body language – Body language in building industrial relations – Improving body language- Types of body language – Gender differences – Female interest and body language – shaking hands with Women – Interpreting body language – Developing confidence with correct body language.	
Activity. 10	<u>Team Building and Teamwork</u>
Introduction – Meaning – Aspects of Team building – Skills needed for Team work – A model of team building – Team vs Group – Characterizer of effective team – Role of a team leader – nine persons a successful team should have – inter – group collaboration – Advantages of Inter-group collaboration – Differences faced in intergroup collaboration. <i>Activity: Test your team work skills.</i>	
Activity. 11	<u>Group Discussion</u>
Introduction – Meaning of GD – Why Group Discussion – Charaters tested in a GD – Tips of GD – skills required in a GD – consequences of GD – Behaviour in a GD – Essential elements of GD – Traits tested in a GD – GD etiquette – Areas to be concentrated while preparing for a GD – Initiating a GD – Non-verbal communication in GD – Movement and Gestures to be avoided in a GD – Topics for GD. <i>Activity: Group Discussion.</i>	
Activity. 12	<u>Interview Skills</u>
Introduction – Why an interview – Type of interview – Interview panel – Types of Questions asked – Reason for selecting a candidate – Reasons for selecting a candidate – Reasons for rejecting a candidate – on the day of interview – on to the interview table – attending job fair – common mistakes that you wouldn’t want to do – question the candidate should not ask during the interview – pot interview etiquette – How does one follow- up? – Telephonic interview – Dress code at interview – Typical questions asked – Interview mistakes – quick tips – How to present well in interview – Tips to make a good impression in an interview – Job	

interview – Basic tips – How to search for job effectively – Interview quotations.

Activity. 13 | **Time Management**

Introduction – The 80:20 rule – Take a good look at the people around you – Examine your work – sense of time management – Time is money – Features of Time – Three secrets of time management – Time management matrix – Analysis of time matrix – Effective scheduling – Group of activities – Five steps to successful time management – difficulties in time management – Evil of not planning – time management is a myth – overcoming procrastination – ways to find free time – Time Management tips for students – Interesting facts about time – Ideal way of spending a day – time wasters – time savers – realizing the value of time – time circle planner.

Activity: Test your time management skills.

Activity. 10 | **Stress Management**

Introduction – Meaning – At one level stress may be a positive aid to performance – At one level stress may be a negative aid to performance – Effects of stress – Kinds of stress – sources of stress – Few other common sources of stress case study – behaviors identified with stress – Assessing the existence of stress – What are signs of stress? – Spotting stress in you – stress management tips : Teenage stress – Make the mornings memorable.

Text Books:

- 1 Soft Skills : Life skills, Communication Skills, Employability skills and Corporate skills.
Authors : S. Hariharan, N. Sundararajan and S.P. Shanmugapriya , Publishers : MJP Publishers
- 2 Soft Skills : Know yourself and know the world.
Authors : Alex .Publishers : S Chand & Co., New Delhi.
3. Making work for highly sensitive person.
Authors : Beverly Jaeger, Ph.D.
Publishers : Tata Mcgraw hill Education

Reference Books:

- 1 Thill, John V. & Courtland L. Bovée, Excellence in Business Communication, 10th edition. Boston : Pearson, 2013.
- 2 Thorpe, Edgar & Showick Thorpe. Winning at Interviews. 2nd Edition. Delhi: Dorling Kindersley, 2006.

Web References:

1. <http://www.indiabix.com/group-discussion/topics-with-answers/>
2. <http://www.owl.net.rice.edu/~cainproj>

Outcomes:

1. Receive the support they need to resolve issues and make decisions
2. Explore their personal resources and aptitudes
3. Understand new career prospects and strive for personal development
4. Make a proper and informed decision for their career
5. In an era of stiff competition success can only be received if one knows Team work as team work always pays rich dividends.
6. Problem solving skills for personal and professional development.

ENVIRONMENTAL STUDIES (Mandatory Course)

B.Tech III Semester: Common to CE, EEE, ME, ECE & CSE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18MD301	H&S	L	T	P	C	CIA	SEE	TOTAL
		2	0	0	0	0	0	0
Contact Classes:30	Tutorial Classes: 0	Practical Classes: Nil			Total Classes: 30			
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> To create a stronger foundation in the understanding of fundamentals of environment with an applied perspective for future engineers with a focus on Engineering & Technology. To impart the awareness among the engineering students about the present day problems of environment, threats to biodiversity, social issues and excess usage of natural resources to reach the heights of technical globe with latest technologies. Prepare with perspective of “Think Globally Act Locally” 								
UNIT-I	Introduction to Environmental Studies						Classes:6	
Introduction to Environmental Studies: Definition, scope, need for public awareness. Natural Resources: Renewable & Non-renewable resources in India, Forest Resources: Use, Deforestation-Case Studies; Water Resources: Use, Over-exploitation of surface and ground water, Environmental impacts of Dams, Floods and Droughts; Food Resources: Changes caused by agriculture, over grazing; Effects of modern agriculture-fertilizer, pesticide problems, water - logging and salinity; Energy Resources: Renewable & nonrenewable energy resources, Use of alternate energy sources.								
UNIT-II	Ecosystems and Biodiversity						Classes:6	
Ecosystems: Definition, Structure of an ecosystem Functions of ecosystem- Food chains, Food web, Energy flow, Ecological pyramids Types of Ecosystems: Grass land, Desert, Forest Ecosystem, and Aquatic Ecosystem: Pond, River, and Ocean Ecosystem. Biodiversity: Definition, levels of biodiversity, Value of biodiversity, Hotspots of biodiversity, India as mega biodiversity nation, Threats to biodiversity- Poaching, Habitat loss, Endangered & endemic species of India, Conservation of biodiversity: In-situ & Ex-situ conservation.								
UNIT-III	Environmental Pollution						Classes:6	
Environmental Pollution: Definition, Causes & Control measures of Air pollution, Water pollution, Soil pollution, noise pollution. Solid waste management: Causes, effects and control measures Role of an individual in preventing pollution.								
UNIT-IV	Social Issues & Environment						Classes:6	
From unsustainable to sustainable development, water conservation, rain water harvesting, watershed management, environmental ethics & issues, possible solutions, ozone layer depletion, global warming, consumerism & waste products.								
UNIT-V	Human Population and the Environment						Classes:6	
Population growth, variation among nations, Population explosion-family welfare programme, Women and Child welfare, Role of Information Technology in Environment and human health, Case Studies.								
Text Books:								
<ol style="list-style-type: none"> Environmental Studies for Undergraduate courses by Erach.Bharucha for University Grants Commission, Universities press 								

2. Environmental Studies by R Rajagopalan, Oxford's University Press.
3. Kaushik A, Kaushik CP, perspectives in environment, New International Publishers.
4. R.J.Ranjit Daniels and Jagdish Krishna Swamy, (2009), "Environmental Studies", Wiley India Private Ltd., New Delhi.

Reference Books:

1. P. Meenakshi, "Elements of Environmental Science and Engineering", Prentice Hall of India Private Limited, New Delhi, 2006.
2. G. Tyler Miller Jr., "Environmental Science – working with the Earth", Eleventh Edition, Thomson Brooks /Cole, 2006.
3. S.M. Prakash, "Environmental Studies", Elite Publishers Mangalore, 2007.
4. Raman Siva Kumar, "Principals of Environmental Science and Engineering", Second Edition, Cengage learning Singapore, 2005.
5. Dr.Pratiba Sing, Dr.AnoopSingh and Dr.Piyush Malaviya, "Text Book of Environmental and Ecology", Acme Learning Pvt. Ltd. New Delhi.

Web References:

1. www.ugc.ac.in
2. <https://en.wikiboos.org>

E-Text Books:

1. Textbook of Environmental Studies for Undergraduate Courses.By Erach Bharucha (Author)
2. A Textbook of Environmental Studies. By Dr. D.K. Asthana.

Outcomes:

At the end of the course students able to

1. Apply their knowledge in biology, physics, chemistry, earth science and economics for better understanding of earth's environment.
2. Understanding the importance of natural resources.
3. Comprehend the environmental problems from multiple perspectives with emphasis on human modern life style and developmental activities.
4. Influence his society in proper utilization of goods & services.
5. Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century
6. Recognize the inter connectedness of human dependence on earth's ecosystems- Understanding the value of bio diversity & the conservation of biodiversity.

SWITCHING THEORY AND LOGIC DESIGN

B.Tech IV Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC401	Core	L	T	P	C	CIA	SEE	TOTAL
		3	-	-	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to :								
I. Understand the different number system, its conversions and binary arithmetic								
II. Know the fundamentals of Boolean algebra and theorems, Karnaugh maps including the minimization of logic functions to SOP or POS form								
III. understand the logic design of programmable devices, including PLDs								
IV. understand RAMS, and ROMS including its sequencing and control								
UNIT-I	Digital Codes and Boolean Algebraic Switching Functions						Classes:20	
Types of number systems – complement representation of Negative numbers, Implementation of simple arithmetic operations and conversions using Binary, BCD, OCTAL and Hexa- Decimal Numbers, Error Detecting & Error Correcting codes - Hamming codes, Fundamental postulates of Boolean Algebra, Basic theorems and properties, Switching Functions, Canonical and Standard forms, Algebraic simplification, Digital Logic Gates, Universal Gates.								
UNIT-II	Minimization of Switching Functions and Combinational Logic Design						Classes:10	
Map Method - Prime Implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime-Implicant chart, Simplification Rules, Design using conventional Logic Gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Introduction to Modular design using IC chips, MUX Realization of switching functions Parity bit generator, Code-converters, Hazards and hazard free realizations.								
UNIT-III	Programmable Logic Devices and Sequential Circuits						Classes:10	
Basic PLD's-ROM, PROM, PAL, PLA. Realization of Switching functions using PLD's, Capabilities and limitations of Threshold gate, Classification of sequential circuits: (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic Flip-Flops, Triggering and Excitation Tables, Steps in Synchronous Sequential Circuit Design, Design of modulo-N Ring & Shift counters, Serial Binary Adder, Sequence Detector and Memory (Register level: Serial and Parallel).								
UNIT-IV	State Machines: FSMs AND ASMs						Classes:10	
Finite State Machine – capabilities and Limitations, Mealy and Moore models, Examples of Mealy and Moore models, Partition Techniques and Merger chart Methods Concept of Minimal cover table.								
UNIT-V	State Machines: FSMs AND ASMs						Classes:10	
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.								
Text Books:								
1. Zvi Kohavi, Switching & Finite Automata theory, TMH, 2 nd Edition, 1979								
2. Morris Mano, Digital Design, PHI, 3 rd Edition, 2008								
3. A. Anand Kumar, Switching Theory and Logic Design, PHI, 1 st Edition, 2011.								
Reference Books:								
1. R.P.Jain, "Modern Digital Electronics", 4 th Edition, TMH								
2. Fletcher, An Engineering Approach to Digital Design, PHI. 1 st Edition 2001								
Web References:								

1. https://en.wikipedia.org/wiki/Numeral_system
2. https://en.wikipedia.org/wiki/Boolean_algebra
3. https://www.tutorialspoint.com/computer_logical_organization/combinational_circuits.htm
4. https://www.tutorialspoint.com/computer_logical_organization/sequential_circuits.htm

E-Text Books:

1. https://mrcet.com/downloads/digital_notes/ECE/II%20Year/Switching%20Theory%20and%20Logic%20Design.pdf
2. <https://www.geethanjaliinstitutions.com/engineering/coursefiles/downloads/eee/stdl.pdf>

Outcomes:

1. Use the underlying features of various number systems.
2. Execute the concepts of Boolean Algebra for the analysis
3. Use simplification methods to simplify the given Boolean function (Boolean algebra, k-map and Tabular method).
4. Design and analyze small combinational circuits and to use standard
5. Design and analyze small sequential circuits and devices and to use standard sequential functions
6. Analyze synchronous and asynchronous sequential circuits

PULSE AND DIGITAL CIRCUITS

B.Tech IV Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC402	Core	L	T	P	C	CIA	SEE	TOTAL
		3	-	-	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to:								
I. Differentiator and Integrator circuits, clippers (limiters)								
II. Time Base generators (Miller, Bootstrap Voltage time base generator and Current time basegenerator)								
III. Synchronization and Frequency division (Synchronization using Astable, Monostable relaxation circuits)								
IV. Sampling Gates (Unidirectional, Bidirectional sampling gates without pedestal and Applications of sampling gates) and Realization of Logic gates using Diodes andTransistors.								
UNIT-I	Linear Wave Shaping						Classes:10	
Introduction to elementary signals and representations, RC circuits, types. High pass and low pass RC circuits and their response for Sinusoidal, Step, Pulse, Square, & Ramp inputs, The High pass RC Circuit as a Differentiator, Low pass RC Circuit, The Low pass RC Circuit, The Low Pass RC Circuit as a Integrator, Attenuators.								
UNIT-II	Non-Linear Wave Shaping						Classes:10	
Clipping Circuits, Diode Clippers, Clipping at Two Independent Levels, The Clamping Operation, Clamping Circuits Taking Source and Diode Resistances into Account, Clamping Circuit Theorem and Practical Clamping Circuits.								
UNIT-III	Multivibrators						Classes:10	
Bistable Multivibrator: The Stable States of a Bistable Multivibrator, A Fixed Bias Transistor Bistable Multivibrator, Self Bias Transistor Bistable Multivibrator, Commutating Capacitors, Methods of Improving Resolution, Unsymmetrical Triggering of the Bistable Multivibrator. Triggering Unsymmetrical through a Unilateral Device, Symmetrical Triggering and Schmitt Trigger. Monostable And Astable Multivibrators: The Monostable Multivibrators, Gate Width of a Collector Coupled Monostable Multivibrator, Waveforms of The Collector Coupled Monostable Multivibrators, The Astable Collector Coupled Multivibrator.								
UNIT-IV	Time Base Generators						Classes:20	
Voltage Time Base Generators: General Features of a Time Base Signal, Methods of Generating a Time Base Waveform, Exponential Sweep Circuit, Negative Resistance Switches, Sweep Circuit Using a Transistor Switch, A Transistor Constant Current Sweep, Miller and Boot Strap Time Base Generators-General Considerations, The Transistor Miller Time Base Generator, The Transistor Boot Strap Time Base Generator.								
Current Time Base Generators: A Simple Current Sweep, Linearity Correction through Adjustment of Driving Waveform, A Transistor Current Time Base Generator. Blocking Oscillators: A Triggered Transistor Blocking Oscillator (Base Timing), A Triggered Transistor Blocking Oscillator (Emitter Timing).								
UNIT-V	Sampling Gates						Classes:10	
basic operating principle, types & applications of S.G, synchronization andfrequency division applications.								
Logic Gates and Applications: OR, AND, NOT, NAND, NOR, EX-OR and EX-NOR gates, RTL, DTL,TTL and CMOS logic families.								
Text Books:								

1. J.Millman, H.Taub, Pulse, Digital and Switching Wave forms, TMH publishers, 1st edition, 2001.
2. A.Anand Kumar, Pulse and Digital Circuits, PHI Publishers 2nd edition, 2008.
3. David A.Bell , Solid State Pulse Circuits, PHI, 4th edition, 2006.
4. Jacob Millman, Christos C. Halkis, Integrated Electronics, TMH, 2nd edition, 2009.

Reference Books:

1. L.Strauss, Wave Generation and shaping, McGraw-Hill, 1970.
2. Ronald J.Tocci, Fundamentals of pulse and digital circuits, 3rd edition 2008

Web References:

1. https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_nonlinear_wave_shapping.htm
2. <https://www.oreilly.com/library/view/pulse-and-digital/9788131721353/xhtml/sec11-5.xhtml>
3. https://www.tutorialspoint.com/pulse_circuits/pulse_circuits_time_base_generators_overview.htm

E-Text Books:

1. <http://vignanits.ac.in/new/course%20notes/ECE/II/PDC%20UNIT-II%20NOTES.pdf>
2. <http://ece.gecgudlalleru.ac.in/pdf/manuals/PDC-WITHOUTREADINGSMANUAL.pdf>

Outcomes:

1. Categorize linear and non-linear wave shaping.
2. Explain about multivibrators.
3. Categorize time based generators.
4. Explain sampling gates and its applications.
5. List out different logic gates and their applications.
6. Explain about Blocking Oscillators.

ANALOG CIRCUIT ANALYSIS

B.Tech IV Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC403	Core	L	T	P	C	CIA	SEE	TOTAL
		3	-	-	3	30	70	100
Contact Classes:60		Tutorial Classes: -		Practical Classes: Nil		Total Classes:60		
OBJECTIVES:								
<p>The course should enable the students to:</p> <p>I. Conduct experiment on Common Emitter and Common Source amplifiers.</p> <p>II. Construct negative feedback in amplifiers</p> <p>III. Accomplish the frequency response of two stage RC coupled amplifier.</p> <p>IV. Construct sinusoidal oscillators and power amplifiers.</p>								
UNIT-I	Small Signal Amplifiers						Classes:20	
<p>Common emitter amplifier with emitter resistance, Emitter follower, FET small signal model, Low frequency common source and common drain amplifiers, FET as Voltage Variable Resistor, Cascading Transistor Amplifiers, High input Resistance Transistor Circuits – Darlington pair, Cascode amplifier, Frequency response and analysis of RC Coupling, Direct coupling and Transformer coupling, Difference amplifier, Two Stage RC Coupled JFET amplifiers (in Common Source (CS) configuration). Transistor at High Frequencies, Hybrid- π Common Emitter transistor model, Hybrid- π conductances, Hybrid π capacitances, Validity of hybrid π model, Variation of Hybrid Parameters, CE short circuit gain, Current gain with resistive load, Single stage CE transistor amplifier response, Gain Bandwidth product, Emitter follower at High frequencies.</p>								
UNIT-II	Large Signal Amplifiers						Classes:10	
<p>Classification of amplifiers, Class A large signal amplifiers, second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio power amplifier – efficiency of Class A amplifiers. Class B amplifier – efficiency – push pull amplifier - distortion in amplifiers - complementary-symmetry (Class B) push-pull amplifier, Class C, Class D Amplifier – Class S amplifier – MOSFET power amplifier, Thermal stability and heat sink.</p>								
UNIT-III	Feedback Amplifiers						Classes:10	
<p>Block diagram, Loop gain, Gain with feedback, Effects of negative feedback – Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback, Four types of negative feedback connections – voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Method of identifying feedback topology and feedback factor, Nyquist criterion for stability of Feedback amplifiers.</p>								
UNIT-IV	Oscillators						Classes:10	
<p>Classification, Barkhausen Criterion - Mechanism for start of oscillation and stabilization of amplitude, General form of an Oscillator, Analysis of LC oscillators -Hartley, Colpitts, Clapp, Armstrong, Tuned collector oscillators, RC oscillators -phase shift –Wien bridge.</p>								
UNIT-V	Tuned Amplifiers and Voltage Regulators						Classes:10	
<p>Introduction, Q-Factor, Small Signal Tuned Amplifier – Capacitance single tuned amplifier, Double Tuned Amplifiers, Effect of Cascading Single tuned amplifiers on Band width, Effect of Cascading Double tuned amplifiers on Band width, Staggered tuned amplifiers, Stability of tuned amplifiers, Voltage regulation – Line Regulation, Load Regulation, Types of Regulators, Series voltage regulator, shunt regulators, Overload Voltage protection.</p>								
Text Books:								
<ol style="list-style-type: none"> 1. Jacob Millman, Christos C Halkias & Satyabratajit, Electronic Devices and Circuits, TMH, 2nd edition 2007. 2. Robert L Boylested and Louis Nashelsky, Electronic Devices and Circuit Theory, Pearson 								

India, 10th Edition, 2009.

3. David A Bell, Electronic Devices and Circuits, Oxford, 5th edition, 2008.
4. Floyd, Electronic Devices, Low Price Edition, 6th Edition, 2009

Reference Books:

1. NN Bhargava, DC Kulshrestha and SC Gupta, Basic Electronics and Linear Circuits, TMH, 2nd edition, 2009.
2. Jacob Millman and Arvin Grabel, Microelectronics, Tata McGraw Hill, 2nd edition, 2007.

Web References:

1. <https://electronicspost.com/single-stage-transistor-amplifier/>
2. https://en.wikipedia.org/wiki/Negative-feedback_amplifier
3. https://en.wikipedia.org/wiki/Electronic_oscillator

E-Text Books:

1. http://www.owl.net.rice.edu/~dodds/Files331/analog_notes.pdf
2. https://www.ucursos.cl/usuario/9553d43f5ccbf1cca06cc02562b4005e/mi_blog/r/%5BGray___Meyer%5D_Analysis_and_Design_of_Analog_Integrated_Circuits_5th_cropped.pdf

Outcomes:

1. Implement single stage amplifiers at low and high frequencies using transistors and FETs
2. Implement multistage amplifiers at low and high frequencies using transistors.
3. Illustrate feedback amplifiers for different applications
4. Design sinusoidal Oscillators for a specified frequency
5. Design power amplifier for different applications
6. Evaluate tuned amplifiers for communication systems.

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

B.Tech IV Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC404	Core	L	T	P	C	CIA	SEE	TOTAL
		3	-	-	3	30	70	100
Contact Classes:60	Tutorial Classes: -		Practical Classes: Nil		Total Classes:60			
OBJECTIVES:								
The course should enable the students to:								
I. Acquire the prerequisites of the electro-magnetic fields and their interaction with materials								
II. Understand the applications of Coulomb's law and Gauss law to different charged distributions								
III. Know the physical interpretation of Maxwell's equations and applications for various fields like Antennas, Waveguides								
IV. Understand behavior of E.M. waves incident on the interface between two different media								
UNIT-I	ELECTROSTATICS						Classes:15	
Coulomb's Law, Electric Field Intensity - Fields due to Different Charge Distributions, Electric Flux Density, Gauss's Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density. Convection and Conduction Currents, Polarization of Dielectrics, Dielectric Constant, Linear, Isotropic and Homogeneous Dielectrics, Continuity Equation & Relaxation Time, Poisson's and Laplace's Equations, Capacitance - Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.								
UNIT-II	MAGNETO STATICS						Classes:10	
Biot - Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative problems.								
UNIT-III	MAXWELL'S EQUATIONS (TIME VARYING FIELDS)						Classes:10	
Faraday's Law, Transformer and Motional Electromotive Forces, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric- Dielectric and Dielectric - Conductor Interfaces, Illustrative Problems.								
UNIT-IV	EM WAVE CHARACTERISTICS						Classes:10	
Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization, Direction Cosines. Reflection and Refraction of Plane Waves - Normal and Oblique Incidences or both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Poynting Vector and Poynting Theorem – Applications, Surface Impedance, Power Loss in a Plane Conductor, Illustrative Problems.								
UNIT-V	TRANSMISSION LINES						Classes:15	
Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Distortion - Condition for Distortion less and Minimum Attenuation, Loading – Types of Loading. Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR, UHF Lines as Circuit Elements, Smith Chart - Configuration and Applications, Impedance Matching- Quarter Wave Transformer, Single and Double Stub Matching, Illustrative problems.								
Text Books:								

1. William H. Hayt Jr. and John A. Buck, Engineering Electromagnetics, TMH, 7th edition 2006
2. Mathew N.O. Sadiku , Elements of Electromagnetics, Oxford University Press, 4th edition 2007.
3. E.C. Jordan and K.G. Balmain, Electromagnetic Waves and Radiating Systems, PHI, 2nd edition 2008
4. Umesh Sinha, Transmission Lines and Networks, Satyaprakashan (Tech India publications), 8th edition, 2009

Reference Books:

1. Nannapaneni Narayana Rao, Elements of Engineering Electromagnetics, PHI, 4th edition, 2002
2. John D. Ryder , Networks, Lines and Fields, PHI, 2nd edition, 2000
3. K.D. Prasad, Antenna & Wave Propagation, Tech India Publishers, 1st edition, 2001.
4. “Electromagnetics”, Schaum’s Outline Series, 3rd edition, 2011.

Web References:

1. https://en.wikipedia.org/wiki/Maxwell%27s_equations
2. https://www.school-for-champions.com/science/electromagnetic_waves.htm
3. <https://www.khanacademy.org/science/physics/light-waves/introduction-to-light-waves/a/light-and-the-electromagnetic-spectrum>

E-Text Books:

1. https://mrcet.com/downloads/digital_notes/ECE/II%20Year/Electromagnetic%20Theory%20and%20Transmission%20Lines.pdf
2. <http://www.geethanjaliinstitutions.com/engineering/coursefiles/downloads/ece/emt&tl.pdf>

Outcomes:

1. Understand the Maxwell’s Equations.
2. Understand and analyze the Boundary conditions for different media.
3. Analyze the various parameters and characteristics of the EM Waves
4. Understand how electromagnetic wave propagates.
5. Acquire knowledge about Reflection and refraction of plane waves.
6. Analyze basic transmission line parameters and usage of Smith chart.

ANALOG COMMUNICATIONS

B.Tech IV Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC405	Core	L	T	P	C	CIA	SEE	TOTAL
		3	-	-	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to:								
I. Categorize different amplitude modulation techniques.								
II. Categorize angle modulation techniques.								
III. Categorize pulse amplitude modulation techniques.								
IV. Analyze receivers for continuous wave modulation.								
V. Explain noise characteristics in analog communication.								
VI. Solve the parameters required for modulation and receivers.								
UNIT-I	Introduction- Communication Systems & Linear Continuous						Classes:10	
Communication Process, Elements of communication Systems - information, Messages and Signals, Communication channel, Modulation , Modulation Methods, Modulation Benefits and Applications Fundamental Limitations of communication Systems.								
UNIT-II	Double Side Band Amplitude Modulation						Classes:10	
AM Signals and Spectra, DSB Signals and Spectra, Tone Modulation, Modulators and Transmitters – Product Modulators, Square Law Modulators, Balanced Modulators and Switching Modulators. Suppressed Side Band (SSB) Amplitude Modulation - Single Side Band Signals and Spectra, Single Side Band Generation, Vestigial Side Band Signals and Spectra, Frequency Conversion and Demodulation –Frequency Conversion, Synchronous Detection, Envelope Detection, And Illustrative Problems.								
UNIT-III	Angle Continuous Wave (CW) Modulation: Phase and Frequency Modulation						Classes:10	
PM and FM Signals, Narrow Band PM and FM, Tone Modulation, Multi Tone and Periodic Modulation, Transmission Bandwidth and Distortion – Transmission Estimates, Linear Distortion, Non-Linear Distortion and Limiters. Generation and Detection of PM and FM – Direct FM and VCOs, Phase Modulators and Indirect FM, Frequency Detection, Interference – Interfering Sinusoids, Pre-Emphasis and De-Emphasis Filtering, FM Capture Effect, Illustrative Problems.								
UNIT-IV	Analog Communication Systems and Pulse Modulation Techniques:						Classes:20	
Receivers for CW Modulation – Super Heterodyne receivers, direct conversion receiver, special purpose receivers, Receiver Specifications, Receiver Measurements, Multiplexing Systems, synchronous detection and frequency synthesizers using Phase Locked Loop (PLL), Linearized PLL FM detection, Illustrative Problems. Pulse amplitude modulation – Flat top sampling and Pulse amplitude modulation (PAM), Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, PPM spectral analysis, Illustrative Problems.								
UNIT-V	Noise						Classes:10	
Thermal Noise & Available Power, White noise and filtered noise, Noise equivalent bandwidth, base band signal Transmission with noise- Additive Noise & S/N, Analog Signal Transmission, Noise in Analog Modulation Systems- Band Pass Noise System Models, Quadrature Components, envelope phase, Correlation Functions, Linear CW Modulation with Noise – Synchronous Detection, Envelope Detection, and Threshold Effect, Angle CW with Noise, Post detection Noise, Destination S/N, FM Threshold Effect, Analog Pulse modulation with Noise, Illustrative Problems.								
Text Books:								
1. Simon Haykin, “Communication Systems”, Wiley-India Edition, 3 rd Edition, 2010.								
2. A. Bruce Carlson, & Paul B. Crilly, “Communication Systems – An Introduction to Signals & Noise in								
Reference Books:								

1. B.P. Lathi, & Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press International, 4th edition, 2010.
2. Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.

Web References:

1. <https://www.electronics-notes.com/articles/radio/modulation/amplitude-modulation-am-modulator-circuits.php>
2. <https://www.audioholics.com/loudspeaker-design/audibility-of-distortion-at-bass/nonlinear-distortion>

E-Text Books:

1. https://mrcet.com/downloads/digital_notes/ECE/III%20Year/ANALOG%20COMMUNICATIONS-18.pdf
2. http://www.vssut.ac.in/lecture_notes/lecture1428643367.pdf

Outcomes:

1. Know the various types of Analog Modulation schemes for transmission of Analog Information.
2. Understand basic concepts of designing components like Modulators and demodulators used in design of Analog communication systems.
3. Analyze the Transmitter and Receiver sections in Communication system and effect of Noise in Receivers.

MANAGEMENT SCIENCE

B.Tech IV Semester: Common to ECE & EEE								
Course code	Category	Hours/week			Credits	Maximum Marks		
18ME306	Core	L	T	P	C	CIA	SEE	TOTAL
		3	-	-	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes: Nil			Total Classes:60			
OBJECTIVES:								
The course should enable the students to:								
I. To inculcate knowledge over management practices in the organization								
II. The objective of this course is to learn the production concepts and different types of layouts for business purpose								
III. To enable the students know about the inventory methods and its evolution								
IV. To learn about consumers behavior and its factors. And also learn about the compensation, training and development facilities of employees.								
V. To know about the strategic management process and SWOT analysis of companies.								
UNIT-I						Classes:10		
Introduction to management and organization: Nature of management, functions of management. Taylor's scientific management, Fayol's principles of management, Maslow's theory, Douglas theory X & Theory Y, Herzberg theory, systems approaches to management, leadership styles, social responsibilities of management, Departmentation & Decentralization, types of organization Structures.								
UNIT-II						Classes:10		
Operations & Materials Management: Plant layout, types of plant layout-Methods of production (Job, batch, & Mass production), work study, statistical quality control, R-chart, C-chart, P-chart & Xchart (simple problems). Inventory control, Economic Order Quantity (EOQ), ABC analysis, supply chain management.								
UNIT-III						Classes:10		
Marketing Management & Human resource: Factions of marketing, marketing mix, marketing strategies, distribution channels. Manpower planning, recruitment, selection, T&D, placement, wage & salary administration, promotion, transfer, performance appraisal, welfare administration.								
UNIT-IV						Classes:20		
Project management: Network Analysis, PERT, CPM, identifying critical path, project cost analysis, project crashing (simple problems).								
UNIT-V						Classes:10		
Strategic Management: Mission, goals, objectives, policy, programmes, corporate planning process, environmental scanning, SWOT analysis, steps in strategy formulation & implementation.								
Text Books:								
1. Management Science – A.R.Aryasri, TMH.								
Reference Books:								
1. Management Science – Siddiqui & Siddqui, TMH								
2. Prasad LM, Principles and Practices of Management, Sultan Chand & Sons, New Delhi								
3. Marketing Management – Phillip Kotler, 11/e, pearson, 2007								
4. Personnel and Human Resource management – P.Subbarao – Himalaya Publication.								
5. Production and operation management – Aswathappa.K, Himalaya Publication House, Mumbai.								
Web References:								
1. http://www.icmrindia.org/courseware/Operations%20Management%202nd%20Edition/Materials%20Management.htm								

2. <https://www.google.com/search?q=manpower+planning&oq=Manpower+planning&aqs=chrome.0.016.590j0j4&sourceid=chrome&ie=UTF-8>

E-Text Books:

1. https://mrcet.com/downloads/digital_notes/ECE/II%20Year/Management%20Science.pdf
2. http://www.crectirupati.com/sites/default/files/lecture_notes/MS%20Lecture%20notes.pdf

Outcomes:

1. The end of the course students can have knowledge over various management aspects.
2. They can improve knowledge over various production aspects and different types of layouts and its application in manufacturing concern.
3. They can have knowledge over various decision-making aspects of the business.

ANALOG CIRCUIT ANALYSIS LABORATORY

B.Tech IV Semester: Electronics and communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18EC406	Core	L	T	P	C	CIA	SEE	Total
		-	-	2	1	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 39			Total Classes: 39			
OBJECTIVES:								
<ol style="list-style-type: none"> 1. Conduct experiment on Common Emitter and Common Source amplifiers 2. Accomplish the frequency response of two stage RC coupled amplifier. 3. Construct sinusoidal oscillators 4. Construct power amplifiers 								
LIST OF EXPERIMENTS								
Expt. 1	Common Emitter amplifier.							
To verify the characteristics of Common Emitter amplifier.								
Expt. 2	Common Base Amplifier							
To verify the characteristics of Common Base Amplifier								
Expt. 3	Common Source Amplifier							
To verify the characteristics of Common Source Amplifier								
Expt. 4	Common Drain Amplifier							
To verify the characteristics of Common Drain Amplifier								
Expt. 5	Two Stage RC Coupled Amplifiers							
To verify the characteristics of Two Stage RC Coupled Amplifiers								
Expt. 6	Current shunt Feedback Amplifier							
To verify the characteristics of Current shunt Feedback Amplifier								
Expt. 7	Voltage Feedback Amplifier							
To verify the characteristics of Voltage Feedback Amplifier								
Expt. 8	Wien Bridge Oscillator using Transistors							
To verify the characteristics of Wien Bridge Oscillator using Transistors								
Expt. 9	RC Phase Shift Oscillator using Transistors							
To verify the characteristics of RC Phase Shift Oscillator using Transistors								
Expt. 10	Hartley and Colpitts Oscillator using Transistors							
To verify the characteristics of Hartley and Colpitts Oscillator using Transistors								
Expt. 11	Class A Power Amplifier (Transformer less)							
To verify the characteristics of Class A Power Amplifier (Transformer less)								

Expt. 12	Class B Complementary Symmetry Amplifier
To verify the characteristics of Class B Complementary Symmetry Amplifier	
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS:	
SHARDWARE:Kits	
Course Outcome: <ol style="list-style-type: none">1. Recognize the importance of feedback in amplifiers2. the use of Power amplifiers and Tuned amplifiers in real time applications3. Know how the negative feedback provides better stability with less distortion4. Understand the principle, operation and design of oscillators.	

ANALOG COMMUNICATIONS LABORATORY

B.Tech IV Semester: Electronics and communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18EC408	Core	L	T	P	C	CIA	SEE	Total
		-	-	2	1	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil		Practical Classes: 39			Total Classes: 39		
OBJECTIVES:								
<ol style="list-style-type: none"> 1. Analyze and specify the fundamental parameters of a communication system. 2. Evaluate the advantages and disadvantages of communications systems, from the point of view analog modulations. 3. To strengthen the ability to identify and apply the suitable modulation techniques for the given real world problem. 4. To gain knowledge in practical applications of communication systems. 								
LIST OF EXPERIMENTS								
Expt. 1	Amplitude Modulation and Demodulation							
To study the Amplitude Modulation and Demodulation								
Expt. 2	Frequency Modulation and Demodulation							
To study the Frequency Modulation and Demodulation								
Expt. 3	Characteristics of Mixer							
To study the Characteristics of Mixer								
Expt. 4	Pre-Emphasis and De-Emphasis							
To study Pre-Emphasis and De-Emphasis								
Expt. 5	Pulse Amplitude Modulation and Demodulation							
To study the Pulse Amplitude Modulation and Demodulation								
Expt. 6	Pulse Width Modulation and Demodulation							
To study the Pulse Width Modulation and Demodulation								
Expt. 7	Pulse Position Modulation and Demodulation							
To study the Pulse Position Modulation and Demodulation								
Expt. 8	Radio receiver Measurements-Selectivity, Sensitivity & Fidelity							
To study the Radio receiver Measurements-Selectivity, Sensitivity & Fidelity								
Expt. 9	DSB SC Modulation and Demodulation							
To study DSB SC Modulation and Demodulation								

Expt. 10	SSB SC Modulation and Demodulation
To study SSB SC Modulation and Demodulation	
Expt. 11	Phase Locked Loop
To study Phase Locked Loop	
Expt. 12	AGC Characteristics
To study AGC Characteristics	
Expt. 13	Simulation of Analog Modulation Technique using NI LABVIEW
To study the Simulation of Analog Modulation Technique using NI LABVIEW	
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS:	
SHARDWARE:Kits	
Course Outcome:	
<ol style="list-style-type: none"> 1. Demonstrate understanding of various amplitude modulation and demodulation techniques. 2. Demonstrate understanding of frequency modulation and demodulation technique. 3. Explain the Sampling Theorem. 4. Explain the basic multiplexing techniques: FDM, TDM. 5. Understand and explain the AGC Characteristics. 6. Compare different modulations and to recognize the advantages and disadvantages of them. 	

PULSE AND DIGITAL CIRCUITS LABORATORY

B.Tech4th Semester: Electronics and communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18EC409	Core	L	T	P	C	CIA	SEE	Total
		-	-	2	1	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil		Practical Classes: 39			Total Classes: 39		
OBJECTIVES:								
<ol style="list-style-type: none"> 1. Generation and processing of sinusoidal and non-sinusoidal signals 2. Fundamentals of basic logic gates and its applications 3. Analysis and design of various multivibrator circuits 4. Design and analysis of UJT relaxation oscillator and boot-strap sweep circuits 								
LIST OF EXPERIMENTS								
Expt. 1	Linear wave-shaping							
To verify Linear wave-shaping characteristics								
Expt. 2	Non linear wave-shaping-clippers							
To verify Non linear wave-shaping-clippers characteristics								
Expt. 3	Non linear wave-shaping-clampers							
To verify Non linear wave-shaping-clampers characteristics								
Expt. 4	Transistor as a switch							
To verify Transistor working as a switch characteristics								
Expt. 5	Design of logic gates							
To Design logic gates and to measure their characteristics								
Expt. 6	Study of flip-flops							
To Study flip-flops characteristics								
Expt. 7	Sampling gates							
To verify Sampling gates characteristics								
Expt. 8	Astable Multivibrator							
To verify Astable Multivibrator characteristics								
Expt. 9	Mono-stable Multivibrator							
To verify Mono-stable Multivibrator characteristics								
Expt. 10	Bi-stable Multivibrator							
To verify Bi-stable Multivibrator characteristics								
Expt. 11	Schmitt trigger							

To verify Schmitt trigger characteristics	
Expt. 12	UJT Relaxation oscillator
To verify UJT Relaxation oscillator characteristics	
Expt. 13	Colpittsoscillator
To verify Colpitts oscillator characteristics	
Expt. 14	RC- Phase shiftoscillator
To verify RC- Phase shift oscillator characteristics	
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS:	
SHARDWARE:Kits	
Course Outcome:	
<ol style="list-style-type: none"> 1. Generate and process sinusoidal and non-sinusoidal signals 2. understand fundamentals of basic logic gates and design applications 3. design and analyze various multivibrator circuits 4. design and analyze UJT relaxation oscillator and boot-strap sweep circuits 	

TECHNICAL SEMINAR

B.Tech IV Semester – Electronics and communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18EC410	Core	L	T	P	C	CIA	SEE	Total
		-	2	0	1	50	-	50
Contact Classes: Nil	Tutorial Classes: 25		Practical Classes: -		Total Classes: 25			
<p>OBJECTIVES:</p> <p>The course should enable the students to:</p> <ol style="list-style-type: none"> I. Distinguish the multiple senses of a text (literal and beyond the literal). II. Identify and understand assumptions, theses & arguments that exist in the work of authors. III. Evaluate and synthesize evidence in order to draw conclusions consistent with the text. <p>There shall be a Technical seminar presentation in B.Tech IV Semester. A Technical Seminar shall have two components, one chosen by the student from the course work as an extension and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar topics shall be made before a committee consisting of Head of the department, seminar supervisor and a senior faculty member. Each Technical Seminar shall be evaluated for 50 marks. Technical Seminar component-I for 25 marks and component-II for 25 marks making total 50 marks. (Distribution of marks for 25: 5 marks for report, 5 marks for subject content, 10 marks for presentation and 5 marks for queries).</p>								

PROFESSIONAL SOCIETY ACTIVITIES-II

B.Tech IV Semester: Common to CE, EEE, ME, ECE & CSE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18AS401	-	L	T	P	C	CIA	SEE	Total
		2	0	0	0	-	-	-
Contact Classes: 12	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 12			
<p>OBJECTIVES: The course should enable the students to:</p> <ol style="list-style-type: none"> 1. Improve communication skills 2. Develop leadership qualities <p>Professional Society Activities (PSA) course is aimed at enhancing the self-learning, communication, managerial skills of the students by engaging them in various Co & Extra Curricular activities during their course of study. Activities in each of the department shall be designed and conducted by the Professional Society Executive Committee whose composition is:</p> <ol style="list-style-type: none"> 1. Faculty Mentors- 2 No. 2. Student Chairman: 1 No.- Final year Student 3. Student General Secretary: 1 No.- Third year Student 4. Treasurer: 1 No.- Third year Student <p>Student Members: 2 No's from each class PSA related activities would be of the following nature but not limited to:</p>								
Activity#1	Just A Minute							
Activity#2	Technical Quiz							
Activity#3	Open House- Lab Demo							
Activity#4	Technical Paper Presentation- Preliminary							
Activity#5	Technical Paper Presentation- Final							
Activity#6	Poster Presentation							
Activity#7	Collage- A theme based event							
Activity#8	Debate Competition							
Activity#9	Group Discussion Competition							
Activity#10	Mock Interviews							
Activity#11	Model Exhibition							
Activity#12	Valedictory Function							

COMMUNICATION SKILLS PRACTICE

B.Tech IV Semester: Common to CE, EEE, ME, ECE & CSE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18AS402	Core	-	-	2	-	-	-	-
		Tutorial Classes: Nil		Practical Classes: 28			Total Classes: 28	
CONTACT CLASSES: Nil								
OBJECTIVES: To convey or communicate the exact thought to express effectively with maximum efficiency								
LIST OF ACTIVITIES								
Activity. 1		Development of Proficiency in Concepts of effective communication						
Practice on Oral and spoken communication skill & testing– Communication process and voice & accent, voice clarity, handling them voice modulation & intonation, KISS (Keep it short and sweet) in word stress etc. Composing Feedback and questioning effective messages. Non–Verbal Communication: Objectiveness in Argument its importance and nuances: Development etiquettes and Facial Expression, Posture, manners Gesture , Eye contact, appearance Study of different pictorial (dress code).								
Activity. 2		Art of Speaking						
Introduction – What makes communication important? – Defining communication – special feature of communication – communication process – channels of communication – Formal communications network – Informal communications network (Grapevine Communication) – Importance of Communication – Barriers to communication – Tips for effective communication – conversation tips – what is presentation? – Tips for powerful presentation – Art of public speaking – Importance of public speaking – Benefits of public speaking – Public speaking tips – overcoming fear of public speaking. <i>Activity : Conservation; Presentation; Pubic Speaking</i>								
Activity. 3		Art of Writing						
Introduction – Importance of Writing – Writing tips – Drawbacks of written communications								
Activity. 4		Art of Writing E-Mail						
Introduction – The Mail Magic – use appropriate salutations – Make the subject matter significant – keep a dictionary close by – use commas – use smileys – when I doubt, preface – include previous message – shorten the file attachments – Reread before pressing ‘Send’ button –Be polite, and reciprocate good deeds – Anticipate, empathize, understand – what netiquette?								
Activity. 5		Etiquette and Manners						
<u>Etiquette</u> Introduction – Modern etiquette – Benefits of etiquette – classification of etiquette – accompanying women – Taboo topics – proposing the toast.								
<u>Manners</u> Introduction – Poor Manners noticed in youth – why should you practice good manners ? – Practicing good manners – Manners at the wheel driving – Manners in the flight – Respecting the sacred – visiting holy places – Dealing with the challenged – Attending the funeral –								

Professional manners – social skills (manners) – getting along with people – Manners to get respect from others – To sum up : corporate grooming tips – Mind your mobile manners – Annoying office habits. <i>Activity : 1. Test your Etiquette; 2. Test your Manners</i>	
Activity. 6	Preparing CV / Resume
Introduction – Meaning – Differences among Bio-data, CV and Resume – The terms – The purpose of CV writing – Types of Resumes – Interesting facts about Resumes – CV writing tips – CV/Resume preparation – the do’s – Resume checkup – Electronic Resume tips – References – Power words – Common Resume builders – Key skills that can be mentioned in the Resume – Cover letters – Cover letter tips Expression of non-verbal communication and its analysis	
Activity. 7	Written Communication Skill
Practice for: · Correction of errors · Making of Sentences · Paragraph Writing · Leave Application and simple letter writing	
Activity. 8	Presentation Skill practice
· Preparing in presentation · Delivery of presentation	
Activity. 9	Telecommunication Skills
· Tele – etiquette · Receiving Calls · Transferring calls · Taking Message/ Voice Mails · Making Outgoing Calls	
Activity. 10	Computer and Internet operational
· Key boarding skills · Practice on computer using MS office XP ·Practice on sending & receiving e-mail	
Text Books: 1 .Soft skills Training – A workbook to develop skills for employment by Fredrick H. Wentz 2. Personality Development and Soft skills, Oxford University Press by Barun K. Mitra 3. The Time Trap : the Classic book on Time Management by R. Alec Mackenzine	
Reference Books: 1. Ajmani, J. C. Good English: Getting it Right. New Delhi: Rupa Publications, 2012. 2. Bovee, Courtland L, John V. Thill & Barbara E. Schatzman. Business Communication Today: Tenth Edition. New Jersey: Prentice Hall, 2010.	
Web References: 1. http://networketiquette.net/ 2. https://public.wsu.edu/~brians/errors/	
Outcomes: 1. Students will demonstrate competency in communication skills related to production and presentation of messages in multiple formats.	

2. Students will demonstrate competency in critical thinking skills related to the analysis, interpretation, and criticism of messages.
3. Students will demonstrate competency in skills related to the construction and analysis of argumentation and persuasive discourse.
4. Students will demonstrate an understanding of multiple theoretical perspectives and diverse intellectual traditions in Communication.
5. Students will demonstrate competency in human relational interaction.
6. Students will demonstrate competency in the analysis and practice of ethical communication.
7. Students will demonstrate an understanding of the importance of free expression and the responsibilities it entails.
8. Students will demonstrate competency in effective communication with diverse others and an understanding of the impact of culture on communication.

LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

B.Tech 5th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC501	Core	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to :

1. Study the basic principles, configurations and practical limitations of op-amp
2. Understand the various linear and non-linear applications of op-amp
3. Understand the operation and analysis of op-amp oscillators, single chip oscillators and frequency generators
4. Identify the active filter types, filter response characteristics, filter parameters and IC voltage regulators.
5. Gain knowledge on data converter terminology, its performance parameters, and various circuit arrangements for A/D and D/A conversions.
6. Gain hands-on experience to put theoretical concepts learned in the course to practice.

UNIT-I	INTEGRATED CIRCUITS	Classes:20
<p>Operational Amplifier: Introduction, Differential amplifier, DC analysis of differential amplifier, CMRR improvement methods, Basic Information of Op-amp, The ideal Operational Amplifier. Operational amplifier characteristics: DC characteristics, AC characteristics. Operational amplifier Applications: Basic Op-amp Applications, Instrumentation Amplifier, Sample and Hold Circuits, Differentiator, Integrator.</p>		
UNIT-II	LINEAR AND NON LINEAR APPLICATIONS OF OP-AMPS	Classes:10
<p>Linear Applications of OP-AMPS: Inverting and non-inverting amplifier, integrator and differentiator, difference amplifier, instrumentation amplifier, AC amplifier, V-I, I-V converters, Buffers.</p> <p>Non Linear Applications of OP-AMPS: Non-linear function generation, comparators, Multivibrators, Triangular and square wave generators, Log and antilog amplifiers, precision rectifiers.</p>		
UNIT-III	ANALOG FILTERS, TIMERS	Classes:10
<p>Analog Filters: Introduction, Butterworth filters-first order, second order LPF, HPF filters. Band pass, Band reject and all pass filters.</p> <p>Introduction to 555 Timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger,</p>		
UNIT-IV	PHASE LOCKED LOOPS	Classes:10
<p>PLL-Introduction, Block schematic, principles and description of individual blocks, PLL, applications of PLL-Frequency multiplication, frequency translation, AM, FM and FSK demodulators.</p> <p>Analog Multipliers and Modulators: Four quadrant multiplier, Balanced modulator, IC 1496, applications of analog switches and multiplexers, sample and hold amplifiers, Voltage regulator (IC based).</p>		

UNIT-V	D/A AND A/D CONVERTERS	Classes:10
<p>D/A AND A/D Converters: Introduction, Basic DAC techniques, weighted resistor DAC, R-2R Ladder DAC, Inverted R-2R DAC and IC 1408 DAC, different types of ADCs-parallel comparator type ADC, counter type ADC, successive approximation ADC and Dual slope ADC.DAC and ADC specifications, specifications AD 574 (12 bit ADC).</p>		
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, 4th edition, PHI, 2000. 2. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, 6th edition, PHI, 2000. 		
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Operational Amplifiers & Linear ICs by David A. Bell, 2nd edition, Oxford University Press, 2010. 2. Linear Integrated Circuits – D. Roy Chowdhary, New Age International (p) Ltd, 2nd Edition, 2003. 3. Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 1988. 		
<p>Web References:</p> <ol style="list-style-type: none"> 1.https://studentsfocus.com/notes/anna_university/2017/ECE/4th%20sem/THEORY%20NOTES/LIC/106451.pdf 2. https://www.tutorialspoint.com/linear_integrated_circuits_applications/index.htm 3.https://studentsfocus.com/notes/anna_university/2017/ECE/4th%20sem/THEORY%20NOTES/LIC/106453.pdf 		
<p>E-Text Books:</p> <ol style="list-style-type: none"> 1..https://www.academia.edu/40373226/Operational_Amplifiers_and_Linear_Integrated_Circuits_Coughlin 2.http://dea.unsj.edu.ar/sredes/Biblioauxi/130107134-106147696-S-Franco-Design-With-Operational-Amplifiers-and-Analog-Integrated-Circuits-1-pdf.pdf 		
<p>Outcomes:</p> <ol style="list-style-type: none"> 1. Analyze and design electronic circuits and systems using linear ICs, and take measurement of various analog circuits to compare experimental results in the laboratory with theoretical analysis 2. Illustrate the function of application specific ICs such as Voltage regulators, PLL and its application in communication 3. Classify and comprehend the working principle of data converters and active filters 4. Explain and compare the working of multivibrators using special application IC 555 and general purpose op-amp 5. Elucidate and design the linear and non-linear applications of an opamp and special application ICs 6. Infer the DC and AC characteristics of operational amplifiers and its effect on output and their compensation techniques 		

DIGITAL IC SYSTEM DESIGN

B.Tech 5 th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC502	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to:

1. Compare the basic logic families & can write simple VHDL programs
2. Model the combinational logic circuit & can design the basic combinational circuits using VHDL.
3. Model the sequential logic circuit & can design the basic sequential circuits using VHDL.
4. Categorize the different memory elements in design process.

UNIT-I Introduction to Logic Families

Classes:20

Introduction to Logic Families: Bipolar logic, Transistor logic, TTL families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

Bipolar Logic and Interfacing: CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs – Specifications.

UNIT-II THE VHDL HARDWARE DESCRIPTION LANGUAGE

Classes:10

The VHDL Hardware Description Language: Design flow, program structure, types and constants, functions and procedures, libraries and packages.

The VHDL Design Elements: Structural design elements, data flow design elements, behavioral design elements, time dimension and simulation synthesis.

UNIT-III COMBINATIONAL LOGIC DESIGN

Classes:10

Combinational Logic Design: Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, Combinational multipliers. VHDL modes for the above ICs.

Design Examples (Using VHDL): Design examples (using VHDL) - Barrel shifter, comparators, floating-point encoder, dual parity encoder.

UNIT-IV SEQUENTIAL LOGIC DESIGN

Classes:10

Sequential Logic Design: Latches and flip-flops, PLDs, counters, shift register, and their VHDL models, synchronous design methodology, impediments to synchronous design.

UNIT-V MEMORIES

Classes:10

Memories: ROMs: Internal structure, 2D-decoding commercial types, timing and applications.

Static RAM: Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS.

Dynamic RAM: Internal structure, timing, synchronous DRAMs. Familiarity with Component Data Sheets – Cypress CY6116, CY7C1006, Specifications.

Text Books:

1. John F. Wakerly, Digital Design Principles & Practices, PHI/ Pearson Education Asia, 3rd Ed., 2005.
2. J. Bhasker, A VHDL Primer, Pearson Education/ PHI, 3rd Edition.

Reference Books:

1. Charles H. Roth Jr, Digital System Design Using VHDL, PWS Publications, 2nd edition, 2008.
2. Stephen Borwn and Zvonko Vramesic, Fundamentals of Digital Logic with VHDL Design, McGraw Hill, 2nd Edition, 2005.

Web References:

1. <https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/>

E-Text Books:

1. <https://digitalsystemdesign.in/wp-content/uploads/2018/05/C-MOSkang.pdf>
2. <https://dvikan.no/ntnu-studentserver/kompendier/digital-systems-design.pdf>

Outcomes:

1. Compare the basic logic families & can write simple VHDL programs
2. Model the combinational logic circuits like decoders, multiplexers, code converters etc.
3. Design the basic combinational circuits using VHDL.
4. Model the sequential logic circuits like PLDS, Counters, shift registers etc.
5. Design the basic sequential circuits using VHDL.
6. Categorize the different memory elements in design process.

LINEAR CONTROL SYSTEMS

B.Tech 5th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC503	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to:

1. Organize modeling and analysis of electrical and mechanical systems.
2. Analyze control systems by block diagrams and signal flow graph technique.
3. Demonstrate the analytical and graphical techniques to study the stability.
4. Illustrate the frequency domain and state space analysis.

UNIT-I	MATHEMATICAL MODELING OF SYSTEMS	Classes:12
Introduction to control systems. Basic elements of control system - open loop and closed loop systems. Effect of feedback. Modeling of physical systems - electrical systems, mechanical systems, analogous systems, armature control and field control of DC motor, DC servomotor. Transfer function - Block diagram reduction techniques, signal flow graph.		
UNIT-II	TIME RESPONSE AND STABILITY ANALYSIS	Classes:14
Various test signals and its importance. Time response of first and second order systems, Time-domain specifications, steady state response, steady state error and error constants. Routh-Hurwitz stability criterion, Root locus technique- root locus diagram, rules to construct root loci, effect of pole zero additions on the root loci.		
UNIT-III	FREQUENCY DOMAIN ANALYSIS	Classes:12
Introduction, frequency domain specifications, stability analysis from Bode plot, Polar plot, Nyquist plot, calculation of gain margin and phase margin, determination of transfer function.		
UNIT-IV	CONTROLLERS AND COMPENSATORS	Classes:12
Introduction to controllers, effect of P, PI and PID controllers. Compensators - lag, lead, lead-lag compensator design using Bode plot.		
UNIT-V	STATE SPACE ANALYSIS	Classes:10
Concepts of state, state variables and state model. Modeling of physical system in state space. Transfer function to state model and vice versa. State transition matrix and its properties. Controllability and observability using Kalman's test.		
Text Books:		
1. I J Nagrath, M Gopal, "Control Systems Engineering", New Age International Publications, 3 rd Edition, 2007.		
2. K Ogata, "Modern Control Engineering", Prentice Hall, 4 th Edition, 2003.		
3. N C Jagan, "Control Systems", BS Publications, 1 st Edition, 2007.		

Reference Books:

1. Anand Kumar, "Control Systems", PHI Learning, 1st Edition, 2007.
 2. S Palani, "Control Systems Engineering", Tata McGraw-Hill Publications, 1st Edition, 2001.
 3. N K Sinha, "Control Systems", New Age International Publishers, 1st Edition, 2002.
- A. Nagoorkani, Control Systems, RBA Publications, 2nd edition, 2006.

Web References:

1. <https://www.researchgate.net>
2. <https://www.aar.faculty.asu.edu/classes>
3. <https://www.facstaff.bucknell.edu/>
4. <https://www.electrical4u.com>
5. <https://www.iare.ac.in>

E-Text Books:

1. <https://www.jntubook.com/>
2. <https://www.freeengineeringbooks.com>

Outcomes:

On successful completion of the course, students will be able to

1. Demonstrate Knowledge on the concepts of open and closed loop control systems and able to analyze the time and frequency domain response of second order systems.
2. Demonstrate Knowledge on Stability analysis in time and frequency domain and able to analyze the analysis using root-locus, Bode, Polar and Nyquist plots.
3. Demonstrate Knowledge on Controllers and compensators and able to design a compensator to meet the design specifications of control system.
4. Demonstrate Knowledge on State space representation from transfer function.
5. Solve problems pertaining to control systems to provide feasible solutions in real time environment.
6. Apply the conceptual knowledge of control systems in domestic and industrial applications.

DIGITAL COMMUNICATION

B.Tech 5th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC504	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to :

1. Understand the different digital modulation techniques.
2. Discuss the importance of error detection and correction codes and use them in the presence of the channel.
3. Describe and analyze the methods of transmission of digital data using baseband and carrier modulation techniques.
4. Decompose codes separately into source codes and develop competency in modeling and analyzing communication system elements

UNIT-I PULSE DIGITAL MODULATION

Classes:10

Introduction: Elements of digital communication systems, advantages and disadvantages of digital communication systems, applications; Pulse Digital Modulation: Elements of PCM; Sampling, quantization and coding; Quantization error, non-uniform quantization and companding; Differential PCM (DPCM); Adaptive DPCM; Delta modulation and its drawbacks; Adaptive delta modulation; Comparison of PCM and DM systems; Noise in PCM and DM systems.

UNIT-II DIGITAL MODULATION TECHNIQUES

Classes:10

Digital Modulation Techniques: Introduction, ASK modulator, coherent ASK detector, non-coherent ASK detector, FSK, bandwidth and frequency spectrum of FSK, non-coherent FSK detector, coherent FSK detector; BPSK, coherent BPSK detection; QPSK; DPSK, DEPSK; Optimal reception of digital signal: Baseband signal receiver; Probability of error; Optimum filter; matched filter, probability of error using matched filter; Correlation receiver; Calculation of probability of error for ASK, FSK, BPSK.

UNIT-III BASE BAND TRANSMISSION AND PULSE SHAPING

Classes:10

Base Band Transmission: Requirements of a line encoding format, Various line encoding formats: Unipolar, Polar, Bipolar; computation of power spectral densities of various line encoding formats. Scrambling techniques: BZ8S, HDB3.
Pulse Shaping: Inter symbol interference; pulse shaping to reduce ISI; Nyquist's criterion; Raised cosine filter; Equalization; Correlative level coding; Duo-binary encoding, modified duo –binary coding; Eye diagrams; Cross Talk

UNIT-IV INFORMATION THEORY AND SOURCE CODING

Classes:15

Information Theory: Information, entropy, conditional entropy; Mutual information; Channel capacity; Various mathematical modeling of communication channels and their capacities;
Source coding: Fixed length and variable length Source Coding Schemes, Huffman coding; Shannon fano

coding, Source coding to increase average information per bit; Lossy source coding; Channel coding theorem; Hartley Shannon law; Tradeoff between bandwidth S/N ratio, bandwidth and S/N ratio;
Spread spectrum modulation: Use of spread spectrum; Direct sequence spread spectrum(DSSS); Code division multiple access using DSSS, frequency hopping spread spectrum; PN-Sequences: Generation and characteristics; Synchronization in spread spectrum systems.

UNIT-V	LINEAR BLOCK CODES AND SOURCE CODES	Classes:15
<p>Linear Block Codes: Introduction to error control coding; Matrix description of linear block codes, error detection and error correction capabilities of linear block codes; Hamming code; Binary cyclic codes algebraic structure, encoding, syndrome calculation and decoding; Convolution Codes: Introduction, Encoding of convolution codes; Time Domain Approach; Transform Domain Approach; General approach; State, Tree And Trellis Diagram; Decoding using Viterbi Algorithm; Burst Error Correction: Block Interleaving and convolution interleaving.</p>		
<p>Text Books:</p> <ol style="list-style-type: none">1. Herbert Taub, Donald L. Schilling, "Principles of Communication Systems", TMH, 3rd Edition, 20082. K. Sam Shanmugam, "Digital and Analog Communication Systems", John Wiley & Sons, 2nd Edition, 2005.3. Simon Haykin, "Digital communications", John Wiley, 3rd Edition, 2005.		
<p>Reference Books:</p> <ol style="list-style-type: none">1. John Proakis, "Digital Communications", TMH, 2nd Edition 1983.2. B.P.Lathi, "Modern Analog and Digital Communication", Oxford reprint, 3rd Edition, 2004.3. Singh, Sapre, "Communication Systems Analog and Digital", TMH, 2nd Edition, 2004.		
<p>Web References:</p> <ol style="list-style-type: none">1. http://www.igniteengineers.com2. http://www.ocw.nthu.edu.tw3. http://www.uotechnology.edu.iq		
<p>E-Text Books:</p> <ol style="list-style-type: none">1. https://www.jntubook.com/digital-communications-textbook2. http://trardownload.com/results/neamen-digital-communications-.html3. http://www.everythingvtu.wordpress.com		
<p>Outcomes:</p> <ol style="list-style-type: none">1. Analyze components of digital communication systems.2. Compare various pulse digital modulation techniques.3. Compare various digital modulation techniques.4. Interpret and model baseband pulse transmission systems and digital pass band transmission systems5. Analyze various parameters of information theory & source coding methods & understand spread spectrum usage.6. Analyze and design error-correcting codes used in digital communication.		

MICROPROCESSORS AND MICROCONTROLLERS

B.Tech 5 th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC505	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -		Practical Classes:		Total Classes:60			
			Nil					

OBJECTIVES:

The course should enable the students to:

1. Understand fundamental operating concepts behind microprocessors and microcontrollers.
2. Appreciate the advantages in using RISC microprocessors / microcontrollers in engineering applications
3. Design microprocessor / microcontroller based solutions to problems.
4. Develop skill in simple program writing for 8086; MSP430 and application.

UNIT-I	INTRODUCTION	Classes:20
Introduction-8085 Architecture-Block Diagram, Flag Register, Pin Diagram, Timing and Control Signals, System Timing Diagram, Overview of 8086-Internal Architecture- Register Organization, Memory Segmentation, Flag Register, Pin Configuration. Interrupt structure of 8085 and 8086		
UNIT-II	INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMING OF 8086	Classes:10
Instruction Formats -Addressing Modes-Instruction Set of 8086, Assembler Directives-Macros and Procedures. Programs Involving Logical, Branch Instructions – Sorting and Evaluating Arithmetic Expressions – String Manipulations-Simple ALPs. Brief discussion of peripheral sub systems like 8251, 8253, 8255, 8257 and 8259 (only Pin diagrams and key features of these peripheral sub systems)		
UNIT-III	INTERFACING WITH ADVANCED DEVICES	Classes:10
Comparison between RISC and CISC architecture, Low power RISC MSP430 – block diagram, features and architecture, Variants of the MSP430 family viz. MSP430x2x, MSP430x4x, MSP430x5x and their targeted applications, MSP430x5x series block diagram, address space, on-chip peripherals (analog and digital), and Register sets. Sample embedded system on MSP430 microcontroller.		
UNIT-IV	INTRODUCTION TO MSP 340	Classes:10
I/O ports pull up/down registers concepts, Interrupts and interrupt programming. Watchdog timer. System clocks. Low Power aspects of MSP430: low power modes, Active vs Standby current consumption, FRAM vs Flash for low power & reliability. Timer & Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430, data transfer using DMA. Case Study: MSP430 based embedded system application using ADC & PWM demonstrating peripheral intelligence. “Remote Controller of Air Conditioner Using MSP430”		
UNIT-V	COMMUNICATION INTERFACE	Classes:10
Serial communication basics, Synchronous/Asynchronous interfaces (like UART, USB, SPI, and I2C). UART protocol, I2C protocol, SPI protocol. Implementing and programming UART, I2C, SPI interface using MSP430, Interfacing external devices. Implementing Embedded Wi-Fi using C3100 Case Study: MSP430		

based embedded system application using the interface protocols for communication with external devices: “A Low-Power Battery less Wireless Temperature and Humidity Sensor with Passive Low Frequency RFID”

Text Books:

1. “Microprocessor and Microcontrollers”, N. Senthil Kumar, M. Saravanan, S. Jeevanathan, Oxford Publishers. 1 st Edition, 2010
2. “The X86 Microprocessors , Architecture, Programming and Inerfacing” , Lyla B. Das, Pearson Publications, 2010

Reference Books:

1. MSP430 microcontroller basics. John H. Davies, Newnes Publication, I st Edition

Web References:

1. http://processors.wiki.ti.com/index.php/MSP430_LaunchPad_Low_Power_Mode 2.

E-Text Books:

1. http://processors.wiki.ti.com/index.php/MSP430_16-Bit_Ultra_Low_Power_MCU_Training.

Outcomes:

1. Understands the internal architecture and organization of 8085 & 8086 processors, MSP430 controller.
2. Design and implement programs on 8086 microprocessor
3. Understands the interfacing techniques to 8086 and MSP 430 and can develop assembly language programming to design microprocessor/ micro controller based systems.
4. Program MSP 430 for designing any basic Embedded System.
5. Classify different communication protocols synchronous or asynchronous.
6. Design and implement some specific real time applications.

PRINCIPLES OF MODERN COMMUNICATION SYSTEMS (OPEN ELECTIVE-I)

B.Tech 5th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC506	Core	L	T	P	C	CIA	SEE	TOTAL
		2	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to:

1. Summarize the different amplitude modulation techniques
2. Summarize the different angle modulation techniques
3. Contrast the noise effect in different amplitude modulation
4. Distinguish different methods to convert analog to digital form of representation.

UNIT-I	AMPLITUDE MODULATION	Classes:15
AMPLITUDE MODULATION: Introduction, Amplitude Modulation: Time & Frequency – Domain description, Switching modulator, Envelop detector. DOUBLE SIDE BAND-SUPPRESSED CARRIER MODULATION: Time and Frequency – Domain description, Ring modulator, Coherent detection, Costas Receiver, Quadrature Carrier Multiplexing. SINGLE SIDE-BAND AND VESTIGIAL SIDEBAND METHODS OF MODULATION: SSB Modulation, VSB Modulation, Frequency Translation, Frequency-Division Multiplexing, Theme Example: VSB Transmission of Analog and Digital Television		
UNIT-II	ANGLE MODULATION	Classes:10
ANGLE MODULATION: Basic definitions, Frequency Modulation: Narrow Band FM, Wide Band FM, Transmission bandwidth of FM Signals, Generation of FM Signals, Demodulation of FM Signals, FM Stereo Multiplexing, Phase-Locked Loop: Nonlinear model of PLL, Linear model of PLL, Nonlinear Effects in FM Systems. The Superheterodyne Receiver		
UNIT-III	RANDOM VARIABLES & PROCESS	Classes:15
RANDOM VARIABLES & PROCESS: Introduction, Probability, Conditional Probability, Random variables, Several Random Variables. Statistical Averages: Function of a random variable, Moments, Random Processes, Mean, Correlation and Covariance function: Properties of autocorrelation function, Cross-correlation functions .NOISE: Shot Noise, Thermal noise, White Noise, Noise Equivalent Bandwidth, Noise Figure.		
UNIT-IV	NOISE IN ANALOG MODULATION	Classes:10
NOISE IN ANALOG MODULATION: Introduction, Receiver Model, Noise in DSB-SC receivers, Noise in AM receivers, Threshold effect, Noise in FM receivers, Capture effect, FM threshold effect, FM threshold reduction, Pre-emphasis and Deemphasis in FM		
UNIT-V	DIGITAL REPRESENTATION OF ANALOG SIGNALS	Classes:10
DIGITAL REPRESENTATION OF ANALOG SIGNALS: Introduction, Why Digitize Analog Sources?, The Sampling process, Pulse Amplitude Modulation, Time Division Multiplexing, Pulse-Position Modulation, Generation of PPM Waves, Detection of PPM Waves, The Quantization Process, Quantization Noise, Pulse-Code Modulation: Sampling, Quantization, Encoding, Regeneration, Decoding, Filtering, Multiplexing (refer		

Chapter 7 of Text), Application to Vocoder.

Text Books:

1. **Communication Systems**, Simon Haykins & Moher, 5th Edition, John Willey, India Pvt. Ltd, 2010, ISBN 978 – 81 – 265 – 2151 – 7.
2. **Modern Digital and Analog Communication Systems**, B. P. Lathi, Oxford University Press., 4th edition.
3. **An Introduction to Analog and Digital Communication**, Simon Haykins, John Wiley India Pvt. Ltd., 2008, ISBN 978–81–265–3653–5.

Reference Books:

1. **Principles of Communication Systems**, H.Taub & D.L.Schilling, TMH, 2011.
2. **Communication Systems**, Harold P.E, Stern Samy and A.Mahmond, Pearson Edition, 2004.
3. **Communication Systems: Analog and Digital**, R.P.Singh and S.Sapre: TMH 2nd edition, 2007.

Web References:

1. <https://nptel.ac.in/courses/117/102/117102059/>
2. <https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-36-communication-systems-engineering-spring-2009/syllabus/>

E-Text Books:

1. <http://www.only4engineer.com/2014/10/principle-of-communication-systems-by.html>
2. <https://ict.iitk.ac.in/wp-content/uploads/EE320A-Principles-Of-Communication-CommunicationSystems-4ed-Haykin.pdf>

Outcomes:

1. Contrast & Summarize the different amplitude modulation techniques
2. Contrast & Summarize the different angle modulation techniques
3. Relate the basics of random variable & Process to communication system
4. Contrast the noise effect in different amplitude modulation
5. Distinguish different methods to convert analog to digital form of representation.
6. Define the multiplexing in communication system.

NANO ELECTRONICS (OPEN ELECTIVE-I)

B.Tech 5th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC507	Core	L	T	P	C	CIA	SEE	TOTAL
		2	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:		
The course should enable the students to:		
<ol style="list-style-type: none"> 1. Encapsulate the basics of Nano electronics & limiting effects. 2. Classify the quantum electronic devices. 3. Summarize the nano electronics with tunneling devices. 4. Distinguish the memory devices and sensors. 		
UNIT-I	BASICS OF NANO ELECTRONICS	Classes:13
BASICS OF NANO ELECTRONICS – Capabilities of nano electronics - physical fundamentals of nano electronics: Scaling principles, limits to scaling, power constrained scaling limits - basics of information theory - basics of lithographic techniques for nanoelectronics.		
UNIT-II	LIMITING EFFECTS	Classes:10
LIMITING EFFECTS - Replacement Technologies - Energy and Heat dissipation - Parameter spread as Limiting Effect - Limits due to thermal particle motion - Reliability as limiting factor - Final objectives of integrated chip and systems.		
UNIT-III	QUANTUM ELECTRON DEVICES	Classes:12
QUANTUM ELECTRON DEVICES - from classical to quantum physics: upcoming electronic devices - electrons in mesoscopic structure - short channel MOS transistor - split gate transistor - electron wave transistor - electron spin transistor - quantum cellular automate - quantum dot array. Principles of Single Electron Transistor (SET) - SET circuit design - comparison between FET and SET circuit design		
UNIT-IV	NANO ELECTRONICS WITH TUNNELING DEVICES	Classes:13
NANO ELECTRONICS WITH TUNNELING DEVICES - tunneling element technology - RTD: circuit design based RTD, Nano structured LEDs, photo detectors. Superconducting devices: Macroscopic characteristics, macroscopic model, super conducting switching devices, memory cells, flux quantum devices - application of Superconducting devices. Molecular electronics - Nano tubes and fullerene based switches, elementary circuits.		
UNIT-V	MEMORY DEVICES AND SENSORS	Classes:12
MEMORY DEVICES AND SENSORS - Nano ferroelectrics - Ferroelectric random access memory - Fe-RAM circuit design - ferroelectric thin film properties and integration - calorimetric sensors - electrochemical cells - surface and bulk acoustic devices - gas sensitive FETs - resistive semiconductor gas sensors -electronic noses - identification of hazardous solvents and gases - semiconductor sensor array.		
Text Books:		

1. Rainer Waser, —Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel and Devices, Wiley Vch Verlag, Weiheim, 2005.
2. Shunri Oda and David Ferry, —Silicon Nanoelectronics, CRC Press, New York, 2005.
3. Karl Goser, Peter Glosekotter and Jan Dienstuhl, —Nanoelectronics and Nanosystems, Springer, New Jersey, 2004.

Reference Books:

1. Mick Wilson, Kamali Kannangara, Geoff Smith Michelle Simmons, Burkhard Raguse, Nanotechnology: Basic Science and Emerging technologies, Overseas Press India Pvt.Ltd.,2005.
2. George W. Hanson, —Fundamentals of Nanoelectronics, Pearson, New Delhi, 2009.

Web References:

1. <https://nptel.ac.in/courses/117/108/117108047/>
2. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-701-introduction-to-nanoelectronics-spring-2010/>

E-Text Books:

1. <https://bazaarmodel.net/Project-C-MDE/DataGroup/Qauntum-computer-Nanobook.pdf>
2. <https://www.taylorfrancis.com/books/e/9781315220857/chapters/10.1201/9781315220857-2>

Outcomes:

1. Summarize the basics of Nano electronics & lithography process
2. Examine the limiting effects & objectives of integrated chips & systems
3. Classify the quantum electronic devices & compare FET , SET devices.
4. Summarize the nano electronics with tunneling devices.
5. Distinguish the memory devices and sensors.
6. identification of hazardous solvents and gases

MICRO CONTROLLER APPLICATIONS (OPEN ELECTIVE-I)

B.Tech 5th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC508	Core	L	T	P	C	CIA	SEE	TOTAL
		2	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to :

1. Relate the basics concepts of microprocessors
2. Write Simple assembly language programs.
3. Relate the basic architectural features & programming of PIC16F877
4. Summarize the peripherals like timers, ADC etc

UNIT-I INTRODUCTION

Classes:20

Introduction to Microprocessors: Registers - File registers - Memory Organization - Tristate logic – Buses - Memory Address register – Read/Write operations. ROM, RAM, PROM, EPROM, E2PROM.

UNIT-II 8085 MICROPROCESSOR

Classes:10

Introduction to elementary processor – Organization - Data Transfer Unit (DTU)operation - Enhanced Data Transfer Unit (EDTU) – opcode - machine language - assembly language - pipeline and system clock. Architecture of 8085 – Addressing modes - Data transfer, data processing and program flow control instructions - Simple assembly language programs.

UNIT-III INTRODUCTION TO MICROCONTROLLERS

Classes:10

PIC16F877 Architecture - Program and Data memory organization - Special Function Registers - Addressing modes, Instruction set. MPLAB Integrated Development Environment

UNIT-IV ASSEMBLY LANGUAGE PROGRAMMING

Classes:10

Introduction to Assembly language and Embedded C programming – Stack – Subroutines - Interrupt structure – Peripherals – Input/Output Ports.

UNIT-V PIC PERIPHERALS

Classes:10

Timers/Counters - Watchdog Timer – Capture/Compare/PWM (CCP) - Analog to Digital Converter(ADC) – EEPROM - Serial Communication – USART - Development of Application Programs and interfacing - LED, LCD, Keyboard, DC and Stepper motor interface. Introduction to 8051 Microcontroller: Architecture – Ports - Timers.

Text Books:

1. T. R. Padmanabhan, “Introduction to microcontrollers and applications”, First Edition, Narosa publishing house private limited, 2007.
2. Martin P. Bates, “Programming 8 bit PIC Microcontrollers in C with Interactive Hardware Simulation”, Newnes, 2008.

Reference Books:

1. PIC Micro Mid-Range MCU Family Reference Manual, Micro Chip Technology Inc.

2. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, “The 8051 Microcontroller and Embedded Systems Using Assembly and C”, Prentice Hall, Second Edition, 2005.

Web References:

1. <https://nptel.ac.in/courses/108/105/108105102/>
2. <https://freevideolectures.com/course/3018/microprocessors-and-microcontrollers>

E-Text Books:

1. <https://class.ece.uw.edu/475/peckol/doc/8976457-Programming-8Bit-PIC-Micro-Controllers-in-C.pdf>
2. <http://irist.iust.ac.ir/files/ee/pages/az/mazidi.pdf>

Outcomes:

1. Relate the basics concepts of microprocessors
2. Write Simple assembly language programs.
3. Relate the basic architectural features PIC16F877
4. Embedded c programming of PIC16F877
5. Summarize the peripherals like timers, ADC etc
6. Summarize the 8051 micro controller architecture

LINEAR & DIGITAL IC APPLICATIONS LAB

B.Tech 5th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC511	Core	L	T	P	C	CIA	SEE	TOTAL
		0	0	2	1	25	50	75
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:			
		Nil						

OBJECTIVES:

The course should enable the students to :

1. Understand the building blocks and performance parameters of an operational amplifier.
2. Realize analog filters using Op-amp
3. Design monostable and astable multivibrators using 555 IC.
4. Get knowledge to interface real life analog signals to the digital computational devices through ADCs and DACs.

LIST OF EXPERIMENTS

Expt. 1	Applications of Op-amp
To study the application of Op-amp IC741 as a. Inverting amplifier b. Non-inverting amplifier d. Summer e. Subtractor	
Expt. 2	Inverting, Non – inverting and Differential amplifiers.
To study the op-amp performance as differentiator and integrator for various time constants	
Expt. 3	Active filters-LPF, HPF.
To design and test the performance of LPF, HPF	
Expt. 4	Schmitt Trigger circuits-using IC 555.
To identify LTP & UTP values for an Schmitt trigger using IC 555 timer	
Expt. 5	Data converters:v4-Bit DAC using 741 Op-amp.
Construction and study performance of a. DAC circuits	
Expt. 6	IC 555 timer-Monostable operation circuits.
Design and find steady state currents and voltages.	
Expt. 7	IC 555 timer Astable operation circuits.
Design and find steady state currents and voltages.	
Expt. 8	Variable Power Supply Using LM317
Design and Testing of DC power supply using LM317	
Expt. 9	Log, antilog and instrumentation amplifier
To study 1. Logarithmic and antilog amplifiers 2. Instrumentation amplifier	
Expt. 10	Precision rectifiers
To study performance of half wave and full wave precision rectifiers using IC 741.	
Expt. 11	IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators
To design and study the time period of the oscillator circuit	
Expt. 12	Frequency synthesizers :To study performance of PLL IC 565
Design of Phase Locked Loops (PLL)- IC 565	
Hardware: 1. Regulated Power supplies 2. Analog/Digital Storage Oscilloscopes 3. Analog/Digital Function	

Generators 4. Digital Multimeters 5. Decade Resistance Boxes/Rheostats 6. Decade Capacitance Boxes 7. Ammeters (Analog or Digital) 8. Voltmeters (Analog or Digital) 9. Active & Passive Electronic Components 10. Bread Boards 11. Connecting Wires 12. CRO Probes etc.

Reference Books:

1. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, 4th edition, PHI, 2000.
2. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, 6th edition, PHI, 2000.

Web References:

1. https://studentsfocus.com/notes/anna_university/2017/ECE/4th%20sem/THEORY%20NOTES/LIC/106451.pdf
2. https://www.tutorialspoint.com/linear_integrated_circuits_applications/index.htm

Outcomes:

1. Analyze and design simple differential amplifier circuits with BJTs/FETs for Integrated circuits (IC)
2. Analyze and design operational amplifier circuits for linear and non-linear applications.
3. Design analog filters and realize them using operational amplifier based simple filter circuits.
4. Understand the working of mixed signal circuits like Analog to Digital Convertors, Digital to analog Convertors and Phase Locked Loop & realization of frequency synthesizers

DIGITAL COMMUNICATION LAB

B.Tech 5th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC512	Core	L	T	P	C	CIA	SEE	TOTAL
		0	0	2	1	25	50	75
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:			
		Nil						

OBJECTIVES:	
The course should enable the students to:	
<ol style="list-style-type: none"> 1. Exhibit the sampling theorem & TDM process 2. Exhibit PCM & DM process 3. Exhibit PSK, DPSK & QPSK process 4. Simulation of digital modulation techniques 	
Expt. 1	Sampling theorem verification
Study the Sampling theorem verification with different conditions	
Expt. 2	Time Division Multiplexing
Study the process of Time Division Multiplexing	
Expt. 3	Pulse Code Modulation
Study & analyze the Pulse Code Modulation	
Expt. 4	Differential Pulse Code Modulation
Study & analyze the Differential Pulse Code Modulation	
Expt. 5	Delta Modulation
Study & analyze the Delta Modulation	
Expt. 6	Adaptive Delta Modulation
Study & analyze the Adaptive Delta Modulation	
Expt. 7	Frequency shift Keying-Modulation & Demodulation
Study the process of FSK modulation & demodulation process	
Expt. 8	Phase shift Keying-Modulation & Demodulation

Study the process of PSK modulation & demodulation process	
Expt. 9	Differential Phase shift Keying-Modulation & Demodulation
Study the process of DPSK modulation & demodulation process	
Expt. 10	QPSK-Modulation & Demodulation
Study the process of QPSK modulation & demodulation process	
Expt. 11	Bit Error Rate (BER) for BPSK modulation
Simulate and compare BER for BPSK Modulation	
Expt. 12	Simulation of Direct Sequence Spread Spectrum
Simulation of Direct Sequence Spread Spectrum process using Matlab	
<p>Web References:</p> <ol style="list-style-type: none"> 1. https://in.mathworks.com/academia/courseware/digital-communication-laboratory.html <p>E-Text Books:</p> <ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/117/101/117101051/ 	
<p>Outcomes:</p> <ol style="list-style-type: none"> 1. Demonstrate the sampling theorem & TDM process 2. Demonstrate PCM & DM proces 3. Demonstrate PSK, DPSK & QPSK process 4. Simulation of digital modulation techniques 	

MICROPROCESSORS AND MICROCONTROLLERS LAB

B.Tech 5th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC513	Core	L	T	P	C	CIA	SEE	TOTAL
		0	0	2	1	25	50	75
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:			
<p>OBJECTIVES: The course should enable the students to :</p> <ol style="list-style-type: none"> 1. Write ALP for arithmetic and logical operations in 8086 2. Familiarize with MASM, Embedded C & Code composer studio. 3. Write and execute programs in 8086 and MSP430 4. Analyze the low power modes of operation 								
<p style="color: blue;">Part A: 8086 Microprocessor Programs using NASM/8086 microprocessor kit.</p> <ol style="list-style-type: none"> 1. Introduction to MASM Programming. 2. Programs using arithmetic and logical operations 3. Programs using string operations and Instruction prefix: Move Block, Reverse string, Sorting, Length of the string, String comparison. 4. Programs using CALL and RET instructions 								
<p style="color: blue;">Part B: Embedded C Experiments using MSP430 Microcontroller</p> <ol style="list-style-type: none"> 1. Interfacing and programming GPIO ports in C using MSP430 (blinking LEDs , push buttons) 2. Usage of Low Power Modes: (Use MSPEXP430FR5969 as hardware platform and demonstrate the low power modes and measure the active mode and standby mode current) 3. Interrupt programming examples through GPIOs 4. PWM generation using Timer on MSP430 GPIO 5. Interfacing potentiometer with MSP430 6. PWM based Speed Control of Motor controlled by potentiometer connected to MSP430 GPIO 7. Using ULP advisor in Code Composer Studio on MSP430 8. Low Power modes and Energy trace++: <ol style="list-style-type: none"> a. Enable Energy Trace and Energy Trace ++ modes in CCS b. Compute Total Energy, and Estimated lifetime of an AA battery 								
<p style="color: blue;">Web References:</p> <ol style="list-style-type: none"> 1. https://circuitdigest.com/microcontroller-projects/getting-started-with-msp430-using-code-composer-studio 								
<p style="color: blue;">E-Text Books:</p> <ol style="list-style-type: none"> 1. http://read.pudn.com/downloads544/ebook/2246231/MSP430_Microcontroller_Basics.pdf 								
<p style="color: blue;">Outcomes:</p> <ol style="list-style-type: none"> 1. Execution of different programs for 8086 in Assembly Level Language using MASM Assembler 2. Program MSP 430 for various applications. 3. Design and implement some specific real time applications 4. Program MSP430 in low power modes 								

PROFESSIONAL ACTIVITIES-III

B.Tech 5th Semester – Electronics and communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
18AS501	-	2	-	-	0	-	-	-
Contact Classes: 12	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 12			
OBJECTIVES:								
<p>The course should enable the students to:</p> <ol style="list-style-type: none"> 1. Improve communication skills 2. Develop leadership qualities 								
<p>Professional Society Activities (PSA) course is aimed at enhancing the self-learning, communication, managerial skills of the students by engaging them in various Co & Extra Curricular activities during their course of study. Activities in each of the department shall be designed and conducted by the Professional Society Executive Committee whose composition is:</p> <ol style="list-style-type: none"> 1. Faculty Mentors- 2 No. 2. Student Chairman: 1 No.- Final year Student 3. Student General Secretary: 1 No.- Third year Student 4. Treasurer: 1 No.- Third year Student <p>Student Members: 2 No's from each class PSA related activities would be of the following nature but not limited to:</p>								
Activity#1	Just A Minute							
Activity#2	Technical Quiz							
Activity#3	Open House- Lab Demo							
Activity#4	Technical Paper Presentation- Preliminary							
Activity#5	Technical Paper Presentation- Final							
Activity#6	Poster Presentation							
Activity#7	Collage- A theme based event							
Activity#8	Debate Competition							
Activity#9	Group Discussion Competition							
Activity#10	Mock Interviews							
Activity#11	Model Exhibition							
Activity#12	Valedictory Function							

QUANTITATIVE APTITUDE

B.Tech 5th Semester – Electronics and communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18AS502	-	L	T	P	C	CIA	SEE	Total
		2	-	-	0	0	0	0
Contact Classes: 12	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 12			
The external examination will be conducted for 50 Marks with 1 Credit; examination type is Multiple Choice Question (MCQ) – Offline/Online.								
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. Formulate the problem quantitatively and use appropriate arithmetical methods to solve the problem. 2. Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions. 3. Solve campus placements aptitude papers covering Quantitative Ability 4. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc. 								
UNIT-I							Classes:3	
Calendars, Clocks, L. C. M & H. C. F, Problems on Numbers, Averages.								
UNIT-II							Classes:3	
Percentages, Profit, Loss & Discount, Simple Interest & Compound Interest.								
UNIT-III							Classes:3	
Ratio & Proportion, Mixture and Alligation, Partnership, problems on ages.								
UNIT-IV							Classes:3	
Time & Work, Pipes and Cisterns, Time & Distance, Problem on Trains, Boats and Streams, Mensuration.								
Text Books:								
1. Dr. R.S. Aggarwal, “Quantitative Aptitude”, S.Chand Publication, New Delhi.								
Reference Books:								
<ol style="list-style-type: none"> 1. Quantitative Aptitude - G. L BARRONS 2. Abhijit Guha, “Quantitative Aptitude for Competitive Examinations”, 4th Edition. 								
Web References:								
<ol style="list-style-type: none"> 1. www.indiabix.com 2. https://www.campusgate.co.in 3. https://m4maths.com 								

INDIAN CONSTITUTION

B.Tech 5th Semester – Electronics and communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18MD501	MC							
		2	-	-	0	0	0	0
Contact Classes: 30	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 24			
OBJECTIVES:								
The course should enable the students to:								
I. Understand the premises informing the twin themes of liberty and freedom from a civil right perspective.								
II. Address the growth of Indian opinion regarding modern Indian intellectuals’ constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.								
III. Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.								
UNIT-I	HISTORY OF MAKING OF THE INDIAN CONSTITUTION & PHILOSOPHY OF THE INDIAN CONSTITUTION						Classes: 08	
History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution: Preamble, Salient Features								
UNIT-II	CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES						Classes: 04	
Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.								
UNIT-III	ORGANS OF GOVERNANCE						Classes: 04	
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive President, Governor, Council of Minister. Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions								
UNIT-IV	LOCAL ADMINISTRATION						Classes: 04	
District’s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy								
UNIT-V	ELECTION COMMISSION						Classes: 04	
Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.								

Text Books:

1. Dr. S. N. Busi, "Dr. B. R. Ambedkar framing of Indian Constitution", 1st Edition, 2015.
2. M. P. Jain, "Indian Constitution Law", Lexis Nexis, 7th Edition, 2014.

Reference Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. D.D. Basu, "Introduction to the Constitution of India", Lexis Nexis, 2015.

Web References:

1. <http://www.constitution.org/cons/india/p18.html>

E-Text Books:

1. <https://www.india.gov.in/my-government/constitution-india/constitution-india-full-text>

VLSI DESIGN

B.Tech 6th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18EC601	Core	3	1	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to :

1. Give exposure to different steps involved in the fabrication of ICs using MOS transistor, CMOS/BICMOS transistors and passive components.
2. Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads
3. Give exposure to the design rules to be followed to draw the layout of any logic circuit
4. Provide concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics
5. Provide design concepts to design building blocks of data path of any system using gates.
6. Understand basic programmable logic devices and testing of CMOS circuits.

UNIT-I INTRODUCTION

Classes:20

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS &BiCMOS Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, Figure of merit ω_0 ; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT-II DESIGN RULES OF VLSI

Classes:10

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 μ m CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT-III LOGIC GATES IN VLSI

Classes:10

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

UNIT-IV TYPES OF MEMORY

Classes:10

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters. Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories

UNIT-V PROGRAMMABLE LOGIC DEVICES

Classes:10

PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design. CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

Text Books:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, PHI, 2005 Edition
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan

Banerjee, 3rd Ed, Pearson, 2009.

3. VLSI Design – M. Michael Vai, 2001, CRC Press.

Reference Books:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011
2. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
4. VLSI Design- K .Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.
5. Introduction to VLSI – Mead & Convey, BS Publications, 2010.

Web References:

1. <https://www3.nd.edu/~kogge/courses/cse40462-VLSI-fa18/www/links.html>
2. <https://www.eetimes.com/indian-vlsi-group-cites-dearth-of-design-skills/>

E-Text Books:

1. <https://nptel.ac.in/courses/117/101/117101058/>
2. <https://www.freebookcentre.net/Electronics/VLSI-Books-Download.html>

Outcomes:

1. Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
2. Choose an appropriate inverter depending on specifications required for a circuit
3. Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit
4. Design different types of logic gates using CMOS inverter and analyze their transfer characteristics
5. Design simple memories using MOS transistors and can understand design of large memories.
6. Design simple logic circuit using PLA, PAL, FPGA and CPLD.

ANTENNAS AND WAVE PROPAGATION

B.Tech 6th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18EC602	Core	3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to:

1. Relate the basic concepts of antenna parameters & analyze with Half wave & quarter wave dipole antennas.
2. Encapsulate the antenna arrays & its effects.
3. Organize the different types of antennas
4. Encapsulate the wave propagations with different frequency ranges

UNIT-I

ANTENNA BASICS

Classes:20

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, Shape-Impedance considerations, Antenna temperature, front-to-back ratio, antenna theorems, radiation- basic Maxwell's equations, retarded potential-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. Natural current distributions, far fields and patterns of Thin Linear Center-fed Antennas of different lengths, Illustrative problems. Loop Antennas: Introduction, Small Loop, Comparison of far fields of small loop and short dipole, Radiation Resistances and Directives of small and large loops (Qualitative Treatment).

UNIT-II

ANTENNA ARRAYS

Classes:10

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, BSAa with Non-uniform Amplitude Distributions- General considerations and Binomial Arrays, Illustrative problems.

UNIT-III

VHF, UHF AND MICROWAVE ANTENNAS

Classes:10

VHF, UHF and Microwave Antennas: Arrays with Parasitic Elements, Yagi - Uda Arrays, Folded Dipoles & 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-IV

TYPES OF ANTENNAS

Classes:10

Micro Strip Antennas: Introduction, features, advantages and limitations, Rectangular patch antennas- Geometry and parameters, characteristics of Micro strip antennas, Impact of different parameters on characteristics, reflector antennas- Introduction, Flat sheet and corner reflectors, paraboloidal reflectors- geometry, pattern characteristics, Feed Methods, Reflector Types- Related Features, Illustrative Problems.

Lens Antennas: Introduction, Geometry of Non-metallic Dielectric Lenses, Zoning , Tolerances, Applications. Antenna Measurements: Introduction, Concepts- Reciprocity, Near and Far Fields, Coordination system, sources of errors, Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement , Gain Measurements (by comparison, Absolute and 3-Antenna Methods).

UNIT-V | WAVE PROPAGATION

Classes:10

Wave Propagation: Introduction, Definitions, Characterizations 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, tropospheric propagation, fading and path loss calculations.

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, Energy loss in Ionosphere, Summary of Wave Characteristics in different frequency ranges.

Text Books:

1. Antennas and wave propagation – John D. Kraus, Ronald 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.

Reference Books:

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

Web References:

1. https://mrcet.com/downloads/digital_notes/ECE/III%20Year/ANTENNA%20AND%20WAVE%20PROPAGATIONS.pdf
2. <https://nptel.ac.in/courses/108/101/108101092/>

E-Text Books:

1. <https://www.scribd.com/document/351688797/Antenna-and-Wave-Propagation-J-D-Kraus-4th-Ed>

Outcomes:

1. Categorize the basic concepts of antenna parameters & analyze with Half wave & quarter wave dipole antennas.
2. Summarize the antenna arrays & its effects.
3. Distinguish **VHF, UHF and Microwave Antennas**
4. Distinguish the different types of antennas microstrip & lense antenna
5. Categorize the basics of wave propagations
6. Categorize the sky wave propagations

EMBEDDED SYSTEMS

B.Tech 6th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC603	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to :

1. To provide an overview of Design Principles of Embedded System.
2. To provide clear understanding about the role of firmware, operating systems in correlation with hardware systems.
3. List out embedded firmware approaches and development languages
4. Encapsulate RTOS based embedded system design

UNIT-I Introduction to Embedded Systems

Classes:15

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT-II Typical Embedded System

Classes:15

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS). Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT-III Embedded Firmware

Classes:10

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages

UNIT-IV RTOS Based Embedded System Design

Classes:10

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT-V Task Communication

Classes:10

Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

Text Books:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.
2. Embedded Systems - Raj Kamal, MC GRAW HILL EDUCATION
3. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.

Reference Books:

1. Embedded Systems – Lyla, Pearson, 2013
2. An Embedded Software Primer - David E. Simon, Pearson Education.

Web References:

1. <https://nptel.ac.in/courses/108/102/108102045/>
2. <https://freevideolectures.com/course/2914/introduction-to-embedded-systems>

E-Text Books:

1. <https://sushmatoravi.files.wordpress.com/2017/08/233633895-intro-to-embedded-systems-by-shibu-kv.pdf>

Outcomes:

1. Illustrate the basics of embedded systems
2. Expected to understand the selection procedure of Processors in the embedded domain.
3. Summarize the memory selection, sensors & actuators
4. Design Procedure for Embedded Firmware.
5. Expected to visualize the role of Real time Operating Systems in Embedded Systems.
6. Expected to evaluate the Correlation between task synchronization and latency issues

DIGITAL SIGNAL PROCESSING

B.Tech 6th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC604	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to:

1. Provide background and fundamental material for the analysis and processing of digital signals.
2. Understand the fast computation of DFT and appreciate the FFT processing.
3. Study the designs and structures of digital IIR filters and analyze and synthesize for a given specifications.
4. Study the designs and structures of digital FIR filters and analyze and synthesize for a given specifications.
5. Acquaint in Multi-rate signal processing techniques.
6. Study the applications of DSP.

UNIT-I	INTRODUCTION TO DSP	Classes:20
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Introduction: Why Digital in Signal Processing, Introduction to digital signal processing: Discrete time signals and sequences, linear shift invariant systems, stability and causality, linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

Discrete Fourier Series: Properties of discrete Fourier series, DFS representation of periodic sequences, discrete Fourier transforms: properties of DFT, linear convolution of sequences using DFT, computation of DFT. Relation between Z-Transform and DFS.

UNIT-II	FFT AND Z-TRANSFORMS	Classes:10
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Fast Fourier Transforms: Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, inverse FFT and FFT for composite N.

Realization of Digital Filters: Review of Z-transforms, applications of Z-Transforms, solution of difference equations of digital filters, block diagram representation of linear constant-coefficient difference equations, basic structures of IIR systems, transposed forms, basic structures of FIR systems, system function.

UNIT-III	IIR DIGITAL FILTERS	Classes:10
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Analog filter approximations-Butterworth and chebyshev, design of IIR digital Filters from analog filters, design examples: analog-digital transformations, Illustrative Problems.

UNIT-IV	FIR DIGITAL FILTERS	Classes:10
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Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques, frequency sampling technique, comparison of IIR and FIR filters, Illustrative Problems.

UNIT-V	APPLICATIONS OF DIGITAL SIGNAL PROCESSING	Classes:10
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Basic sample rate alteration devices, Multirate Structures for sampling rate Converters, Multistage design of decimator and Interpolator, Polyphase Decomposition, Nyquist filters.

Spectral analysis of nonstationary Signals, Musical Sound processing, signal Compression, Transmultiplexers, Discrete Multitone Transmission of digital data.

Speech processing special processing

Text Books:

1. Digital signal processing, principles, Algorithms and applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education/PHI, 4th ed., 2007.
2. Digital signal processing , A computer base approach- Sanjit K Mitra, Tata Mcgraw Hill, 3rd edition, 2009.
3. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009

Reference Books:

1. Digital signal processing: Andreas Antoniou, TATA McGraw Hill, 2006.
2. Digital Signal processing – R S Kaler, M Kulkarni,, Umesh Gupta, I K International Publishing House Pvt. Ltd.
3. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008

Web References:

1. <https://doku.pub/documents/digital-signal-processing-by-s-salivahananpdf-z0x2wr19rwqn>
2. <https://www.cl.cam.ac.uk/teaching/0809/DSP/>

E-Text Books:

1. https://users.dimi.uniud.it/~antonio.dangelo/MMS/materials/Guide_to_Digital_Signal_Process.pdf
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007

Outcomes:

1. Learn basics of DFT and its computation.
2. Learn design and computation of FFT Radix-2.
3. Design digital IIR and FIR filters.
4. Learn realization of IIR and FIR by considering computational complexity.
5. Learn the concept of multi rate signal processing.
6. Understand the basic applications of DSP.

DIGITAL TELEVISION

B.Tech 6th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC605	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60		Tutorial Classes: -		Practical Classes: Nil		Total Classes:60		

OBJECTIVES:		
<p>The course should enable the students to :</p> <ol style="list-style-type: none"> 1. Relate the basic parameters of digital television 2. Encapsulate the image digitalization process 3. Encapsulate the standards & evolution of HDTV 4. Encapsulate the DTV feature & Accessories 		
UNIT-I	INTRODUCTION	Classes:10
Raster images – Quantization – Image structure – Brightness and contrast – Raster scanning – Resolution – Introduction to luma and chroma.		
UNIT-II	IMAGE DIGITIZATION	Classes:13
Perception and visual acuity – Luminance and lightness – CIE system of colorimetry – Color science – Video signal processing – Gamma – Luma and color differences.		
UNIT-III	DIGITAL TELEVISION	Classes:13
Digital Television types – JPEG – Video compression – MPEG2, MPEG4, H264, Motion – JPEG (M-JPEG) compression.		
UNIT-IV	HIGH DEFINITION TV	Classes:12
HDTV evolution and role of Grand Alliance – HDTV compressed video and audio streams – Packetized transport –Transmission – HDTV receiver – HDTV standards – Metadata broadcasting.		
UNIT-V	DTV FUTURE AND ACCESSORIES	Classes:12
3D TV – Plasma, LCD, Digital Light Processing – HDMI – Digital Video Disk (DVD), Blue Ray Disk, Super hi-vision.		
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Philip J. Cianci, “HDTV and the Transition to Digital Broadcasting: Understanding New Television Technologies”, Focal Press, 2007. 2. Iain E. G. Richardson, “H.264 and MPEG-4 and Video compression video coding for Next-generation Multimedia”, John Wiley & Sons Ltd., 2003. 		
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Ibrahim.K.F, “Newnes Guide to Television and Video Technology”, Newnes Publishers, 2007. 2. Charles poynton, “Digital Video and HDTV Algorithms and Interfaces”, Morgan Kaufman publishers, 		

2007.

Web References:

1. <http://www.faadooengineers.com/online-study/post/ece/tv-engineering/409/digital-television>
2. <http://www.ieee.org.ar/downloads/Chernock-DTV-Basics.pdf>

E-Text Books:

1. <https://www.taylorfrancis.com/books/e/9780080547237>
2. <https://doc.lagout.org/network/H.264%20and%20MPEG4%20Video%20Compression.pdf>

Outcomes:

1. Relate the basics of television like scanning & quantization process
2. Summarize the process of Image digitization
3. Compare the digital television types & different video compression process
4. **Summarize the evaluation & standards of High Definition Tv**
5. Summarize the **DTV Future**
6. **Examine the Accessories**

COMPUTER NETWORKS

B.Tech 6th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC606	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to:

1. To introduce the fundamental various types of computer networks.
2. To demonstrate the TCP/IP and OSI models with merits and demerits.
3. To explore the various layers of OSI Model.
4. To introduce UDP and TCP Models.
5. To have the concept of different routing techniques for data communications.

UNIT-I	INTRODUCTION TO COMPUTER COMMUNICATION	Classes:20
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Uses of Computer Networks, Network Hardware, The OSI Reference Model, The TCP/IP Reference Model, Example Networks, Data communications fundamentals.

The Physical Layer: Guided Transmission Media, Wireless Transmission.

UNIT-II	DATA LINK AND MAC LAYER	Classes:10
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: Data Link Layer Design Issues, Error Detection And Correction, Elementary Data Link Protocols, Sliding Window Protocols, Example Data Link Protocols.

Medium Access Control Sub Layer: The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Wireless LANS, Data Link Layer Switching.

UNIT-III	NETWORK LAYER	Classes:10
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Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Internetworking, The Network Layer in the Internet. Firewall. Bluetooth, Zigbee.

UNIT-IV	TRANSPORT LAYER	Classes:10
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: The Transport Service, Elements of Transport Protocols, the Internet Transport Protocols; UDP, the Internet Transport Protocols; TCP.

UNIT-V	APPLICATION LAYER	Classes:10
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Domain Name Space, DNS in Internet, Electronic Mail, File Transfer Protocol, WWW, HTTP, SNMP, Multi-Media. Network security and monitoring.

Text Books:

1. Computer Networks, Andrew S Tanenbaum , 4th Edition, Pearson Education/PHI.
2. Computer Networks, Bhushan Trivedi

Reference Books:

1. Data Communications and Networking, Behrouz A. Forouzan. 4th Edition, TMH.
2. An Engineering Approach to Computer Networks, S.Keshav, 2nd Edition, Pearson Education.

Web References:

1. <https://iamlearninghere.blogspot.com/2013/03/computer-networks-ppts-downloads.html>

E-Text Books:

1. <https://theswissbay.ch/pdf/Gentoomen%20Library/Networking/Prentice%20Hall%20-%20Computer%20Networks%20Tanenbaum%204ed.pdf>
2. <https://docs.google.com/viewer?a=v&pid=sites&srcid=Y3MudW9sLmVkdS5wa3xjY24tZjE2fGd4OjVjOTU2NTY2MTAzYzNiMTE>

Outcomes:

1. **Classify the models of networks like OSI & TCP/IP**
2. Interpret the **Physical Layer** both Guided Transmission Media& Wireless Transmission.
3. Summarize the design issues of **the Data Link Layer & protocols.**
4. **Illustrate the Medium Access Control Sub Layer & protocols**
5. Examine the network, transport layer & protocols
6. Examine the application layer with different applications

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

B.Tech 6th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC607	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to:

1. It provides an understanding of various measuring systems functioning and metrics for performance analysis.
2. Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
3. Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

UNIT-I	Block Schematics of Measuring Systems	Classes:15
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	Classes:15
AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Network analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal 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	Classes:10
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	Classes:10
Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers.		
UNIT-V	V Bridges	Classes:10
Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge. Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure – High Pressure, Vacuum level, Temperature -Measurements, Data Acquisition Systems. Overview of Smart instrumentation.		
Text Books:		

1. Electronic Instrumentation: H. S. Kalsi – MC GRAW HILL EDUCATION, 2nd Edition 2004.
2. Electronic Measurements and Instrumentation – K. Lal Kishore, Pearson Education 2010.
3. Electronic Instrumentation and Measurements – David A. Bell, 3rd Edition Oxford Univ. Press, 2013

Reference Books:

1. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ. Press, 1997.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbins, W.D. Cooper: PHI 5th Edition 2003.
3. Electronic Measurements and Instrumentation: B.M. Oliver, J.M. Cage MC GRAW HILL EDUCATION Reprint 2009.
4. Industrial Instrumentation: T.R. Padmanabham Springer 2009.

Web References:

1. <https://nptel.ac.in/courses/108/105/108105153/>
2. https://www.tutorialspoint.com/electronic_measuring_instruments/index.htm

E-Text Books:

1. https://kupdf.net/download/electronic-instrumentation-h-s-kalsi_58eee5badc0d600f4fda9816_pdf

Outcomes:

1. Distinguish the various electronic instruments based on their specifications for carrying out a particular task of measurement.
2. Compare different signal Analyzers with characteristics.
3. **Make use of Oscillators for measuring purpose**
4. Measure various physical parameters by appropriately selecting the transducers.
5. Classify the different V bridges for measuring purposes.
6. Summarize the data acquisition system.

BIOMEDICAL ELECTRONICS (Open Elective-II)

B.Tech 6th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC609	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60		Tutorial Classes: -		Practical Classes:		Total Classes:60		
				Nil				

OBJECTIVES:

The course should enable the students to:

1. Acquire and analyze the various bio signals and vital parameters.
2. Explain the function and application of various diagnostic and therapeutic equipment.
3. Explain about the recent developments in the field of biomedical engineering

UNIT-I	ELECTRO-PHYSIOLOGY AND BIOPOTENTIAL RECORDING	Classes:15
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The origin of Bio-potentials, bio potential electrodes, bio amplifiers, ECG, EEG, EMG, PCG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT-II	BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT	Classes:15
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pH, PO₂, PCO₂, colorimeter, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse rate, Blood cell counters.

UNIT-III	ASSIST DEVICES	Classes:10
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Cardiac pacemakers – Need, different types, DC defibrillators - asynchronous and synchronous, Hemodialyser-Membrane, Dialysate. Heart lung machine - Block diagram, oxygenators and pumps

UNIT-IV	PHYSICAL MEDICINE AND BIOTELEMETRY	Classes:10
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Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy Telemetry principles, frequency selection, biotelemetry, radiopill, electrical safety

UNIT-V	RECENT TRENDS IN MEDICAL INSTRUMENTATION	Classes:10
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X Rays, Thermography- principle, detectors, Endoscopy unit, Applications of Laser in medicine, cryogenic application, Introduction to telemedicine

Text Books:

1. Leslie Cromwell, Fred J. Weibell, "Erich A. Pfeiffer, Biomedical Instrumentation and Measurements", Pearson Education India, 2 nd Edition, 2015.
2. John G. Webster, "Medical Instrumentation Application and Design", John Wiley and Sons, New York, 4 th Edition, 2009.

Reference Books:

1. Khandpur R.S, "Handbook of Biomedical Instrumentation", Tata McGraw Hill, New Delhi, 3 rd Edition, 2014.
2. Joseph J. Carr and John M. Brown, "Introduction to Biomedical Equipment Technology", Pearson Education, 4th Edition, 2014.

Web References:

1. https://books.google.co.in/books?id=Uu1_6V7H5n8C&lpg=PP1&dq=biomedical%20electron

ics%20web%20references&pg=PP1#v=onepage&q&f=false

E-Text Books:

1. John G. Webster, "Medical Instrumentation Application and Design", John Wiley and sons, New York, 2004. (Units I, II & V)
2. Khandpur R.S, "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, 2003.(Units II & IV)

Outcomes:

1. Perform electrical and non-electrical physiological measurements
2. Explain the function of bio amplifiers.
3. Understand how to measure circuit performance
4. Solve problems in the areas of biomedical signals
5. Understand the patient imaging and monitoring systems
6. Understand recording and analysis of prominent biosignals of human

CONSUMER ELECTRONICS (Open Elective-II)

B.Tech 6th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18EC610	Core	3	0	0	3	30	70	100
		Contact Classes:60		Tutorial Classes: -	Practical Classes:	Total Classes:60		
				Nil				

OBJECTIVES:

The course should enable the students to :

1. Understand electronics engineering concepts used in consumer electronics systems.
2. Identify the need of preventive maintenance in various electronic appliances.
3. Use different product safety, compliance standards and techniques associated with electronic products.
4. Evaluate and analyze different electronic products and systems based on specifications.
5. Manage multi-faceted and multi-disciplinary projects with significant technical considerations using a broad systems perspective.
6. Foster a desire to continue life-long learning

UNIT-I	FUNDAMENTALS OF CONSUMER ELECTRONICS	Classes:10
Microcontrollers in consumer electronics, Energy management, Intelligent Building Perspective.		
UNIT-II	FUNDAMENTALS OF ENTERTAINMENT ELECTRONICS	Classes:15
Audio systems: Construction and working principle of : Microphone, Loud speaker, AM and FM receiver, stereo, 2.1 home theatre, 5.1 home theatre. Display systems: CRT, LCD, LED and Graphics displays Video Players : DVD and Blue RAY. Recording Systems: Digital Cameras and Camcorders		
UNIT-III	SMART HOME	Classes:10
Technology involved in Smart home, Home Virtual Assistants-Alexa and Google Home. Home Security Systems -Intruder Detection, Automated blinds, Motion Sensors, Thermal Sensors and Image Sensors, PIR, IR and Water Level Sensors.		
UNIT-IV	Home Enablement Systems	Classes:10
RFID Home, Lighting control, Automatic Cleaning Robots, Washing Machines, Kitchen Electronics- Microwave, Dishwasher, Induction Stoves, Smart Refrigerators, Smart alarms, Smart toilet, Smart floor, Smart locks.		
UNIT-V	COMMUNICATION SYSTEMS	Classes:10
Cordless Telephones, Fax Machines, PDAs-Tablets, Smart Phones and Smart Watches. Introduction to Smart OS-Android and iOS. Video Conferencing Systems-Web/IP Camera, Video security, Internet Enabled Systems, Wi-Fi, IoT, Li-Fi, GPS and Tracking Systems.		
Text Books:		

1. Thomas L Floyd, "Electronic Devices", 10th Edition, Pearson Education, Asia, 2018.
2. Philp Hoff, "Consumer Electronics for Engineers", Cambridge University Press, 1998

Reference Books:

1. Jordan Frith, "Smartphones as Locative Media", Wiley, 2014.
2. Dennis C Brewer, "Home Automation", Que Publishing, 2013.
3. Thomas M. Coughlin, "Digital Storage in Consumer Electronics", Elsevier and Newness, 2012.

Web References:

1. https://en.wikipedia.org/wiki/Consumer_electronics

E-Text Books:

1. <https://books.google.co.in/books?id=ZDfABAAAQBAJ&lpg=PA52&dq=consumer%20electronics%20subject%20web%20references&pg=PA52#v=onepage&q=consumer%20electronics%20subject%20web%20references&f=false>

Outcomes:

1. Review the fundamental concepts of Audio systems
2. Categorize the different Home security systems and Home enablement systems
3. Interpret the working of various communication systems
4. Describe the troubleshooting procedure of a typical TV receivers and video systems
5. Understand the basic functions of various consumer electronic goods
6. To learn various components of composite video signal and differentiate between hue, brightness, saturation, luminance and chrominance.

DISPLAY SYSTEMS

(Open Elective-II)

B.Tech 6th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC611	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60		Tutorial Classes: -		Practical Classes: Nil		Total Classes:60		

OBJECTIVES:

The course should enable the students to:

1. To understand properties of light.
2. To analyse Display Glasses, Inorganic Semiconductor TFT Technology.
3. To compare Inorganic Phosphors, Cathode Ray Tubes, Vacuum Florescent Displays.
4. To differentiate between Paper like and Low Power Displays.
5. To analyse Micro-display Technologies.

UNIT-I INTRODUCTION

Classes:15

Properties of Light, Geometric Optics, Optical Modulation; Vision and Perception: Anatomy of Eye, Light Detection and Sensitivity, Spatial Vision and Pattern Perception, Binocular Vision and Depth Perception; Driving Displays: Direct Drive, Multiplex and Passive Matrix, Active Matrix Driving, Panel Interfaces, Graphic Controllers, Signal Processing Mechanism; Power Supply: Fundamentals, Power Supply Sequencing.

UNIT-II TFT TECHNOLOGY

Classes:10

Display Glasses, Inorganic Semiconductor TFT Technology, Organic TFT Technology; Transparent Conductors, Patterning Processes: Photolithography for Thin Film LCD, Wet Etching, Dry Etching; Flexible Displays: Attributes, Technologies Compatible with Flexible Substrate and Applications, TFT Signal Processing Techniques; Touch Screen Technologies: Introduction, Coatings, Adhesive, Interfaces with Computer Mechanism.

UNIT-III FLAME PHOTOMETERS

Classes:15

Flame photometers: principle, constructional details of flame photometers, types of flame photometers, types of flame photometers, clinical flame photometers, accessories for flame photometer, expression for concentration, interferences in flame photometry, procedure for determinations. Atomic Absorption Spectrometers: Atomic Absorption Spectroscopy, Atomic Absorption Instrumentation, Sources of interferences, meter scale.

UNIT-IV OPERATION OF SPECTROMETER

Classes:10

Mass Spectrometers: Basic Mass Spectrometer, Principle of operation, Type of Mass Spectrometers, components of Mass Spectrometers, inductively coupled plasma-mass spectrometer, trapped ion analyzers, ion cyclotron resonance (ICR) mass spectrometer, quadruple ion trap mass spectrometer, applications of mass spectrometry, gas chromatograph-mass spectrometer, liquid chromatograph-mass spectrometer, tandem mass spectrometry (MS/MS)

UNIT-V NUCLEAR MAGNETIC RESONANCE

Classes:10

Nuclear Magnetic Resonance (NMR) Spectroscopy, Principle of NMR, types of NMR spectrometers, constructional details of NMR spectrometer, variation T-60A NMR spectrometer, sensitivity enhancement for

analytical NMR-spectroscopy, Fourier transform NMR spectroscopy

Text Books:

1. DA Skoog, "Principles of Instrumental Analysis," 6th Ed. Cengage
2. R. S. Kandpur, "Handbook Of Analytical Instruments", Mc Graw Hill 3rdEdition,

Reference Books:

1. Willard, Merritt, Dean and Settle, "Instrumental Methods of Analysis", 7thEdition, CBS Publishers.

Web References:

1. <http://what-when-how.com/display-interfaces/basic-concepts-in-display-systems-part-1/>

E-Text Books:

1. <https://www.pdfdrive.com/principles-of-instrumental-analysis-sixth-edition-e159582326.html> 2. <http://web.uni-plovdiv.bg/plamenpenchev/mag/books/anchem/Handbook%20of%20Analytical%20Techniques,%20%20Volume%20Set.pdf>

Outcomes:

1. Understand Anatomy of Eye, Light Detection and Sensitivity, Spatial Vision and Pattern Perception, Binocular Vision and Depth Perception.
2. Understand Photolithography for Thin Film LCD, Wet Etching, Dry Etching; Flexible Displays.
3. Understand Thin Film Electroluminescent Displays, AC Powder Electroluminescent Displays.
4. Be aware of Colorant Transposition Displays, MEMs Based Displays, 3-D Displays, 3-D Cinema Technology, Auto stereoscopic 3-D Technology.
5. Understand Liquid Crystals on Silicon Reflective Micro-display, Transmissive Liquid Crystal Micro-display, MEMs Micro-display, DLP Projection Technology.
6. Understand Organic Electroluminescent Displays: OLEDs, Active Matrix for OLED Display.

DIGITAL SIGNAL PROCESSING LABORATORY

B.Tech 6th Semester – Electronics and Communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18EC612	Core	-	-	3	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36			
OBJECTIVES:								
<p>The course should enable the students to:</p> <ul style="list-style-type: none"> I. Implementation of convolution in MATLAB. II. Implementation of digital signal processing algorithms in MATLAB and C. III. Understand the real-time operation of digital filters. IV. Analyze the Multirate signal processing algorithms. 								
LIST OF EXPERIMENTS								
Expt. 1	Linear Convolution Vs Circular Convolution							
Generation of linear convolution without using built in function and the function conv in MATLAB Generation of circular convolution without using built in function in MATLAB								
Expt. 2	DFT and IDFT							
Compute the Discrete Fourier Transform and IDFT with and without FFT and IFFT in MATLAB								
Expt. 3	Overlapadd and Overlap-Save Methods							
Implementation of Linear convolution using DFT (Overlapadd and Overlap-Save methods).								
Expt. 4	DIT-FFT Algorithm							
Implementation of Decimation-in-time radix-2 FFT algorithm								
Expt. 5	DIF-FFT Algorithm							
Implementation of Decimation-in-frequency radix-2 FFT algorithm								
Expt. 6	IIR Digital Filter using Butterworth Method And Bilinear Transformation							
Implementation of IIR digital filter using Butterworth method and bilinear transformation								
Expt. 7	IIR Digital Filter Using Chebyshev (Type I And II) Method							
Implementation of IIR digital filter using Chebyshev (Type I and II) method								

Expt. 8	FIR Digital Filter Using Windows
Implementation of FIR digital filter using window (Rectangular, Hamming, Hanning, Bartlett) methods.	
Expt. 9	FIR Digital Filter Using Frequency Sampling Method
Implementation of FIR digital filter using frequency sampling method	
Expt. 10	Optimum Equiripple FIR Digital Filter
Implementation of optimum equiripple FIR digital filter using window methods	
Expt. 11	DTMF Tone Generation And Detection
DTMF Tone Generation and Detection Using Goertzel Algorithm	
Expt. 12	Sampling Rate Conversion
Implementation of sampling rate conversion by decimation, interpolation and a rational factor using MATLAB	
Reference Books:	
<ol style="list-style-type: none"> 1. Digital Signal Processing – Jonathan Stein, John Wiley, 2005. 2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000. 	
Web References:	
<ol style="list-style-type: none"> 1. https://www.kdkce.edu.in/pdf/DSP Processor Architecture compressed.pdf 2. http://www.smdp2vlsi.gov.in/smdp2vlsi/downloads/ICDSPMicroprocessorArch.pdf 	
Course Home Page:	
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:	
SOFTWARE: MATLAB R2015a	
HARDWARE: Desktop Computers (36 nos)	
Course Outcome:	
At the end of the course, a student will be able to:	
<ol style="list-style-type: none"> 1. Execute MATLAB programs for convolution of sequence. 2. Execute MATLAB programs for FIR and IIR 3. Execute basic applications using sampling method 4. Execute basic applications using DTMF tone generation 5. Demonstrate the architecture of ARM processor 	

EMBEDDED SYSTEMS LABORATORY

B.Tech 6th Semester – Electronics and Communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18EC613	Core	-	-	3	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36			
OBJECTIVES:								
<p>The course should enable the students to:</p> <p>I. Use embedded C for reading data from port pins.</p> <p>II. Understand the interfacing of data I/O devices with microcontroller.</p> <p>III. Understand serial communication, port RTOS on microcontroller.</p>								
LIST OF EXPERIMENTS								
Expt. 1	LED Blinking							
Write a program to toggle all the led to port and with some time delay using ARM7								
Expt. 2	Interfacing of LCD							
Write a program to interface LCD with ARM7								
Expt. 3	Interfacing of Keypad							
Write a program to interface 4*4 matrix keypad with ARM7								
Expt. 4	Interfacing of LED							
Write a program for interfacing LED and PWM and to verify the output in the ARM7								
Expt. 5	Interfacing of Stepper Motor							
Write a program to interface Stepper motor with ARM7								
Expt. 6	Interfacing of DC Motor							
Write a program for interfacing of DC motor with ARM7								
Expt. 7	Programmable Gain Amplifier							
Write a program to study and characteristics of the programmable gain amplifier (PGA)								
Expt. 8	Filters							
Write a Program realization of low pass, high pass and band pass filters and their characteristics								

Expt. 9	ADC and DAC
Write a program to interface ADC and DAC with PSOC	
Expt. 10	Digital Function Implementation
Digital function implementation using digital blocks A. Counter for blinking LED B. PWW Digital buffer and digital inverter	
Expt. 11	ALU Operations
Write a program to verify Timer operation in different modes	
Expt. 12	Timer
Write a Program to interface stepper motor with PSOC	
Reference Books:	
1. Michael J. Pont, "Embedded C", Pearson Education, 2nd Edition, 2008. 2. Nigel Gardner, "The Microchip PIC in CCS C". Ccs Inc, 2nd Revision Edition, 2002	
Web References:	
1. http://processors.wiki.ti.com/index.php/MSP430_LaunchPad_Low_Power_Mode 2.	
Course Home Page:	
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS: SOFTWARE: System Software: Microsoft windows/ Linux. Programming Languages: Keil Embedded C. HARDWARE: ARM, Keil and Desktop Computers (36 nos)	
Course Outcome: At the end of the course, a student will be able to:	
<ol style="list-style-type: none"> 1. Interface LCD and LED using ARM 7. 2. Analyze the characteristics of low pass, high pass and band pass filters. 3. Execute basic applications on interfacing DC and stepper motors. 4. Demonstrate the architecture of ARM processor 	

VLSI DESIGN LAB

B.Tech 6th Semester – Electronics and Communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18EC614	Core	L	T	P	C	CIA	SEE	Total
		-	-	3	2	25	50	75
Contact Classes: Nil		Tutorial Classes: Nil		Practical Classes: 36		Total Classes: 36		
OBJECTIVES:								
The course should enable the students to:								
I. Understand the Fabrications steps of MOS and BiCMOS technologies.								
II. Learn the Basic NMOS, CMOS & BiCMOS circuits.								
III. Understand NMOS & CMOS process technology								
IV. Learn Technology Scaling and Designing of VLSI subsystems								
V. Write a Program on digital system using Hardware Description Language								
LIST OF EXPERIMENTS								
Expt. 1	Part I: Designing and analysis (DC, AC, Transient) of Circuit models through CADENCE or MICROWIND Modeling and analysis of PMOS & NMOS transistor.							
To Design PMOS and NMOS Transistor and Schematic Capture of Transistor by Performing Layout Extraction								
Expt. 2	Designing and Extracting, the layout of CMOS inverter.							
To Design an Inverter and Schematic Capture of Inverter by Performing Layout Extraction								
Expt. 3	Designing and Extracting the layout of logic gates.							
To Design and Implement Logic Gates by using FPGA or CPLD Device								
Expt. 4	Designing and Extracting layout of Common source amplifier							
To Develop, Implement and Schematic Capture of Common Source Amplifier by Performing Layout Extraction								
Expt. 5	Designing and Extracting layout of Single stage differential amplifier							
To Develop, Implement and Schematic Capture of Single Stage Differential Amplifier by Performing Layout Extraction								
Expt. 6	Part II: Design and Implementation using Verilog program and FPGA Implementations of given Boolean function through HDL language, and verifying the functionality with FPGA Design a decimal up/down counters that counts up from 00 to 99 and vice versa							
To Design and Implement Decimal Up/ Down Counter by using FPGA Device								
Expt. 7	Design an 8 Bit parity generator (with for loop and Generic statements)							

To Design and Implement 8 Bit Parity Generator by using FPGA Device	
Expt. 8	Ripple Carry Adder
To Design and Implement Ripple Carry Adder by using FPGA Device	
Expt. 9	Carry look ahead
To Design and Implement Carry Look Ahead Adder by using FPGA Device	
Expt. 10	8- bit comparator
To Design and Implement 8-Bit Comparator by using FPGA Device	
Expt. 11	Flip-Flops
To Develop and Implement SR Flip Flop, JK Flip Flop, D Flip Flop, T Flip Flop by using FPGA Device	
Expt. 12	Shift Register
To Develop and Implement Serial in Parallel Out Register, Parallel in Serial out by using FPGA and CPLD Device	
Expt. 13	Barrel shift register
To Develop and Implement Barrel Shifter by using FPGA Device	
Expt. 14	ALU
To Develop and Implement Arithmetic Logic Unit by using FPGA Device	
Reference Books:	
1. John P.Uyemura, Introduction to VLSI circuits and systems, John Wiley, 2003 2. John M. Rabaey, Digital Integrated circuits, PHI, EEE, 1997	
Web References:	
1. https://en.wikipedia.org/wiki/Very_Large_Scale_Integration 2. https://ieeexplore.ieee.org/document/6004383?reload=true&arnumber=6004383	
Course Home Page:	
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS: SOFTWARE: Microwind 2.1v, 45nm Technology HARDWARE: Desktop Computers (04 nos)	
Course Outcome:	
<ol style="list-style-type: none"> 1. Understand the Verilog hardware description language 2. Model a Combinational circuits using hardware description language Verilog HDL and validate its functionality 3. Design and implement a subsystem on a FPGA board 4. Model a Sequential circuits using hardware description language Verilog HDL and validate its functionality 5. Design and Model different MOS circuits 	

TERM PAPER

B.Tech VI Semester: Electronics and Communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18EC615	-	L	T	P	C	CIA	SEE	Total
		-	-	-	-	2	0	50
Contact Classes: 24	Tutorial Classes: 0	Practical Classes: 0			Total Classes: 24			
OBJECTIVES: The course should enable the students to: <ol style="list-style-type: none">1 Guide students through the process of planning and executing a substantial project.2 Allow students the opportunity to teach themselves.3 Improves the power of designing, organizing, communication, coordination and judgment.								
<p>The Term Paper is a self study report and shall be carried out either during 5th Semester along with other lab courses. Every student will take up this term paper individually and submit a report. The scope of the term paper could be an exhaustive literature review choosing any engineering concept with reference to standard research papers or an extension of the concept of earlier course work in consultation with the term paper supervisor. The term paper reports submitted by the individual students during the 5th Semester shall be evaluated for a total of 50 marks for external evaluation, it shall be conducted by two Examiners, one of them being term paper supervisor as internal examiner and an external examiner nominated by the Principal from the panel of experts recommended by HOD.</p>								
Outcomes: <ol style="list-style-type: none">1. Prepare comprehensive report based on literature survey related to considered area2. Select the paper to be solved and analyze the extension possibilities3. Identify the applicability of modern software tools and technology4. Correct himself to improve write-up skills5. Exhibit the professional behavior								

PROFESSIONAL SOCIETY ACTIVITIES-IV

B.Tech 6th Semester – Electronics and Communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18AS601		2	-	-	0	-	-	-
		Contact Classes: 12		Tutorial Classes: Nil		Practical Classes: Nil		Total Classes: 12
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. Improve communication skills 2. Develop leadership qualities 								
Professional Society Activities (PSA) course is aimed at enhancing the self-learning, communication, managerial skills of the students by engaging them in various Co & Extra Curricular activities during their course of study. Activities in each of the department shall be designed and conducted by the Professional Society Executive Committee whose composition is: <ol style="list-style-type: none"> 1. Faculty Mentors- 2 No. 2. Student Chairman: 1 No.- Final year Student 3. Student General Secretary: 1 No.- Third year Student 4. Treasurer: 1 No.- Third year Student Student Members: 2 No's from each class PSA related activities would be of the following nature but not limited to:								
Activity#1	Just A Minute							
Activity#2	Technical Quiz							
Activity#3	Open House- Lab Demo							
Activity#4	Technical Paper Presentation- Preliminary							
Activity#5	Technical Paper Presentation- Final							
Activity#6	Poster Presentation							
Activity#7	Collage- A theme based event							
Activity#8	Debate Competition							
Activity#9	Group Discussion Competition							
Activity#10	Mock Interviews							
Activity#11	Model Exhibition							
Activity#12	Valedictory Function							

TECHNICAL APTITUDE

B.Tech 6th Semester – Electronics and Communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18AS602	-	2	0	0	0	0	0	0
		Contact Classes: 36		Tutorial Classes: Nil		Practical Classes: Nil		Total Classes: 36
OBJECTIVES:								
The course should enable the students to :								
I.To ensure that students learn to think critically about mathematical models.								
II.To ensure students in solving problems effectively and accurately.								
III.Application of mathematical or statistical models to different real world contexts.								
UNIT-I						Classes:5		
Problem Solving in Commercial Mathematics (Percentages, Profit and Loss, Discount and Interest)								
UNIT-II						Classes:5		
Problem Solving in advanced level of Mathematical Ability (Ratio and Proportions, Mixtures, Time and Work, Time and Distance)								
UNIT-III						Classes:7		
C - language concepts:								
C language basics, Structure of a C Program, C Tokens, Variables, Constants, C functions, types, recursion, Header files, Preprocessor Commands, Storage Classes, Arrays, types of Arrays, Strings, Pointers, Structures.								
UNIT-IV						Classes:8		
Data Structures:								
Introduction, Stacks, Queues, types of Queues, Applications of Stacks and Queues, Linked Lists, Search Techniques: Linear Search, Binary Search, Sorting Techniques: Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort, Trees: basic terminology, Binary Trees, Binary Search Trees.								
UNIT-V						Classes:11		
Personality Development- Personal Grooming-Dressing, Body, Language, Leadership Skills, Basic Etiquettes, Mannerism / Confidence Building - Positive Attitude/ Mind Power Training etc								
HR Fundamentals- Practice of self concept.								
Kinds of Interviews –Structured Interview. A structured interview is typically formal and organized and may include several interviewers, commonly referred to as a panel interview. ... Unstructured Interview. ... Stress Interview. ... Behavioral Interview. ... Problem Solving or Case Interview. ... Panel Interview. Required Key Skills – Corporate culture								
Interview Skills - Mock Interviews [One –One, Panel, Telephonic & Skype]								
Outcomes:								

1. Student can attempt different technical competitive exams.
2. Student can enhance technical ability and logical thinking.

INTERNET OF THINGS (IOT)

B.Tech 7th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC701	Core	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
		Nil						

OBJECTIVES:

The course should enable the students to :

1. To understand Smart Objects and IoT Architectures
2. To learn about various IOT-related protocols
3. To build simple IoT Systems using Arduino and Raspberry Pi.
4. To understand data analytics and cloud in the context of IoT
5. To develop IoT infrastructure for popular applications

UNIT-I	Iot	Classes:20
Protocols: IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions,		
UNIT-II	Constrained Nodes and Constrained Networks	Classes:10
Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT		
UNIT-III	Design and Development	Classes:10
Design Methodology – Embedded computing logic – Microcontroller, System on Chips – IoT system building blocks – Arduino – Board details, IDE programming – Raspberry Pi – Interfaces and Raspberry Pi with Python Programming.		
UNIT-IV	Use Cases/Industrial Applications	Classes:10
Industrial IOT introduction, Cisco IoT system – IBM Watson IoT platform – Manufacturing – Converged Plant wide Ethernet Model (CPwE) – Power Utility Industry – Grid Blocks Reference Model –		
UNIT-V	Applications	Classes:10
Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control		
Text Books:		
<ol style="list-style-type: none"> 1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017 2. Arshdeep Bahga, Vijay Madisetti, Internet of Things – A hands-on approach, Universities Press, 2015 3. Olivier Hersent, David Boswarthick, Omar Elloumi , The Internet of Things – Key applications and Protocols, Wiley, 2012 (for Unit 2). 		
Reference Books:		
<ol style="list-style-type: none"> 1. Jan Ho” ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David 2. Boyle, “From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence”, Elsevier, 2014. 		
Web References:		
<ol style="list-style-type: none"> 1. https://www.arduino.cc/ 		

2. <https://www.ibm.com/smarterplanet/us/en/?ca=v> smarterplanet

E-Text Books:

1. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), Architecting the Internet of Things, Springer, 2011.
2. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O,Reilly_Media,_2011.

Outcomes:

1. Explain the concept of IoT.
2. Analyze various protocols for IoT.
3. Design a PoC of an IoT system using Rasperry Pi/Arduino
4. Apply data analytics and use cloud offerings related to IoT.
5. Analyze applications of IoT in real time scenario.

MICROWAVE ENGINEERING

B.Tech 7th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC702	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60		Tutorial Classes: -		Practical Classes: Nil		Total Classes:60		

OBJECTIVES:

The course should enable the students to :

1. Understand fundamental characteristics of waveguides and Microstrip lines through electromagnetic field analysis.
2. Understand the basic properties of waveguide components and Ferrite materials composition
3. Understand the function, design, and integration of the major microwave components oscillators, power amplifier.
4. Understand a Microwave test bench setup for measurements.

UNIT-I	MICROWAVE TRANSMISSION LINES	Classes:20
Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides – TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations; Power Transmission and Power Losses in Rectangular Guide, Impossibility of TEM mode. Related Problems.		
UNIT-II	CIRCULAR WAVEGUIDES	Classes:10
Introduction, Nature of Fields, Characteristic Equation, Dominant and Degenerate Modes. Cavity Resonators– Introduction, Rectangular and Cylindrical Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients, Excitation techniques- waveguides and cavities, Related Problems. MICROSTRIP LINES– Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor		
UNIT-III	MICROWAVE TUBES -I	Classes:10
Limitations and Losses of conventional tubes at microwave frequencies. Re-entrant Cavities, Microwave tubes – O type and M type classifications. O-type tubes :2 Cavity Klystrons – Structure, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory –Expressions for o/p Power and Efficiency, Applications, Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Electronic Admittance; Oscillating Modes and o/p Characteristics, Electronic and Mechanical Tuning, Applications, Related Problems.		
UNIT-IV	MICROWAVE TUBES -II	Classes:10
Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants (Qualitative treatment). M-type Tubes Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron – Hull Cut-off Condition, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics. BWO		
UNIT-V	WAVEGUIDE COMPONENTS AND APPLICATIONS – I & MICROWAVE SOLID STATE DEVICES	Classes:10
Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide irises, Tuning		

Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types. Scattering Matrix– Significance, Formulation and Properties. S-Matrix Calculations for – 2 port Junction, E-plane and H-plane Tees, Magic Tee, Hybrid Ring; Directional Couplers – 2Hole, Bethe Hole types, Ferrite Components– Faraday Rotation, S-Matrix Calculations for Gyrator, Isolator, Circulator, Related Problems Introduction, Classification, Applications. TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes. Avalanche Transit Time Devices – Introduction, IMPATT and TRAPATT Diodes – Principle of Operation and Characteristics. MICROWAVE
MEASUREMENTS: Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, Qfactor, Phase shift, VSWR, Impedance Measurement.

Text Books:

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition, 1994.
2. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.

Reference Books:

1. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004
2. Microwave Engineering- Annapurna Das and Sisir K.Das, Mc Graw Hill Education, 3rd Edition.
3. Microwave and Radar Engineering-M.Kulkarni, Umesh Publications, 3rd Edition.
4. Microwave Engineering – G S N Raju , I K International
5. Microwave and Radar Engineering – G Sasibhushana Rao Pearson

Web References:

1. <https://nptel.ac.in/courses/108/103/108103141/>

E-Text Books:

1. <https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnoxqb3ZpdGFzZXJyYW8yM3xneDoyNzdmM2NhNzIwOWY3YTfk>
2. https://radfiz.org.ua/share/sheva_s8_DEK/SECONDARY/%E4%C5%D2%D6/%E4%C5%D2%D6/%CE%D7%DE%20%D4%C5%C8%CE%A6%CB%C1/%CC%A6%D4/Collin.%20Foundations%20for%20Microwave%20Engineering.pdf

Outcomes:

1. Design different modes in waveguide structures
2. Calculate S-matrix for various waveguide components and splitting the microwave energy in a desired direction
3. Distinguish between Microwave tubes and Solid State Devices, calculation of efficiency of devices.
4. Measure various microwave parameters using a Microwave test bench

FUNDAMENTALS OF IMAGE PROCESSING
(OPEN ELECTIVE-III)

B.Tech 7th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC703	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. Familiarize with basic concepts of digital image processing and different image transforms 2. Learn various image processing techniques like image enhancement, restoration, segmentation and compression 3. Understand color fundamentals and different color 								
UNIT-I	Introduction						Classes:15	
Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing. Image Transforms: Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Importance of Phase, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform, KL Transform, SVD and Radon Transform, Comparison of different image transforms								
UNIT-II	fundamentals of spatial filtering						Classes:10	
Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters , sharpening spatial filters, Combining spatial enhancement methods Filtering in the Frequency Domain: Preliminary concepts, The Basics of filtering in the frequency domain, image smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering.								
UNIT-III	Image Restoration and Reconstruction						Classes:10	
A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, constrained least squares filtering ,geometric mean filter ,image reconstruction from projections.								
UNIT-IV	Image compression						Classes:10	
Fundamentals, Basic compression methods: Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run-Length coding, Symbol-Based coding, Bit-Plane coding, Block Transform coding, Predictive coding Wavelets and Multiresolution Processing: Image pyramids, subband coding, Multiresolution expansions, wavelet transforms in one dimensions & two dimensions, Wavelet coding.								
UNIT-V	Image segmentation and Color image processing						Classes:15	
Fundamentals, point, line, edge detection, thresholding, region –based segmentation. Morphological Image Processing: Preliminaries, Erosion and dilation, opening and closing, basic morphological algorithms for boundary extraction, thinning, gray-scale morphology, Segmentation using morphological watersheds.color fundamentals, color models, pseudo color image processing, basics of full color image processing, color								

transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

Text Books:

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.
2. Jayaraman, S. Esakkirajan, and T. Veerakumar, "Digital Image Processing", Tata McGraw-Hill Education, 2011.

Reference Books:

1. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition, Indian Reprint, 2002.
2. B.Chanda, D.Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2009.

Web References:

1. <https://nptel.ac.in/courses/117/105/117105079/>

E-Text Books:

1. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf
2. <http://ultra.sdk.free.fr/docs/DxO/Fundamentals%20of%20Digital%20Image%20Processing.pdf>

Outcomes:

1. Perform image manipulations and different digital image processing techniques
2. Summarize the spatial operations on images
3. **Classify the Image restoration & reconstruction process**
4. Classify different image compression methods
5. **Characterize the Image segmentation process**
6. **Characterize the Color image processing**

BIOMEDICAL INSTRUMENTATION
(OPEN ELECTIVE-III)

B.Tech 7th Semester: Electronics and communication Engineering									
Course code	Category	Hours/week			Credits	Maximum Marks			
18EC704	Core	L	T	P	C	CIA	SEE	TOTAL	
		3	0	0	3	30	70	100	
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60				
Nil									
OBJECTIVES:									
The course should enable the students to :									
<ol style="list-style-type: none"> 1. Encapsulate the components of medical instrumentation system 2. Describe the Bio electrodes 3. Describe the cardiac instrumentation 4. Describe Muscular & Respiratory Instrumentation 									
UNIT-I	INTRODUCTION							Classes:15	
Components of Medical Instrumentation System, Bio – amplifier, Static and dynamic characteristics of medical instruments, Biosignals and characteristics, Problems encountered with measurements from human beings. Organisation of cell, Derivation of Nernst equation for membrane Resting Potential Generation and Propagation of Action Potential, Conduction through nerve to neuro-muscular junction									
UNIT-II	BIOCHEMICAL ELETRODES							Classes:10	
Bio Electrodes – Biopotential Electrodes-External electrodes, Internal Electrodes, Biochemical Electrodes.Mechanical function, Electrical Conduction system of the heart, Cardiac cycle, Relation between electrical and mechanical activities of the heart.									
UNIT-III	ECG WAVEFORMS							Classes:10	
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	EEG AND EMG MACHINES							Classes:10	
Therapeutic equipment, Pacemaker, Defibrillator, Shortwave diathermy, Hemodialysis machine, Neuro-Muscular Instrumentation Specification of EEG and EMG machines, Electrode placement for EEG and EMG recording, Interpretation of EEG and EMG.									
UNIT-V	APPLICATIONS OF BIOMEDICAL INSTRUMENTATION							Classes:15	
Respiratory Instrumentation Mechanism of respiration, Spirometry, Pnemuotachograph Ventilators. Patient electrical safety, types of hazards, natural protective mechanism, leakage current, patient isolation, hazards in operation rooms, grounding conditions in hospital environment.									
Text Books:									
<ol style="list-style-type: none"> 1. Biomedical Instrumentation and Measurements – Leslie Cromwell and F.J. Weibell, E.A. Pfeiffer, PHI, 2nd Ed, 1980. 2. Medical Instrumentation, Application and Design – John G. Webster, John Wiley, 3rd Ed., 1998. 									
Reference Books:									

1. Principles of Applied Biomedical Instrumentation – L.A. Geoddes and L.E. Baker, John Wiley, 1975.
2. Hand-book of Biomedical Instrumentation – R.S. Khandpur, TMH, 2nd Ed., 2003.

Web References:

1. https://www.eecs.umich.edu/courses/bme458/download/bme458_notes1.pdf
2. http://www.robots.ox.ac.uk/~gari/teaching/b18/lecture_slides/B18_LectureA.pdf

E-Text Books:

1. <https://www.scribd.com/doc/288004431/Biomedical-Instrumentation-and-Measurements>
2. <http://fa.bme.sut.ac.ir/Downloads/AcademicStaff/3/Courses/4/Medical%20instrumentation%20application%20and%20design%204th.pdf>

Outcomes:

1. Summarize the components of medical instrumentation system
2. Summarize Problems encountered with measurements from human beings
3. Characterize the Bio electrodes
4. Characterize the cardiac instrumentation
5. Characterize Muscular Instrumentation
6. Characterize Respiratory Instrumentation

FUNDAMENTALS OF EMBEDDED SYSTEMS
(OPEN ELECTIVE-III)

B.Tech 7th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC705	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. Understand the building blocks of typical embedded system and different memory technology and memory types. 2. Learn the characteristics of an embedded system, quality attributes of embedded systems, application specific and domain specific embedded system, 3. Learn about communication devices and basics about VLSI and integrated circuit design and learn concept of firmware design approaches, ISR concept. Interrupt sources, interrupt servicing mechanism, multiple interrupts, 4. Understand the concepts of c versus embedded c and compiler versus cross-compiler. 5. Learn about the integrated development environment, software utility tool. Also learn about quality assurance and testing of the design, testing on host machine, simulators. 								
UNIT-I	Introduction						Classes:20	
Embedded System-Definition, History, Classification, application areas and purpose of embedded systems, The typical embedded system-Core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware,PCB and passive components. Characteristics, Quality attributes of an Embedded systems, Application-specific and Domain-Specific examples of an embedded system.								
UNIT-II	Embedded Hardware Design						Classes:10	
Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.								
UNIT-III	Embedded Firmware Design						Classes:10	
Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.								
UNIT-IV	Hardware Software Co-Design						Classes:10	
Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Threads, Processes and Scheduling, Task Scheduling, Communication, Synchronization, Device Drivers, How to choose an RTOS.								
Hardware Software Co-Design: Fundamental Issues in Hardware Software Co-Design,								

Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

UNIT-V Embedded System Development

Classes:10

he integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

Text Books:

1. Embedded Systems Architecture By Tammy Noergaard, Elsevier Publications, 2005
2. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications.

Reference Books:

1. Embedded Systems, Raj Kamal-Tata McGraw Hill Education Private Limited, Second Edition, 2008
2. Embedding system building blocks By Labrosse, CMP publishers.

Web References:

1. <https://nptel.ac.in/courses/108/102/108102045/>
2. <https://freevideolectures.com/course/2914/introduction-to-embedded-systems>

E-Text Books:

1. http://www.csit-sun.pub.ro/~cpop/Documentatie_SMP/Sisteme_incorporate/Embedded%20Systems%20Architecture%20-%20A%20Comprehensive%20Guide%20for%20Engineers%20and%20Programmers.pdf
2. <http://dsp-book.narod.ru/ESDUA.pdf>

Outcomes:

After going through this course the student will be able to

1. Know basics of embedded system, classification, memories, different communication interface and what embedded firmware is and its role in embedded system, different system components.
2. Characterize the **Embedded Firmware Design**
3. Distinguish all communication devices in embedded system, other peripheral device.
4. Distinguish concepts of C versus embedded C and compiler versus cross-compiler.
5. Choose an operating system, and learn how to choose an RTOS.
6. Characterize the IDE in embedded system development

WAVELET TRANSFORMS (OPEN ELECTIVE-III)

B.Tech 7th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC706	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. Make familiar with the concept of wavelet 2. Characterize the CWT & its properties 3. Characterize the DWT & its properties 4. Make use wavelets for signal & image processing applications 								
UNIT-I	Introduction							Classes:15
Introduction Stationary and non-stationary signals, Signal representation using basis and frames, Brief introduction to Fourier transform and Short time Fourier transform, Timefrequency analysis, Bases of time frequency: orthogonal, Filter banks, Multi resolution formulation: Wavelets from filters, Classes of wavelets: Haar, Daubechies, bi-orthogonal.								
UNIT-II	Continuous Wavelet Transform							Classes:10
Continuous Wavelet Transform Continuous wavelet transform (CWT), Time and frequency resolution of the continuous wavelet transform, Construction of continuous wavelets: Spline, orthonormal, bi-orthonormal, Inverse continuous wavelet transform, Redundancy of CWT, Zoom property of the continuous wavelet transform, Filtering in continuous wavelet transform domain								
UNIT-III	Discrete Wavelet Transform							Classes:10
Discrete Wavelet Transform And Filter banks Orthogonal and biorthogonal two-channel filter banks, Design of two-channel filter banks, Tree-structured filter banks.								
UNIT-IV	Discrete Wavelet Transform							Classes:10
Discrete wavelet transform, Non-linear approximation in the Wavelet domain, multi resolution analysis, Construction and Computation of the discrete wavelet transform, the redundant discrete wavelet transform								
UNIT-V	Applications							Classes:15
Applications Signal and Image compression, Detection of signal changes, analysis and classification of audio signals using CWT, Wavelet based signal de-noising and energy compaction, Wavelets in adaptive filtering, Adaptive wavelet techniques in signal acquisition, coding and lossy transmission, Digital Communication and Multicarrier Modulation, Trans multiplexers , Image fusion, Edge Detection and object isolation.								
Text Books:								
<ol style="list-style-type: none"> 1. A Wavelet Tour of Signal Processing, 2nd edition, S. Mallat, Academic Press, 1999. 2. Wavelets and Sub band Coding, M. Vetterli and J. Kovacevic, Prentice Hall, 1995. 3. Wavelet transforms: Introduction, Theory and applications, Raghuveer rao and Ajit S.Bopardikar, Pearson Education Asia, 2000. 								
Reference Books:								
<ol style="list-style-type: none"> 1. Fundamentals of Wavelets: Theory, Algorithms, and Applications, J.C. Goswami and A.K. Chan, 2nd 								

ed., Wiley, 2011.

2. Wavelets and their Applications, Michel Misiti, Yves Misiti, Georges Oppenheim, JeanMichel Poggi, John Wiley & Sons, 2010 .
3. A premier on Wavelets and their scientific applications, J S Walker, CRC press, 2002.

Web References:

1. http://www.ece.northwestern.edu/local-apps/matlabhelp/toolbox/wavelet/ch06_a28.html

E-Text Books:

1. <http://links.uwaterloo.ca/amath391w13docs/Mallat3.pdf>
2. Wavelets and signal processing: An application based introduction, Stark, Springer, 2005.
3. A friendly guide to Wavelets, Gerald keiser, Springer, 2011.
4. Multirate Systems and Filter Banks, P. P. Vaidyanathan, Pearson Education, 2004.
5. Wavelets : from math too practice, Desanka.P.Radunovik, springer, 2009.
6. Insight into wavelets from theory to practice, K P Soman and KL Ramachandran, PHI, 2008.

Outcomes:

1. Classify various wavelet transform and explain importance of it.
2. Describe Continuous Wavelet Transform (CWT) and Discrete Wavelet Transform (DWT).
3. Explain the properties and application of wavelet transform.
4. Develop and realize computationally efficient wavelet based algorithms for signal and image processing.
5. Explain brief features and strength of transform beyond wavelet.

DSP PROCESSORS AND ARCHITECTURES (ELECTIVE-II)

B.Tech 7th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC707	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to								
<ol style="list-style-type: none"> 1. To recall digital transform techniques. 2. To introduce architectural features of programmable DSP Processors of TI and Analog Devices. 3. To give practical examples of DSP Processor architectures for better understanding. 4. To develop the programming knowledge using Instruction set of DSP Processors. 5. To understand interfacing techniques to memory and I/O devices. 								
UNIT-I	Introduction to Digital Signal Processing, Computational Accuracy in DSP Implementations						Classes:20	
<p>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.</p> <p>Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.</p>								
UNIT-II	Architectures for Programmable DSP Devices						Classes:10	
<p>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.</p>								
UNIT-III	Programmable Digital Signal Processors						Classes:10	
<p>Commercial digital signal processing devices, Data Addressing modes of TMS320C54XX DSps, data Addressing moes 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.</p>								
UNIT-IV	Analog Devices Family of DSP Devices Introduction to Blackfin Processor						Classes:10	
<p>Analog Devices Family of DSP Devices- ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP- 2181 high performance processor.</p> <p>Introduction to Blackfin Processor- The Blackfin Processor, Introduction to Micro signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.</p>								
UNIT-V	Interfacing Memory and I/O Peripherals to Programmable DSP Devices						Classes:10	

Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

Text Books:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach To Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
3. Embedded Signal Processing with the Micro Signal Architecture Publisher: Woon-Seng Gan, Sen M. Kuo, Wiley-IEEE Press, 2007

Reference Books:

1. Digital Signal Processors, Architecture, Programming and Applications–B. Venkataramani and M. Bhaskar, 2002, TMH.
2. Digital Signal Processing – Jonatham Stein, 2005, John Wiley.
3. DSP Processor Fundamentals, Architectures & Features – Lapsley et al., S. Chand & Co.
4. Digital Signal Processing Applications Using the ADSP-2100 Family, Amy Mar, PHI
5. The Scientist and Engineer's Guide to Digital Signal Processing by Steven W. Smith, California Technical Publishing
6. Embedded Media Processing, David J. Katz and Rick Gentile of Analog Devices, Newnes

Web References:

1. <https://www.dspguide.com>
2. <https://www.analog.com>
3. www.ti.com › Processors
4. <https://www.oreilly.com/library/view/vlsi-digital-signal>
5. www.usrmodem.ru/files/tms320.pdf

E-Text Books:

1. <https://www.scribd.com/document/418385964/DSP-by-avatar-singh-pdf>

Outcomes:

1. Understand the basics of Digital Signal Processing and transforms.
2. Able to distinguish between the architectural features of General purpose processors and DSP processors.
3. Understand the architectures of TMS320C54xx devices.
4. Understand the architectures of ADSP 2100 DSP devices.
5. Able to write simple assembly language programs using instruction set of TMS320C54xx.
6. Can interface various devices to DSP Processors.

WIRELESS COMMUNICATION AND NETWORKS

B.Tech 7th Semester: Electronics and Communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
18EC708	Core	3	1	0	3	30	70	100
Contact Classes:51	Tutorial Classes: -	Practical Classes:			Total Classes:51			
Nil								
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> To provide an overview of Wireless Communication networks area and its applications in communication engineering. To appreciate the contribution of Wireless Communication networks to overall technological growth. To understand the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks. 								
UNIT-I	INTRODUCTION TO WIRELESS COMMUNICATION						Classes:10	
Multiple Access Techniques for Wireless Communication: Introduction, FDMA, TDMA, Spread Spectrum, Multiple Access, SDMA, Packet radio, Packet radio protocols, CSMA protocols, Reservation protocols. Introduction to Wireless Networking: Introduction, Difference between wireless and fixed telephone networks, Traffic routing in wireless networks.								
UNIT-II	WIRELESS DATA SERVICES						Classes:10	
CDPD, ARDIS, RMD, Common channel signaling, ISDN, BISDN and ATM, SS7, SS7 user part, signaling traffic in SS7.								
UNIT-III	MOBILE IP AND WIRELESS ACCESS PROTOCOL						Classes:10	
Mobile IP Operation of mobile IP, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol, wireless transaction, Wireless datagram protocol.								
UNIT-IV	WIRELESS TECHNOLOGIES						Classes:10	
IEEE 802 protocol Architecture, IEEE802 architecture and services, 802.11 medium access control, 802.11 physical layer. MIMO: Introduction, Single user MIMO, Multi-user MIMO, Capacity of massive MIMO: a summary, Basic forms of massive MIMO implementation.								
UNIT-V	MOBILE DATA NETWORKS						Classes:10	
Introduction to WLL technology, GPRS and higher data rates, Short messaging service in GSM, HIPERLAN.								
Optimization Process in WCN: Convex Optimization, Ant Colony, Genetic Algorithms, Fuzzy Logic, Heuristic Algorithms. Wireless Network Security,								
Text Books:								
<ol style="list-style-type: none"> Wireless Communications, Principles, Practice – Theodore S. Rappaport, PHI, 2nd Ed., 2002. Wireless Communication and Networking – William Stallings, PHI, 2003. 								

Reference Books:

1. Wireless Digital Communications – Kamilo Feher, PHI, 1999.
2. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy, Pearson Education, 2002.
3. Xiang, W; Zheng, K; Shen, X.S; "5G Mobile Communications", Springer, 2016

Web References:

1. <http://ee.sharif.edu/~pr.wireless.comm/references/Goldsmith.pdf>
2. <http://ee.sharif.edu/~pr.wireless.comm/references/Schwartz.pdf>

E-Text Books:

1. G.L. Stuber, Principles of Mobile Communications, Kluwer Academic, 1996.
2. T.S. Rappaport, Wireless Communications: Principles and Practice, Prentice Hall, 2002.

Outcomes:

1. **Identify** the different Multiple accessing technologies.
2. **Discuss** the basics of wireless Networking.
3. **Discuss** about Mobile IP and Wireless Access Protocol.
4. **Discuss** about Wireless LAN Technologies.
5. **Examine** the Bluetooth technologies.
6. **Compare** different methods of data transfers.

**NEURAL NETWORK AND FUZZY LOGIC
(ELECTIVE-II)**

B.Tech 7th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC709	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. Make familiar with neural networks 2. Characterize the Associative memories 3. Make familiar with fuzzy set theory 4. Characterize the fuzzy inference system 								
UNIT-I	Introduction to Neural Networks						Classes:20	
Biological neuron, McCulloch-pitts neuron model, Neuron Modelling for Artificial Neural Systems, Models of Artificial Neural Networks feedforward and feedback networks, Neural Processing, Learning as approximation, Supervised and unsupervised learning, Neural Network Learning rules- Hebbian, Perceptron, Delta, Widrow-Hoff, Correlation, Winner-Take-All learning rules.								
UNIT-II	Single-Layer Neural Networks						Classes:10	
Classification Model, Features and Decision Regions, Discriminant Functions, Linear Machine and Minimum Distance Classification, Training and Classification using Discrete Perceptron, Single-Layer Continuous Perceptron Networks, Multicategory Single-Layer Perceptron Networks, Hopfield Network – Discrete-time, Gradient type. Multi-Layer Neural Networks: Linearly Nonseparable Pattern Classification, Delta Learning Rule for Multiperceptron Layer, Generalized Delta Learning Rule, Feed forward Recall and Error Back-propagation training, Learning Factors.								
UNIT-III	Associative Memories						Classes:10	
Basic concepts, Linear Associator, Recurrent Auto associate Memory, Performance Analysis of Recurrent Auto associate Memory, Bidirectional Associate Memory(BAM): Memory Architecture, Association Encoding and Decoding, Stability Considerations, Memory Example and Performance Evaluation, Improved coding of memories, Multidirectional Associative Memory, Associative Memory of Spatial-Temporal Patterns.								
UNIT-IV	Fuzzy Set– Introduction						Classes:10	
Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.								
UNIT-V	Fuzzy Logic - Fuzzy Membership, Rules						Classes:10	
Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzifications & Defuzzifications, Fuzzy Controller, Industrial applications.								
Text Books:								
1. Introduction to Artificial neural network, Jackem M Zurada.								

2. Neural networks and fuzzy logic and genetic algorithms synthesis and applications, S.Rajasekarana, G.A.Vijaya lakshmi.

Reference Books:

1. Neural networks and learning machines, simon haykin, 3rd edition.

Web References:

1. <https://nptel.ac.in/courses/127/105/127105006/>

E-Text Books:

1. <https://anuradhasrinivas.files.wordpress.com/2013/08/29721562-zurada-introduction-to-artificial-neural-systems-wpc-1992.pdf>
2. https://cours.etsmtl.ca/sys843/REFS/Books/ebook_Haykin09.pdf

Outcomes:

1. Compare the basic Neural networks.
2. Summarize the single layer neural networks
3. Dissect the associative memories
4. Infer the concepts of theory of fuzzy set
5. Model a fuzzy inference system
6. Apply for controller & industrial applications

AVAILABLE MOOCs (ELECTIVE-III)

B.Tech 7th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC714	Elective	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes: -	Tutorial Classes: -	Practical Classes: -			Total Classes: -			
		Nil						
<p>Meeting with the global requirements, to inculcate the habit of self learning and in compliance with UGC guidelines, MOOC (Massive Open Online Course) courses have been introduced as electives. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion for the course from the MOOCs providers</p> <p>Regulations for MOOCs</p> <ul style="list-style-type: none"> ➤ The respective departments shall give a list from NPTEL or any other standard providers, whose credentials are endorsed by the HOD. ➤ Each department shall appoint Coordinators/Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of the same. ➤ A student shall choose an online course (relevant to his/her programme of study) from the given list of MOOCs providers, as endorsed by the teacher concerned, with the approval of the HOD. ➤ The details of MOOC(s) shall be displayed in Grade card of a student, provided he/she submits the proof of completion of it to the department concerned through the Coordinator/Mentor. ➤ Student can get certificate from SWAYAM/NPTEL or any other standard providers, whose credentials are endorsed by the HOD. The course work should not be less than 12 weeks or student may appear for end examination conducted by the Institute. ➤ There shall be one Mid Continuous Internal Examination (Quiz exam for 40 marks) after 9 weeks of the commencement of the course and semester end examination (Descriptive exam for 60 marks) shall be done along with the other regular courses. ➤ Three credits will be awarded upon successful completion of each MOOC courses having minimum of 8 weeks duration. 								

OPTICAL COMMUNICATIONS (ELECTIVE-III)

B.Tech 7th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC711	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1. To realize the significance of optical fibre communications. 2. To understand the construction and characteristics of optical fibre cable. 3. To develop the knowledge of optical signal sources and power launching. 4. To identify and understand the operation of various optical detectors. 5. To understand the design of optical systems and WDM. 								
UNIT-I	Introduction to Optical Fibers						Classes:20	
Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations –Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts-Linearly Polarized Modes – Single Mode Fibers-Graded Index fiber structure.								
UNIT-II	Signal Degradation Optical Fibers						Classes:10	
Attenuation–Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides - Information Capacity determination –Group Delay- Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.								
UNIT-III	Fiber Optical Sources and Coupling						Classes:10	
Direct and indirect Band gap materials-LED structures– Light source materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes Modes and Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies – Temperature effects, Introduction to Quantum laser, source-to-fiber Power Launching, Lensing schemes, Fiber –to- Fiber joints, Fiber splicing.								
UNIT-IV	Fiber Optical Receivers						Classes:10	
PIN and APD diodes–Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise – Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources –Receiver Configuration –Probability of Error – Quantum Limit								
UNIT-V	System Design and Applications						Classes:10	
Design of Analog Systems: system specification, power budget, bandwidth budget Design of Digital Systems: system specification, rise time budget, power budget, Receiver sensitivity.								
Text Books:								
<ol style="list-style-type: none"> 1. Gerd Keiser, “Optical Fiber Communication” McGraw –Hill International, Singapore, 3rd ed., 2000. 2. J.Senior, “Optical Communication, Principles and Practice”, Prentice Hall of India, 1994. 								
Reference Books:								
<ol style="list-style-type: none"> 1. Max Ming-Kang Liu, “Principles and Applications of Optical Communications”, TMH, 2010. 2. S.C.Gupta, “Text book on optical fiber communication and its applications”, PHI, 2005. 								

3. Satish Kumar, "Fundamentals of Optical Fiber communications", PHI, 2009.

Web References:

1. <https://nptel.ac.in/courses/117/101/117101054/>

E-Text Books:

1. https://kupdf.net/queue/optical-fiber-communications-4th-ed-gerd-keiser_5a258e60e2b6f50d1709f853_pdf?queue_id=-1&x=1596320692&z=MjQwOTo0MDcwOjQyMTg6NTEzNToxNDI0OjY5MGM6NTBmNzo0OTcy
2. <http://www.sharestudies.com/?view=download&f=120118>

Outcomes:

1. Understand and analyze the constructional parameters of optical fibres
2. Summarize the Signal Degradation Optical Fibers
3. Compare different Fiber Optical Sources
4. Compare the different Coupling methods
5. Compare various optical detectors and choose suitable one for different applications.
6. Identify a system based on specifications

**DIGITAL DESIGN THROUGH HDL
(ELECTIVE-III)**

B.Tech 7th Semester: Electronics and communication Engineering									
Course code	Category	Hours/week			Credits	Maximum Marks			
		L	T	P		C	CIA	SEE	TOTAL
18EC712	Core	3	0	0	3	30	70	100	
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60				
Nil									
OBJECTIVES:									
The course should enable the students to :									
<ol style="list-style-type: none"> 1. Understand methodologies to know about different design entry methods 2. To be able to model digital circuits in hardware description languages 3. To be able to use VHDL editors, debug designs and perform logic simulation 4. To be able to implement designs on Programmable Logic Devices 									
UNIT-I	INTRODUCTION							Classes:20	
Introduction to VHDL, design units, data objects, signal drivers, inertial and transport delays, delta delay, VHDL data types, concurrent and sequential statements									
UNIT-II	PROGRAMMING THROUGH VHDL							Classes:10	
Subprograms – Functions, Procedures, attributes, generio, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration.									
UNIT-III	DESIGN AND IMPLEMENTATION							Classes:10	
Design and VHDL implementation of Combinational logic circuit – full adder, Subtractor, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits. Introduction to ROM, PLA, PAL,									
UNIT-IV	SEQUENTIAL CIRCUITS							Classes:10	
Design and VHDL implementation of Synchronous sequential circuits design – finite state machines, Mealy and Moore, state assignments, design and VHDL implementation of FSMs, Linear feedback shift register (Pseudorandom and CRC). Asynchronous sequential circuit design – primitive flow table, concept of race, critical race and hazards, design issues like metastability, synchronizers, and clock skew and timing considerations.									
UNIT-V	TESTING OF LOGIC CIRCUITS							Classes:10	
Introduction to Synthesis, Testing of logic circuits, Simple Test benches. Introduction to Hierarchical and Structured Design, Role of CAD Tools in the VLSI design process.									
Text Books:									
<ol style="list-style-type: none"> 1. Douglas L.Perry “VHDL programming by Example” Tata McGraw Hill J. Bhasker, A VHDL Primer, PH/Pearson 2. J.Bhasker, A VHDL Synthesis Primer, Second Edition, Star Galaxy. 									
Reference Books:									
<ol style="list-style-type: none"> 1. Fundamentals of Digital Logic with VHDL design – Stephen Brown, ZvonkoVranesic, TMH. 2. Charles H Roth Jr.”Digital System Design using VHDL” Thomson learning,2004 3. Digital System Design – John Wakerley. 4. V Z. Navabi, “VHDL-Modular Design and Synthesis of cores and Systems”, TMH – 3rd Edition 									

Web References:

1. <https://lecturenotes.in/video-tutorial/15175-note-of-digital-design-through-verilog-hdl-video-tutorial-by-bhaktishree-sathpathy?reading=true>

E-Text Books:

1. http://vhdl-manual.narod.ru/books/programming_by_example.pdf
2. <https://www.edutechlearners.com/download/books/A%20VHDL%20Primer%20-%20Jayaram%20Bhasker.pdf>

Outcomes:

1. Choose appropriate design technology for a given design
2. Work in a team to develop and implement designs
3. Design and VHDL implementation of Combinational circuits design
4. Design and VHDL implementation of Synchronous sequential circuits design
5. Design and VHDL implementation of Asynchronous sequential circuits design
6. Tool debug and test at the logic level and perform logic synthesis

IMAGE AND VIDEO PROCESSING (ELECTIVE-III)

B.Tech 7th Sefmester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC713	Core	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. Make familiar with basics concepts of image processing 2. Encapsulate the Image enhancement & filtering 3. Make familiar with Image segmentation & Wavelets 4. Encapsulate the Image compression techniques & video processing 								
UNIT-I	INTRODUCTION							Classes:10
Digital Image Fundamentals-Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.								
UNIT-II	FILTERS							Classes:10
Image Enhancements and Filtering-Gray level transformations, histogramequalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain sharpening filters – first and second derivative, two-dimensional DFT and its inverse, frequency domain filters – low-pass and high-pass								
UNIT-III	COLOR COMPLEMENTS							Classes:10
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. Image Segmentation- Detection of discontinuities, edge linking and boundary detection, thresholding – global and adaptive, region-based segmentation. 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 Subband filter banks, wavelet packets.								
UNIT-IV	COMPRESSION AND FUNDAMENTALS OF VIDEO PROCESSING							Classes:20
Image Compression-Redundancy–inter-pixel and psycho-visual; Lossless compression – predictive, entropy; Lossy compression-predictive and transform coding; Discrete Cosine Transform; Still image compression standards–JPEG and JPEG-2000. Fundamentals of Video Coding-Inter-frame redundancy, motion estimation techniques – full-search, fast search strategies, forward and backward motion prediction, frame classification – I, P and B; Video sequence hierarchy–Group of pictures, frames, slices, macro-blocks and blocks; Elements of a video encoder and decoder; Video coding standards – MPEG and H.26X.								
UNIT-V	VIDEO SEGMENTATION							Classes:10
Video Segmentation-Temporal segmentation–shot boundary detection, hard-cutsand soft-cuts; spatial segmentation–motion-based; Video object detection and tracking.								

Text Books:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition 2008
2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2nd edition 2004

Reference Books:

1. Murat Tekalp , Digital Video Processing" Prentice Hall, 2nd edition 2015.

Web References:

1. <https://nptel.ac.in/courses/117/105/117105079/>
2. <https://nptel.ac.in/courses/117/104/117104020/>

E-Text Books:

1. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf
2. <http://ultra.sdk.free.fr/docs/DxO/Fundamentals%20of%20Digital%20Image%20Processing.pdf>

Outcomes:

1. Mathematically represent the various types of images and analyze them.
2. Process these images for the enhancement of certain properties or for optimized use of the resources.
3. Take part in processing of colour image processing & image segmentaion
4. Categorize the image process with wavelets
5. Develop algorithms for image compression and coding.
6. Summarize the video segmentaion methods.

INTERNET OF THINGS (IOT) LAB

B.Tech 7th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC715	Core	L	T	P	C	CIA	SEE	TOTAL
		0	0	2	3	25	50	75
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
<p>OBJECTIVES:</p> <p>The course should enable the students to:</p> <ol style="list-style-type: none"> 1. Do basic python programming. 2. Interface with LED and timing control. 3. Access an image through Webcam. 4. Interface different sensors and upload the sensor data to cloud. 								
Expt. 1	<p>Start Raspberry Pi and try various Linux commands in command terminal window: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.</p>							
To make familiar with basic commands of raspberry pi								
Expt. 2	<p>Run some python programs on Pi like: Read your name and print Hello message with name Read two numbers and print their sum, difference, product and division. Word and character count of a given string Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input Print a name 'n' times, where name and n are read from standard input, using for and while loops. Handle Divided by Zero Exception. Print current time for 10 times with an interval of 10 seconds. Read a file line by line and print the word count of each line.</p>							
To implement basic programs using raspberry pi								
Expt. 3	Light an LED through Python program							
Execute a program to blink LED								
Expt. 4	Get input from two switches and switch on corresponding LEDs							
Execute a program to blink LED for corresponding switch								
Expt. 5	Flash an LED at a given on time and off time cycle, where the two times are taken from a file.							
Execute a program to control ON & OFF time of LED								
Expt. 6	Flash an LED based on cron output (acts as an alarm)							
Execute a program to flash LED as alarm								
Expt. 7	Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.							
Execute a program to interface relay								

Eupt. 8	Access an image through a Pi web cam.
Execute a program to access image through Web Cam	
Eupt. 9	Control a light source using web page.
Execute a program to control the light source from web page	
Eupt. 10	Implement an intruder system that sends an alert to the given email.
Execute a program to identify the intruder	
Eupt. 11	Interface Bluetooth to send sensor data to smartphone using Bluetooth.
Execute a program to interfacing of Bluetooth	
Eupt. 12	Get the status of a bulb at a remote place (on the LAN) through web.
Execute a program to interface with Webpage to know the status of bulb	
Eupt. 13	Get an alarm from a remote area (through LAN) if smoke is detected.
Execute a program to detect smoke & gives an alarm	
Eupt. 14	Upload temperature and humidity data to thingspeak cloud.
Execute a program to thingspeak for temperature & humidity	
Web References:	
1. https://www.codemag.com/Article/1607071/Introduction-to-IoT-Using-the-Raspberry-Pi	
E-Text Books:	
1. https://ocw.cs.pub.ro/courses/iot/labs/01	
Outcomes:	
1. Implement basic python programs	
2. Interface with LED & Control the timing of flash of LED	
3. Interface with relay, Access an image through Webcam & can connect with webpage.	
4. Interface different sensors and upload the sensor data to cloud.	

MICROWAVE ENGINEERING LAB

B.Tech 7th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC716	Core	L	T	P	C	CIA	SEE	TOTAL
		0	0	2	3	25	50	75
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to:								
1. To define the range of frequencies for operation in microwave engineering								
2. To differentiate between microwave oscillators and amplifiers								
3. To discover the functioning of microwave components								
4. To analyze the characteristics and parameters of various microwave components								
Expt. 1	Reflex Klystron Characteristics							
To study the characteristics of reflex klystron								
Expt. 2	Gunn Diode Characteristics							
To study the characteristics of Gunn diode								
Expt. 3	Directional Coupler Characteristics							
To study the characteristics of directional coupler								
Expt. 4	Measurement of VSWR & reflection coefficient using open and short circuit loads							
To measure VSWR and reflection coefficients using different loads								
Expt. 5	Measurement Scattering parameters of Directional coupler							
To measure scattering parameters of directional coupler								
Expt. 6	Measurement of Waveguide Parameters							
To measure different waveguide parameters								
Expt.7	Measurement of Impedance of a given Load							
To measure impedance of different loads								
Expt. 8	Measurement of Scattering Parameters of a E plane Tee							
To measure scattering parameters of E Plane tee								
Expt. 9	Measurement of Scattering Parameters of a H plane Tee							
To measure scattering parameters of H Plane tee								
Expt. 10	Measurement of Scattering Parameters of a Magic Tee							
To measure scattering parameters of Magic tee								
Expt. 11	Measurement of Scattering Parameters of a Circulator							
To measure scattering parameters of Circulator								
Expt. 12	Attenuation Measurement							
To measure attenuation characteristics of microwave components								
Expt. 13	Microwave Frequency Measurement							
To analyze different frequency of microwave components								
Expt. 14	Antenna Pattern Measurements							
To measure different antenna patters for microwave components								

Text Books:

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition, 1994.
2. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.

Reference Books:

1. Samuel Y. Liao, “Microwave Devices and Circuits”, PHI, 3rd Edition, 1994.
2. M. Kulkarni, “Microwave and Radar Engineering”, Umesh Publications 1998.

Web References:

<https://nptel.ac.in/courses/108/103/108103141/>

Outcomes:

1. Interpret the characteristics of Reflex Klystron, LED, GUNN diode and Laser diode
2. Recognize VSWR and Impedance of rectangular waveguide
3. Check attenuation of variable attenuator
4. Implement insertion and isolation loss of Circulator
5. Generate S matrix of Magic Tee
6. Differentiate frequency and wave length of waveguide

COMPREHENSIVE ASSESSMENT

B.Tech VI Semester: Electronics and communication Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
18EC718	PC	L	T	P	C	CIA	SEE	Total
		-	-	2	1	100	-	100
Contact Classes: 24		Tutorial Classes: Nil		Practical Classes: Nil		Total Classes: 24		
<p>OBJECTIVES: The course should enable the students to:</p> <ol style="list-style-type: none"> 1. Students able to crack the exams GATE. 2. Able to assess the knowledge level of the students. 3. Assess the knowledge of the student in the relevant field of Engineering acquired over four years of study. 								
<p>The Comprehensive Assessment will be conducted in VII Semester which will be covering the complete syllabus. Every student will be required to undergo the Comprehensive assessment at the end of the VII semester of B.Tech programme. The duration of the Comprehensive assessment will range from 30 to 45 min. The Examination committee consisting of Head of the Department and two senior faculty members of the department. The Comprehensive assessment shall be evaluated for 100 marks by the committee. There are no external exams for the Comprehensive Assessment.</p>								
<p>Outcomes: At the end of the Programme students are able to</p> <ol style="list-style-type: none"> 1. Apply the knowledge in exams like Engineering Services and GATE. 2. Select the paper to be solved and analyze the extension possibilities 3. Identify the applicability of modern software tools and technology 4. Correct himself to improve write-up skills 5. Exhibit the professional behavior 								

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

B.Tech VII Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18MD701	Core	L	T	P	C	CIA	SEE	TOTAL
		2	0	0	0	0	0	0
Contact Classes:30		Tutorial Classes: 0		Practical Classes: 0		Total Classes:30		
OBJECTIVES:								
The course should enable the students to:								
<ul style="list-style-type: none"> I. Understand the concept of Traditional knowledge and its importance II. Know the need and importance of protecting traditional knowledge. III. Know the various enactments related to the protection of traditional knowledge. IV. Understand the concepts of Intellectual property to protect the traditional knowledge 								
MODULE-I	INTRODUCTION TO TRADITIONAL KNOWLEDGE						Classes:6	
Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.								
MODULE-II	PROTECTION OF TRADITIONAL KNOWLEDGE						Classes:6	
Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.								
MODULE-III	LEGAL FRAME WORK AND TK						Classes:6	
The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.								
MODULE-IV	TRADITIONAL KNOWLEDGE AND INTELLECTUAL PROPERTY						Classes:6	
Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.								
MODULE-V	TRADITIONAL KNOWLEDGE IN DIFFERENT SECTORS:						Classes:6	
Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK. 139.								
Text Books:								
<ul style="list-style-type: none"> 1. Traditional Knowledge System in India, by Amit Jha, 2009. 2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012. 								
Reference Books:								
<ul style="list-style-type: none"> 1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002. 2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino 								

CELLULAR AND MOBILE COMMUNICATION (ELECTIVE-IV)

B.Tech 8th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC801	Core	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
<p>OBJECTIVES: The course should enable the students to:</p> <ol style="list-style-type: none"> To provide the student with an understanding of the Cellular concept, Frequency reuse, Hand-off strategies. To enable the student to analyze and understand wireless and mobile cellular communication systems over a stochastic fading channel. To provide the student with an understanding of Co-channel and Non-Co-channel interferences. To give the student an understanding of cell coverage for signal and traffic, diversity techniques and mobile antennas. To give the student an understanding of frequency management, Channel assignment and types of handoff. 								
UNIT-I	INTRODUCTION					Classes:20		
<p>Introduction to Cellular Mobile Radio Systems: Limitations of Conventional Mobile Telephone Systems, Basic Cellular Mobile System, First, Second, Third and Fourth Generation Cellular Wireless Systems, Uniqueness of Mobile Radio Environment- Fading -Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time.</p> <p>Fundamentals of Cellular Radio System Design: Concept of Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I from a Normal Case in a Omni Directional Antenna System, System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems- Cell Splitting, Sectoring, Microcell Zone Concept.</p>								
UNIT-II	INTERFERENCE					Classes:10		
<p>Co-Channel Interference: Measurement of Real Time Co-Channel Interference, Design of Antenna System, Antenna Parameters and Their Effects, Diversity Techniques-Space Diversity, Polarization Diversity, Frequency Diversity, Time Diversity.</p> <p>Non-Co-Channel Interference: Adjacent Channel Interference, Near End Far End Interference, Cross Talk, Effects on Coverage and Interference by Power Decrease, Antenna Height Decrease, Effects of Cell Site Components.</p>								
UNIT-III	COVERAGE AND MOBILE ANTENNAS					Classes:10		
<p>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, General Formula for Mobile Propagation Over Water and Flat Open Area, Near and Long Distance Propagation, Path Loss from a Point to Point Prediction Model in Different Conditions, Merits of Lee Model.</p>								

Cell Site and Mobile Antennas: Space Diversity Antennas, Umbrella Pattern Antennas, Minimum Separation of Cell Site Antennas, Mobile Antennas.		
UNIT-IV	CHANNEL ASSIGNMENT	Classes:10
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	HANDOFF	Classes:10
Handoffs and Dropped Calls: Handoff Initiation, Types of Handoff, Delaying Handoff, Advantages of Handoff, Power Difference Handoff, Forced Handoff, Mobile Assisted and Soft Handoff, Intersystem Handoff, Introduction to Dropped Call Rates and their Evaluation.		
Text Books:		
<ol style="list-style-type: none"> 1. Mobile Cellular Telecommunications – W.C.Y. Lee, Mc Graw Hill, 2nd Edn., 1989. 2. Wireless Communications - Theodore. S. Rappoport, Pearson Education, 2nd Edn., 2002. 3. Mobile Cellular Communication - Gottapu sashibhushana Rao, Pearson, 2012. 		
Reference Books:		
<ol style="list-style-type: none"> 1. Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2nd Edn., 2001. 2. Modern Wireless Communications-Simon Haykin, Michael Moher, Pearson Education, 2005. 3. Wireless Communications Theory and Techniques, Asrar U. H .Sheikh, Springer, 2004. 4. Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007. 5. Wireless Communications – Andrea Goldsmith, Cambridge University Press, 2005. 		
Web References:		
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/106/106/106106167/ 2. https://notes.specworld.in/cellular-mobile-communication-notes-cms-pdf/ 		
E-Text Books:		
<ol style="list-style-type: none"> 1. https://potharajuvidyasagar.files.wordpress.com/2018/08/william-c-y-lee-mobile-cellular-telecommunications-systems-mcgraw-hill-inc-us-1988.pdf 2. https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbXJbWxtGVjaDIwMTIxNGJhdGNofGd4OjE4NTVmZjRiY2I4YWZjZjM 		
Outcomes:		
<ol style="list-style-type: none"> 1. The student will be able to analyze and design wireless and mobile cellular systems. 2. The student will be able to understand impairments due to multipath fading channel. 3. The student will be able understand the fundamental techniques to overcome the different fading effects. CO4 The student will be able 4. The student will be able to familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas 5. The student will have an understanding of frequency management, Channel assignment and types of handoff. 6. The student will be able to understand Co-channel and Non Co-channel interferences. 		

VIRTUAL INSTRUMENTATION

(ELECTIVE-IV)

B.Tech 8th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18EC802	Core	3	1	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
<p>OBJECTIVES: The Course should enable the students to:</p> <ol style="list-style-type: none"> To understand what is Virtual instrumentation and to realize the architecture of VI. To familiarize with the VI software and learn programming in VI. To study various Instrument Interfacing and data acquisition methods. To understand various analysis tools and develop programs for Process control applications. 								
UNIT-I	REVIEW OF VIRTUAL INSTRUMENTATION						Classes:20	
Historical perspective – Need of VI – Advantages of VI – Define VI – Block diagram & Architecture of VI – Data flow techniques – Graphical programming in data flow – Comparison with conventional programming.								
UNIT-II	PROGRAMMING TECHNIQUES						Classes:10	
VIS and sub-VIS – Loops and charts – Arrays – Clusters – Graphs – Case & sequence structures – Formula nodes – Local and global variable – String & file input.								
UNIT-III	DATA ACQUISITION BASICS						Classes:10	
DIO – Counters and timers – PC Hardware structure – Timing – Interrupts – DMA – Software and Hardware Installation – GPIB/IEEE 488 concepts – Embedded system buses – PCI – EISA – CPCI.								
UNIT-IV	COMMON INSTRUMENT INTERFACES						Classes:10	
Current loop – RS 232C/RS 485 – Interface basics: USB – PCMCIA – VXI – SCXI – PXI – networking basics for office and industrial application VISA and IVI – Image acquisition and processing – Motion Control – DMM – Waveform generator.								
UNIT-V	USE OF ANALYSIS TOOLS AND APPLICATION OF VI						Classes:15	
Fourier transforms – Power spectrum – Correlation methods – Windowing and flittering – Pressure control system – Flow control system – Level control system– Temperature data acquisition system – Motion control employing stepper motor – PID controller tool box.								
<p>Text Books:</p> <ol style="list-style-type: none"> Dr. Sumathi. S and Prof. Surekha. P, “LabVIEW Based Advanced Instrumentation Systems”, 2nd edition, 2007. Gary Johnson, “LabVIEW Graphical Programming”, McGraw Hill, 2006. 								
<p>Reference Books:</p> <ol style="list-style-type: none"> Lisa .K, Wells and Jeffrey Travis, “LABVIEW for Everyone”, Prentice Hall, 2009. Skolkoff, “Basic concepts of LABVIEW 4”, PHI, 1998. Gupta. S, Gupta. J.P, “PC Interfacing for Data Acquisition and Process Control”, ISA, 1994. Amy. L.T, “Automation System for Control and Data Acquisition”, ISA, 1992. 								

Web References:

1. <https://www.ni.com/en-in/shop/labview.html>

E-Text Books:

1. <https://www.scribd.com/document/374619191/LabVIEW-Graphical-Programming-4th-Ed-Gary-and-Richard>
2. <http://thesherwoodgang.com/FIRST/2013/Programming/LabVIEW%20For%20Everyone.pdf>

Outcomes:

1. Relate the basic components of Virtual Instrumentation
2. Infer the Programming Techniques
3. Organize data acquisition process
4. Classify the Common Instrument Interfaces
5. Distinguish the Analysis Tools
6. Categorize the Application Of VI

**ASIC DESIGN
(ELECTIVE-IV)**

B.Tech 8th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
18EC803	Core	3	1	0	3	30	70	100
Contact Classes:60		Tutorial Classes: -		Practical Classes:		Total Classes:60		
				Nil				
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. Relate the ASIC Design process 2. Make familiar with Design issues 3. Encapsulate the Design Techniques, Logic Synthesis, Simulation and Testing 4. Organize the ASIC Construction 								
UNIT-I	INTRODUCTION						Classes:20	
ASIC Design Styles: Introduction – categories-Gate arrays-Standard cells-Cell based ASICsMixed mode and analogue ASICs – PLDs. ASICs – Programmable Logic Devices: Overview – PAL –based PLDs: Structures; PAL Characteristics – FPGAs: Introduction, selected families – design outline.								
UNIT-II	DESIGN ISSUES						Classes:10	
ASICs –Design Issues: Design methodologies and design tools – design for testability – economies. ACISS Characteristics and Performance: design styles, gate arrays, standard cell -based ASICs, Mixed mode and analogue ASICs.								
UNIT-III	DESIGN TECHNIQUES						Classes:10	
ASICs-Design Techniques: Overview- Design flow and methodology-Hardware description languages- simulation and checking-commercial design tools- FPGA Design tools: XILINX, ALTERA								
UNIT-IV	LOGIC SYNTHESIS, SIMULATION AND TESTING						Classes:10	
Verilog and logic synthesis -VHDL and logic synthesis - types of simulation -boundary scan test - fault simulation- automatic test pattern generation								
UNIT-V	ASIC CONSTRUCTION						Classes:10	
Floor planning, placement and routing system partition. FPGA Partitioning: Partitioning Methods-Floor Planning- Placement-Physical Design FlowGlobal Routing-Detailed Routing –Special Routing-Circuit Extraction-DRC.								
Text Books:								
<ol style="list-style-type: none"> 1. L.J.Herbst, Integrated Circuit Engineering, OXFORD SCIENCE Publications, 1996. 								
Reference Books:								
<ol style="list-style-type: none"> 1. M.J.S.Smith, Application - Specific integrated circuits, Addison-Wesley Longman Inc ,1997. 								
Web References:								
<ol style="list-style-type: none"> 1. https://www.einfochips.com/blog/asic-design-flow-in-vlsi-engineering-services-a-quick-guide/ 2. http://www.asic-world.com/verilog/design_flow1.html 								
E-Text Books:								
<ol style="list-style-type: none"> 1. https://www.zuj.edu.jo/download/application-specific-integrated-circuits-addison-wesley-michael-john- 								

[sebastian-smith-pdf/](#)

Outcomes:

1. Demonstrate in-depth knowledge in ASIC Design Styles, ASICs Design Issues, ASICs Design Techniques, ASIC Construction.
2. Analyze the characteristics and Performance of ASICs and judge independently the best suited device for fabrication of smart devices for conducting research in ASIC design.
3. Solve problems of Design issues, simulation and Testing of ASICs.
4. Apply appropriate techniques, resources and tools to engineering activities for appropriate Solution to develop ASICs.
5. Understand different FPGA Partitioning methods

**SATELLITE COMMUNICATIONS
(ELECTIVE-V)**

B.Tech 8th Semester: Electronics & Communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
16EC805	Core	L	T	P	C	CIA	SEE	TOTAL
		3	1	-	3	30	70	100
Contact Classes:51	Tutorial Classes: - 10	Practical Classes: Nil			Total Classes:61			
OBJECTIVES:								
The course should enable the students to:								
I. To enable the student to become familiar with satellites and satellite services.								
II. Study of satellite orbits and launching								
III. Study of earth segment and space segment components								
IV. Study of satellite access by various users.								
UNIT-I	INTRODUCTION & ORBITAL MECHANICS AND LAUNCHERS						Classes:10	
Origin of satellite communications, Historical background, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications.								
UNIT-II	LOOK ANGLE AND SATELLITE SUBSYSTEMS						Classes:10	
Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance. Attitude and orbital control system, Telemetry, Tracking, command and monitoring, Communication subsystems.								
UNIT-III	SATELLITE LINK DESIGN						Classes:10	
Satellite antenna equipment reliability and space qualification. 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 example.								
UNIT-IV	MULTIPLE ACCESS & EARTH STATION TECHNOLOGY						Classes:10	
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 and Reception. Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods.								
UNIT-V	LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS & SATELLITE NAVIGATION AND THE GLOBAL POSITIONING SYSTEM						Classes:10	
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, differential GPS.								
Text Books:								
1. Satellite Communications-Timothi Pratt, Charles Bostian And Jeremy Allnutt, WSE, Wiley Publications, 2 nd Edition, 2003.								
2. Satellite Communications Engineering-Wilbur L.Prichard, Robert A. Nelson & Henry G.Suyderhoud, 2 nd Edition, Pearson Publications, 2003.								
Reference Books:								

1. Satellite communications: Design principles-M. Richharia, BS publications, 2nd Edition, 2003.
2. Satellite communications-D.C.Agarwal, Khanna publications, 5th Ed.

Web References:

1. https://www.tutorialspoint.com/principles_of_communication/principles_of_satellite_communications.htm
2. <https://www.isro.gov.in/applications/satellite-communication>
3. <https://www.britannica.com/technology/satellite-communication/Development-of-satellite-communication>

E-Text Books:

1. Satellite Communications-Timothy Pratt, Charles Bastian, Jeremy Allnut, Wiley Publications, 2nd edition.
2. Satellite Communications- Sapna Katiyar, S.K.Kataria & Sons, 2013 edition.

Outcomes:

1. Understand the basic concepts in the field of satellite communication.
2. Explain the basic concepts of satellite link design.
3. Understand the basic concepts of satellite subsystems.
4. Differentiate multiple access techniques used in satellite communication system.
5. Describe Geo-Stationary Satellite Systems
6. Analyze the GPS receivers.

**MICRO ELECTRO MECHANICAL SYSTEMS
(ELECTIVE-V)**

B.Tech 8th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC806	Core	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to:								
<ol style="list-style-type: none"> 1. Categorize the basic structures of MEMS Devices 2. Relate the mechanical concepts 3. Analyze the mems structures for simple logic gates 4. Encapsulate the MEMS technologies 								
UNIT-I	INTRODUCTION						Classes:20	
Introduction, Basic Structures of MEM Devices: (Canti Levers, Fixed Beams diaphragms). Broad Response of Micro Electromechanical Systems (MEMS) to Mechanical (force, pressure etc.) Thermal, Electrical, Optical and Magnetic stimuli, Compatability of MEMS from the point of Power Dissipation, Leakage etc.								
UNIT-II	REVIEW OF MECHANICAL CONCEPTS						Classes:10	
Stress, Strain, Bending Moment, Deflection Curve. Differential Equations Describing the Deflection under Concentrated Force, Distributed Force, Deflection Curves for Canti Levers – Fixed Beam. Electrostatic Excitation – Columbic Force between the Fixed and Moving Electrodes. Deflection with Voltage in C.L, Deflection Vs Voltage Curve, Critical Fringe Fields – Field Calculations using Laplace Equation. Discussion on the Approximate Solutions – Transient Response of the MEMS.								
UNIT-III	TWO TERMINAL MEMS						Classes:10	
Capacitance Vs Voltage Curve – Variable Capacitor. Applications of Variable Capacitors. Two Terminal MEM Structures. Three Terminal MEM Structures – Controlled Variable Capacitors – MEM as a Switch and Possible Applications.								
UNIT-IV	MEM CIRCUITS & STRUCTURES FOR SIMPLE GATES						Classes:10	
AND, OR, NAND, NOR, Exclusive OR, simple MEM Configurations for Flip-Flops Triggering, Applications to Counters, Converters. Applications for Analog Circuits like Frequency Converters, Wave Shaping. RF Switches for Modulation. MEM Transducers for Pressure, Force Temperature. Optical MEMS								
UNIT-V	MEM TECHNOLOGIES						Classes:10	
Silicon Based MEMS – Process Flow – Brief Account of Various Processes and Layers like Fixed Layer, Moving Layers, Spacers Etc., Etching Technologies. Metal Based MEMS: Thin and Thick Film Technologies for MEMS. PROCESS flow and Description of the Processes. Status of MEMS in the Current Electronics scenario.								
Text Books:								
<ol style="list-style-type: none"> 1. Gabriel.M.Review, R.F. MEMS Theory, Design and Technology, John Wiley & Sons, 2003. 2. Thimo Shenko, Strength of Materials, CBS Publishers & Distributors., 2000. 								
Reference Books:								
<ol style="list-style-type: none"> 1. Ristic L. (Ed.), Sensor Technology and Devices, Artech House, London 1994. 								

2. Servey E.Lyshevski, MEMS and NEMS, Systems Devices and Structures, CRC Press, 2002.

Web References:

1. https://www.lboro.ac.uk/microsites/mechman/research/ipm-ktn/pdf/Technology_review/an-introduction-to-mems.pdf
2. <https://nptel.ac.in/courses/117/105/117105082/>

E-Text Books:

1. <https://b-ok.asia/book/1082103/bfdabd?regionChanged=&redirect=1054450>
2. http://www.engineering108.com/Data/Engineering/Mechanical/SM/Strength_of_Materials_parts_Iand_II-Timoshenko.pdf

Outcomes:

1. Relate the Basic Structures of MEM Devices
2. Perceive of Mechanical Concepts
3. Examine the Two Terminal MEMS
4. Implement the MEM Circuits & Structures for Simple Gates
5. Summarize the Silicon Based MEMS & process flow
6. Summarize the Metal Based MEMS & process flow

**SOFTWARE DEFINED RADIO
(ELECTIVE-V)**

B.Tech 8th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC807	Core	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to :								
1. To provide fundamentals and state of the art concepts in software defined radio.								
UNIT-I	INTRODUCTION						Classes:10	
Software radio concepts, design principles, receiver front end topologies, noise and distortion in RF chain,digital generation of signals, common ADC and DAC architectures.								
UNIT-II	CONFIGURATION OF SDR						Classes:10	
Object oriented software radios, Transmitter configuration, Digital compensation for analog I/O modulator errors, direct digital synthesizers, recursive oscillator								
UNIT-III	RADIO RESOURCE MANAGEMENT						Classes:20	
Introduction, Definition of Radio Resource Management, Radio Resource Units over RRM Phases, RRM Challenges and Approaches, RRM Modelling and Investigation Approaches, Investigations of JRRM in Heterogeneous Networks, Measuring Gain in the Upper Bound Due to JRRM, CircuitSwitched System, Packet-Switched System, Functions and Principles of JRRM, General Architecture of JRRM, Detailed RRM Functions in Sub-Networks and Overall Systems								
UNIT-IV	PULSE SHAPING						Classes:10	
CORDIC algorithm, pulse shaping and interpolation filters, resampling, DDS with tunable DSM, digital quad modulator, transmitter and receiver architectures.								
UNIT-V	USE CASE STUDIES						Classes:10	
Power amplifier, switches, components, technology and modeling, case studies in software radio design.								
Text Books:								
1. Software Defined Radio Architecture System and Functions- Markus Dillinger, Kambiz Madani, WILEY 2003								
2. Software Defined Radio: Enabling Technologies- Walter Tuttle Bee, 2002, Wiley Publications.								
Reference Books:								
1. Software Radio: A Modern Approach to Radio Engineering - Jeffrey H. Reed, 2002, PEA Publication								
2. Software Defined Radio for 3G - Paul Burns, 2002, Artech House.								
3. Software Defined Radio: Architectures, Systems and Functions - Markus Dillinger, Kambiz Madani, Nancy Alonistioti, 2003, Wiley.								
4. software Radio Architecture: Object Oriented Approaches to wireless System Engineering – Joseph Mitola, III, 2000, John Wiley & Sons.								

Web References:

1. https://www.ofcom.org.uk/_data/assets/pdf_file/0030/56991/anevalofsdrrmaindocumentv_1.pdf
2. <https://www.ofcom.org.uk/research-and-data/technology/general/emerging-tech/software-defined-radio>

E-Text Books:

1. https://omidi.iut.ac.ir/SDR/2008/Projects/Fereydani_SDR_project/References/%5B8%5D%20Software%20Defined%20Radio_Tuttlebee.pdf
2. <https://nvhrbiblio.nl/biblio/boek/wiley-software-defined-radio-the-software-communications-architecture.pdf>

Outcomes:

1. Understand the concepts of Software radio
2. Learn the Object oriented software radio and its configuration
3. Study of the CORDIC algorithm and filters
4. Analyze the transmitter and receiver architectures
5. Identify the switches, power amplifiers, technology and modeling
6. Analyze case studies in software radio design.

RADAR ENGINEERING (ELECTIVE-VI)

B.Tech 8th Semester: Electronics & Communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC809	Core	L	T	P	C	CIA	SEE	TOTAL
		3	1	-	3	30	70	100
Contact Classes:51	Tutorial Classes: - 10	Practical Classes: Nil			Total Classes:61			
OBJECTIVES:								
The course should enable the students to:								
I. To learn Radar Fundamentals like Radar Equation, Operating frequencies & Applications.								
II. To understand the basic concepts of different types of Radars for surveillance & Tracking.								
III. To know the various types of tracking techniques involved.								
IV. To understand Radar Receivers, MTI filters, displays and antennas.								
UNIT-I	INTRODUCTION AND RANGING EQUALITIES						Classes:10	
Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, Illustrative Problems								
UNIT-II	BASICS OF RADAR						Classes:10	
SNR, Envelope Detector, False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.								
UNIT-III	CW & FREQUENCY MODULATED RADAR						Classes:10	
Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems.FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar.								
UNIT-IV	MTI AND PULSE DOPPLER RADAR & TRACKING RADAR						Classes:10	
Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, And Staggered PRFs. Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler 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 & RADAR RECEIVERS						Classes:10	
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. 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, Series versus Parallel Feeds, Applications, Advantages and Limitations								
Text Books:								
1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2 nd Edition, 2007.								

Reference Books:

1. Introduction to Radar Systems – Merrill I. Skolnik, 3rd Edition, Tata McGraw-Hill, 2001.
2. Radar Principles, Technology, Applications – Byron Edde, Pearson Education, 2004.

Web References:

1. https://www.tutorialspoint.com/radar_systems/index.htm
2. <https://www.slideshare.net/karheng1/a-tutorial-on-radar-system-engineering>

E-Text Books:

1. Electronic Scanning Radar Systems- Peter J. Kahrilas, Artech print on Demand, 1976

Outcomes:

1. Discuss the fundamental of RADAR
2. Compare different types of RADAR and their working
3. Explain MTI & pulse Doppler RADAR
4. Describe the working of tracking RADAR
5. Examine RADAR signal detection techniques
6. Differentiate types of RADAR receivers

**ROBOTICS AND AUTOMATION
(ELECTIVE-VI)**

B.Tech 8th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
18EC810	Core	3	1	0	3	30	70	100
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60			
Nil								
OBJECTIVES:								
The course should enable the students to :								
<ol style="list-style-type: none"> 1.To understand the basic concepts associated with the design, functioning, applications and social aspects of robots 2.To study about the electrical drive systems and sensors used in robotics for various applications 3.To learn about analyzing robot kinematics, dynamics through different methodologies and study various design aspects of robot arm manipulator and end-effector 4.To learn about various motion planning techniques and the associated control architecture 5.To understand the implications of AI and other trending concepts of robotics 								
UNIT-I	FOUNDATION FOR BEGINNERS						Classes:15	
Introduction -- brief history, definition, anatomy, types, classification, specification and need based applications; role and need of robots for the immediate problems of the society, future of mankind and automation-ethical issues; industrial scenario local and global, case studies on mobile robot research platform and industrial serial arm manipulator								
UNIT-II	BUILDING BLOCKS OF A ROBOT						Classes:10	
Types of electric motors - DC, Servo, Stepper; specification, drives for motors - speed & direction control and circuitry, Selection criterion for actuators, direct drives, non-traditional actuators; Sensors for localization, navigation, obstacle avoidance and path planning in known and unknown environments – optical, inertial, thermal, chemical, biosensor, other common sensors; Case study on choice of sensors and actuators for maze solving robot and self-driving cars								
UNIT-III	KINEMATICS, DYNAMICS AND DESIGN OF ROBOTS & END-EFFECTORS						Classes:15	
Robot kinematics - Geometric approach for 2R, 3R manipulators, homogenous transformation using D-H representation, kinematics of WMR, Lagrangian formulation for 2R robot dynamics; Mechanical design aspects of a 2R manipulator, WMR; End-effector - common types and design case study.								
UNIT-IV	NAVIGATION, PATH PLANNING AND CONTROL ARCHITECTURE						Classes:10	
Mapping & Navigation – SLAM, Path planning for serial manipulators; types of control architectures - Cartesian control, Force control and hybrid position/force control, Behavior based control, application of Neural network, fuzzy logic, optimization algorithms for navigation problems, programming methodologies of a robot								
UNIT-V	AI AND OTHER RESEARCH TRENDS IN ROBOTICS						Classes:10	
Application of Machine learning - AI, Expert systems; Tele-robotics and Virtual Reality, Micro & Nanorobots, Unmanned vehicles, Cognitive robotics, Evolutionary robotics, Humanoids								
Text Books:								
1. Saeed. B. Niku, Introduction to Robotics, Analysis, system, Applications, Pearson educations, 2002								

2. Roland Siegwart, Illah Reza Nourbakhsh, Introduction to Autonomous Mobile Robots, MIT Press, 2011

Reference Books:

1. Richard David Klafter, Thomas A. Chmielewski, Michael Negin, Robotic engineering: an integrated approach, Prentice Hall, 1989.
2. Craig, J. J., Introduction to Robotics: Mechanics and Control, 2nd Edition, Addison-Wesley, 1989.
3. K.S. Fu, R.C. Gonzalez and C.S.G. Lee, Robotics: Control, Sensing, Vision and Intelligence, McGraw-Hill, 1987.

Web References:

1. <https://nptel.ac.in/courses/112/101/112101098/>

E-Text Books:

1. Wesley E Snyder R, Industrial Robots, Computer Interfacing and Control, Prentice Hall International Edition, 1988
2. Robin Murphy, Introduction to AI Robotics, MIT Press, 2000

Outcomes:

1. Explain the concepts of industrial robots in terms of classification, specifications and coordinate systems, along with the need and application of robots & automation
2. Examine different sensors and actuators for applications like maze solving and self driving cars.
3. Design a 2R robot & an end-effector and solve the kinematics and dynamics of motion for robots.
4. Explain navigation and path planning techniques along with the control architectures adopted for robot motion planning.
5. Describe the impact and progress in AI and other research trends in the field of robotics.

MULTIMEDIA COMMUNICATIONS
(ELECTIVE-VI)

B.Tech 8th Semester: Electronics and communication Engineering									
Course code	Category	Hours/week			Credits	Maximum Marks			
		L	T	P	C	CIA	SEE	TOTAL	
18EC811	Core	3	1	0	3	30	70	100	
Contact Classes:60	Tutorial Classes: -	Practical Classes:			Total Classes:60				
Nil									
OBJECTIVES:									
The course should enable the students to:									
<ol style="list-style-type: none"> 1. Define the Multimedia Communication Models 2. Explain Multimedia Transport in Wireless Networks 3. Solve the Security issues in multimedia networks 4. Illustrate real-time multimedia network applications. 5. Explain different network layer based application. 									
UNIT-I	INTRODUCTION							Classes:12	
Introduction, multimedia information representation, multimedia networks, multimedia applications, Application and networking terminology, network QoS and application QoS, Digitization principles, Text, images, audio and video.									
UNIT-II	IMAGE COMPRESSION							Classes: 12	
Text and image compression,, compression principles, text compression- Runlength, Huffman, LZW, Document Image compression using T2 and T3 coding, image compression- GIF, TIFF and JPEG									
UNIT-III	AUDIO AND VIDEO COMPRESSION							Classes: 12	
Audio and video compression, audio compression – principles, DPCM, ADPCM, Adaptive and Linear predictive coding, Code-Excited LPC, Perceptual coding, MPEG and Dolby coders video compression, video compression principles.									
UNIT-IV	VIDEO COMPRESSION STANDARDS							Classes: 12	
Video compression standards: H.261, H.263, MPEG, MPEG 1, MPEG 2, MPEG-4 and Reversible VLCs, MPEG 7 standardization process of multimedia content description, MPEG 21 multimedia framework.									
UNIT-V	SYNCHRONIZATION							Classes: 12	
Notion of synchronization, presentation requirements, reference model for synchronization, Introduction to SMIL, Multimedia operating systems, Resource management, process management techniques.									
Text Books:									
<ol style="list-style-type: none"> 1. Fred Halsall, “Multimedia Communications”, Pearson education, 2001. 2. Raif Steinmetz, Klara Nahrstedt, “Multimedia: Computing, Communications and Applications”, Pearson education, 2002. 									
Reference Books:									
<ol style="list-style-type: none"> 1. K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovanovic, “Multimedia Communication Systems”, Pearson education, 2004. 									

2. John Billamil, Louis Molina, "Multimedia : An Introduction", PHI, 2002.

Web References:

1. <https://nptel.ac.in/courses/117/105/117105081/>
2. <https://sce.umkc.edu/faculty-sites/lizhu/teaching/2020.spring.video/main-vc.html>

E-Text Books:

1. <https://www.scribd.com/document/349179653/Multimedia-Communications-by-Fred-Halshall>

Outcomes:

1. Illustrate the basic modes of multimedia communications
2. Distinguish the different text & image compression standards
3. Summarize the different audio & video compression techniques
4. Summarize the standards of video compression
5. Examine the reference model for synchronization
6. Illustrate the Multimedia operating systems

**AVAILABLE MOOCs
(ELECTIVE-VI)**

B.Tech 8th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC812	Elective	L	T	P	C	CIA	SEE	TOTAL
		3	0	0	3	30	70	100
Contact Classes: -	Tutorial Classes: -		Practical Classes:			Total Classes: -		
			Nil					

Meeting with the global requirements, to inculcate the habit of self learning and in compliance with UGC guidelines, MOOC (Massive Open Online Course) courses have been introduced as electives. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion for the course from the MOOCs providers

Regulations for MOOCs

- The respective departments shall give a list from NPTEL or any other standard providers, whose credentials are endorsed by the HOD.
- Each department shall appoint Coordinators/Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of the same.
- A student shall choose an online course (relevant to his/her programme of study) from the given list of MOOCs providers, as endorsed by the teacher concerned, with the approval of the HOD.
- The details of MOOC(s) shall be displayed in Grade card of a student, provided he/she submits the proof of completion of it to the department concerned through the Coordinator/Mentor.
- Student can get certificate from SWAYAM/NPTEL or any other standard providers, whose credentials are endorsed by the HOD. The course work should not be less than 12 weeks or student may appear for end examination conducted by the Institute.
- There shall be one Mid Continuous Internal Examination (Quiz exam for 40 marks) after 9 weeks of the commencement of the course and semester end examination (Descriptive exam for 60 marks) shall be done along with the other regular courses.
- Three credits will be awarded upon successful completion of each MOOC courses having minimum of 8 weeks duration.

PROJECT WORK PHASE-II

B.Tech 8th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC813	Core	L	T	P	C	CIA	SEE	TOTAL
		0	0	20	10	60	140	200
Contact Classes:		Tutorial Classes: -		Practical Classes:		Total Classes: 75		
				75				

Internal Evaluation for Major Project Work:

The project Phase-II shall be carried out during the 8th Semester in the **Non FSI Model** and shall be evaluated for 200 marks out of which 100 marks for internal evaluation and 100 marks for semester end evaluation. Project Work Phase-II will be taken up batch wise and batches will be continued as per Project Work Phase-I. The object of project work phase-II is to enable the student to extend further investigative study taken up as the project work phase-I under the guidance of the supervisor/guide from the department.

The assignment normally includes:

- Final development of product/process, testing, results, conclusions and further direction.
- Preparing a paper for conference presentation/ publication in journal if possible.
- Preparing a dissertation in the standard format for being evaluated by the department.
- Final presentation of the work done before the Project Review Committee (PRC).

Project Work Phase-II is allocated 60 internal marks. Out of 60, 30 marks are allocated for the supervisor/guide and head of the department to be evaluated based on two seminars given by each student on the topic of the project. The other 30 marks shall be evaluated on the basis of his presentation on the work done on his project by the Departmental Committee comprising of Head of the Department, respective supervisor/ guide and two senior faculty of the department appointed by the Principal.

External Evaluation for Project Phase-I:

The Project work Phase-II shall be carried out during the 8th Semester in the **Non FSI Model** and shall be evaluated for 200 marks. The Semester End Examination for major project work done during 8th Semester and for 140 marks shall be conducted by a Project Review Committee (PRC). The committee comprises of an External Examiner appointed by the Principal, Head of the Department and Project Guide/Supervisor. The evaluation of project work shall be conducted at the end of the 8th Semester. The above committee evaluates the project work report with weightages of 50% of the marks (50 marks) awarded by external examiner, 20% of marks (20 marks) awarded by HOD & 30% of the marks (30 marks) by Project Guide/Supervisor respectively for a total of 100 marks. Of the 40 marks for Presentation & Viva-Voce examination, HOD evaluates for 10 marks and external examiner for 30 marks. The evaluation of 140 marks is distributed as given below:

Distribution of Project Work Marks

Sl. No.	Criterion	Marks
1	Report	100
2	Presentation & Viva – Voce	40

A candidate shall be declared to have passed in major project if he secures a minimum of 50% aggregate marks (100 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 50% marks (70 marks) in the Project Work Phase-II end examination.

FULL SEMESTER INTERNSHIP (FSI)

B.Tech 8th Semester: Electronics and communication Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
18EC814	Core	L	T	P	C	CIA	SEE	TOTAL
		0	0	40	19	200	300	500
Contact Classes:	Tutorial Classes: -	Practical Classes: 800			Total Classes: 800			
<p>Full Semester Internship (FSI) Full Semester Internship (FSI) programme carries 19 credits with 800marks. During the FSI, student has to spend one full semester in an identified industry /firm / organization and has to carry out the internship as per the stipulated guidelines of that industry / firm / organization and the institute.</p>								
<p>Internal Evaluation for Full Semester Internship: Internship course is 200 marks for continuous internal assessment and will be evaluated based on day to day assessment by concern industry. Following are the evaluation guidelines:</p> <ul style="list-style-type: none"> ➤ Profile and abstract –Student has to submit the industry profile and abstract of the project within four weeks from date of commencement of internship through mail or post. Weightage: 40 Marks ➤ Seminar 1 - at 9th week from date of commencement of internship – weightage: 50 Marks ➤ Seminar 2 - Pre submission at 17th week from date of commencement of internship – Weightage: 50 Marks ➤ Internship Diary, weightage: 60 Marks 								
<p>External Evaluation of Full Semester Internship: Full Semester Internship programme carries 19 credits. During Internship, student has to spend one full semester in an identified industry /firm / organization and has to carry out the internship as per the stipulated guidelines of that industry / firm / organization and the institute. Following are the evaluation guidelines:</p> <ul style="list-style-type: none"> ➤ Project Report, weightage: 60 Marks ➤ Final Presentation, weightage: 160 Marks ➤ Viva-voce, weightage: 80 Marks <p>The internship shall be evaluated for 500 marks out of which 200 marks for internal evaluation and 300 marks for external evaluation. The external evaluation based on the report submitted and viva-voce exam for 300 marks by a committee comprising the HOD, Project supervisor and external examiner (Industry/ Academia). A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.</p> <p>FSI shall be open to all the branches in the VII semester. The selection procedure is:</p> <ul style="list-style-type: none"> ➤ Choice of the students CGPA (> 7.5) upto IV semester with no current arrears and maintains the CGPA of 7.5 till VI Semester. 								