Academic Handbook

B. Tech.

Electronics & Telecommunication Engineering

CONTENTS

1. Institute Profile

Kasegaon Education Society's "Rajarambapu Institute of Technology", Rajaramnagar, Sakharale, (Tal. - Walwa Dist. - Sangli) was established as a self financed Engineering Institute in 1983. It is affiliated to the Shivaji University, Kolhapur, recognized by Government of Maharashtra and approved by All India Council for Technical Education, New Delhi. The objective of the institute is to provide excellent technical education for producing high quality engineering manpower for industry and to promote academic excellence through research and development.

The Institute has achieved a long term goal to attain complete Academic Autonomy. This allows the institute to prescribe its Academic Calendar, design its own structure and syllabi, conduct examination, carry out Assessment/Evaluation and declare results. Under autonomy the degree however shall be awarded by Shivaji University on completion of the program.

The institute proposes to implement an experiential learning model (ELM) under Autonomous structure. It is always perceived in the context of engineering education that institutes produce engineers with a strong theoretical and conceptual background with a limited focus on hands on experience. There exists a gap between what students learn and what the industry demands. RIT in its autonomy model makes a sincere effort to adopt an experiential learning model (ELM) which focuses on learning by doing.

Experiential learning provides opportunity for the students to experiment and learn better by doing. The curriculum will be designed keeping in mind the hands on experience through extensive experimentation through lab work, plant visits, in-plant training, mini projects and projects in industries. A judicious mix of theory and practices will make RIT students as preferred prospective employees.

RIT as an autonomous Institute functions with the objectives of promoting academic freedom and scholarship on the part of teachers and students which are essential for fostering and development of intellectual ambiance conducive to the pursuit of scholarship and excellence. The focus of the Institute is always student centric and the endeavor shall be to ensure that students get the best of what is required to create Outstanding Engineers.

RIT has been offering undergraduate (U.G.) programs leading to Bachelor's degree (B. Tech.) since last 30 years. The admission to U.G. program which shall be of eight academic semesters is as per the norms set by the competent Authority of the Government of Maharashtra/ Directorate of Technical Education, Mumbai / Shivaji University, Kolhapur and which shall be prevailing at the time of the admission.

The sequence of studies consists of broadly four stages.

The first stage involves introduction to courses in science, humanities and technical skills. This shall be common to all UG programs.

The second stage involves the study of engineering courses that emphasize a broad based knowledge in interdisciplinary areas which enables a student to appreciate the links between science, engineering, technology and humanities.

In the third stage, a student is exposed to courses in the chosen branch of Engineering which dwell on the principles governing design and which develop in them the ability for physical and analytical modeling, design and development.

During the final stage, a student studies problems of integrated design with an awareness of size, performance, optimization and cost. The student works for his/her final year project in a small group under the supervision of the faculty member/instructor assigned to the group.

A student is also introduced to the social and economic objectives of the era and to the interaction between man, machine and nature. This is achieved through courses in humanities & social sciences through practical training, fieldwork, industrial visits, seminars, co-curricular and extra-curricular activities etc.

2. Academic Council

Academic Council Members:

Sr. No.	Name	Category	Position
1.	**Dr. (Mrs.) S. S. Kulkarni** Director, RIT, Rajaramnagar	Ex - Officio	Chairman
2.	**Dr. M. T. Telsang** Dean Academics, RIT	Ex - Officio	Member Secretary
3.	**Dr. Milind Sohani** Indian Institute of Technology, Mumbai	BOG Nominee	Member
4.	**Dr. Anant R. Koppar** CEO, KTwo Technology Solutions, Bangalore	BOG Nominee	Member
5.	**Dr. Vishwas Udpikar** President, Wavelet Group, Pune	BOG Nominee	Member
6.	**Principal, Dr. V. R. Ghorpade.** D. Y. Patil College of Engineering, Kasaba bavada, Kolhapur.	University Nominee	Member
7.	**Dr. P. N. Chougale** Principal, D. R. Mane Mahavidyalaya, Kagal, Dist. Kolhapur	University Nominee	Member

8.	**Dr. Suhas Patil** K.B.P. College of Engineering, Satara.	University Nominee	Member
9.	**Dr. S. M. Sawant** Dean Student Development, RIT	Ex - Officio	Member
10.	**Dr. A. C. Attar** Dean Quality Assurance, RIT	Ex - Officio	Member
11.	**Prof. P. M. Mohite** Dean Infrastructure, RIT	Ex - Officio	Member
12.	**Dr. A. B. Kakade** Dean R & D, RIT	Ex - Officio	Member
13.	**Dr. H. S. Jadhav** Dean Diploma, RIT	Ex - Officio	Member
14.	**Prof. M. V. Pisal** Head CIIED	Ex - Officio	Member
15.	**Dr. P. D. Kumbhar** Controller of Examination (COE)	Ex - Officio	Member
16.	**Prof. R. D. Padval** Registrar, RIT	Ex - Officio	Member
17.	**Dr. P. S. Patil** Professor	Ex - Officio	Member
18.	**Dr. S. R. Desai** Chairman, BOS - Automobile Engg.	Ex - Officio	Member
19.	**Prof. D. S. Patil** Chairman, BOS - Civil Engg.	Ex - Officio	Member
20.	**Dr. N. V. Dharwadkar** Chairman, BOS- Computer Sci. Engg.	Ex - Officio	Member
21.	**Dr. H. T. Jadhav** Chairman, BOS - Electrical Engg.	Ex - Officio	Member
22.	**Dr. M. S. Patil** HOD, Electronics & Tele. Engg.	Ex - Officio	Member
23.	**Prof. Mrs. S. P. Patil** Chairman, BOS - Information Tech.	Ex - Officio	Member

24.	**Dr. S. S.Gavade** Chairman, BOS - Mechanical Engg.	Ex - Officio	Member
25.	**Prof. D. G. Thombare** Chairman, BOS - Sciences & Humanities	Ex - Officio	Member
26.	**Dr.Nishikant Bohra** Chairman, BOS - M B A	Ex - Officio	Member
27.	**Dr. S. A. Pardeshi** Professor, Chairman BOS, E T C	Ex - Officio	Member
28.	**Prof. P. M. Jadhav** Training & Placement Officer, RIT	Director's Nominee	Member
29.	**Dr. S. D. Yadav** Associate Professor, RIT	Director's Nominee	Member
30.	**Prof. R. T. Patil** Associate Professor, RIT	Director's Nominee	Member

3. Academic Rules and Regulations

3.1 Academic Calendar

The academic activities of the institute are regulated by Academic Calendar and are made available to the students/ faculty members and all other concerned in electronic form or hard copy. It shall be mandatory for students / faculty to strictly adhere to the academic calendar for completion of academic activities. The copy of the academic calendar is also uploaded on the institute website.

a) The academic activities of the institute are governed by academic calendar prepared by coordinator (Academic planning and Monitoring) and approved by Dean Academics in consultation with Director. It shall be notified at the beginning of the each academic year. Academic calendar refers to schedule of commencement of instruction for the semester, course delivery period, examinations/evaluation, other academic activities, holidays and student major activities schedule.

b) The curriculum shall be typically delivered in two semesters in an academic year. Each semester shall be of 20 weeks duration including curriculum delivery evaluation, and grade declaration. The exact days are mentioned in academic calendar.

c) The minimum teaching days in an academic year are 180 and 90 each in the two semesters. The academic calendar is strictly adhered to and all other activities including co curricular and extra-curricular activities should be scheduled so as not to interface with the curricular activities as stipulated in the academic calendar.

d) The non conduct of academic activities on any particular teaching day for whatever reason shall be compensated by having the academic sessions conducted on suitable Saturdays by following the particular class time table of the lost teaching day.

3.2 Attendance

a) Regular 100% attendance is expected of all students for every registered course in lectures, tutorials, laboratory, seminar, mini-project and project etc. Hence attendance is compulsory and shall be monitored in the semester rigorously. Students shall be informed at the end of every month if they are falling short of attendance requirement.

b) A maximum of 25% absence for the attendance may be permitted only on valid grounds such as illness, death in the blood relation family (father, mother. sister and brother) or other emergency reason which is beyond control of a student and shall be approved by the DPC of respective department. Sanction for such absenteeism shall be taken from the DPC Chairman of the respective department (in case of S.Y., T.Y. and final year students) while, from HOD within a period of maximum one week after availing such leave.

c) Maximum number of days of absence for students participating in Co-curricular activities /Sports/ Cultural events during a semester shall not exceed 10. Any waiver in this context shall be on the approval of the Academic Development Committee (ADC) only after the recommendation by Dean Student Development.

d) DPC Chairman shall report and recommend to ADC the cases of students not having 75% attendance as per the records of course Instructor. After rigorously analyzing these cases, ADC may take a decision to debar such student from End-Semester Examination (ESE) for that course and XX grades will be awarded. Such a student shall re-register for that course as and when it is offered next. ISE and UT1 and UT2 evaluations of such a student for this course during regular semester shall be treated as null and void.

3.3 Curriculum

3.3.1 Curriculum :

Every program has a prescribed course structure which, in general, is known as Curriculum of program of study. It prescribes courses to be studied in each semester with credits assigned to courses and teaching hours, evaluation scheme and minimum requirements for earning credits. The curriculum revisions/revamping shall be a continuous process governed by OBE framework and guidelines from AICTE, UGC from time to time. The booklet containing courses structure along with detail syllabus for each course of each program is updated periodically and made available to the students. The curriculum design follows the guidelines given by AICTE model curriculum.

3.3.2 Curriculum Content

The medium of instruction for course work and examinations at the college shall be English. The course work for the Program shall be broadly divided into six main subject groups, as follows:

i. Humanities and Social Sciences;

ii. Professional Science Courses: Basic Sciences including Mathematics;

iii. Basic Engineering Sciences and Practice;

iv. Professional Subjects;

v. Liberal Learning Courses

vi. The total course package for the Program at a department shall have the following components:

vii. Institutional Core subjects

viii. Departmental Core subjects

ix. Departmental Elective subjects

x. Open Elective subjects

Course content for a 3 credit course contains six units having uniform weightage to each unit.

3.3.3 Course Credit System/Structure:

In general, a certain quantum of work measured in terms of credits is laid down as the requirement for a particular program. Calculation of number of credits for a course in any semester is as per Table 1 in 3.3.1

Table 3.3.1 Calculation of number of credits for a course

Sr.No.	Course	Credits
1	Lecture of 1 hour/week	1
2	Tutorial of 1 hour/week	1
3	Practical / Laboratory / Drawing/ of two hours/ week	1
4	Seminar/Mini project (1 hour per week)	1

There are mainly two types of courses viz. Theory courses and Laboratory courses. Generally, a theory course consists of Lecture hours (L) and Tutorial hours (T). Tutorial hours may not be assigned to a particular theory course if it has a separate laboratory course. Laboratory course consists of practical hours (P) which a student works in a Laboratory/Drawing Hall/Workshop. The other courses required to be taken by a student include seminar, mini project, and project at various levels of the program and also industrial training /internship.

3.3.4 Course Description

A typical description of course syllabus shall consist of course code, course title, teaching hours per week for lecture/practical/tutorials/seminar and project, credits, course outcomes with proper levels of Bloom's Taxonomy and assessment scheme.

3.3.5 Requirements for Earning Course Credit

A student shall earn credits for a particular course by fulfilling the minimum academic requirements for attendance and evaluation. No credits shall be awarded if a student satisfies the minimum attendance requirements but fails to meet minimum evaluation requirements.

3.3.6 Total Credits to Earn the Degree

The total number of credits required for completing an undergraduate program is approximately 192. The total number of credits in a semester which a student registers shall generally be 23-25. The maximum number of credits per semester shall not exceed 30, subject to approval by Department Program Committee (DPC) and Dean Academics. The exact number of credits required to complete the program are mentioned in course structure of the program.

3.3.7 Audit Course:

A student is required to complete an audit course specified in a semester which could be institute requirement or department requirement. An audit course may include either a) a regular course required to be done as per structure or required as pre-requisite of any higher level course or b) the programmes like practical training, industry visits, societal activities etc, as specified from time to time.

Audit course shall not carry any credits but shall be reflected in Grade Card as **"PP"/"NP"** depending upon the satisfactory performance in the in-semester evaluation and any other evaluation as decided by DPC of respective department and academic development Committee.

3.3.8 Seminar/Mini projects

Seminar is a course requirement, wherein under the guidance of an Instructor, a student is expected to do in-depth study in a specialized area by carrying out a literature survey, understanding different aspects related to that area, preparing a status report based on the topic chosen. For a seminar course, a student is expected to learn investigation methodologies, study relevant research papers, correlate work of various authors/researchers critically, study the concepts, techniques and prevailing results, analyze those, prepare a seminar report on all these aspects. It shall be mandatory to give a seminar presentation before a panel constituted for this purpose. The grading shall be done on the basis of the depth of the work done, understanding of the problem, technical quality of the report prepared and presentation given by the student. Students are encouraged to work on Mini projects in small groups to get exposure to real life problem solving and hands on experience.

3.3.9 Project:

a. Project is a course requirement, wherein under the guidance of an Instructor, a final year student is required to do some innovative/contributory/developmental work with application of knowledge earned while undergoing various theory and laboratory courses in his/her course of study. A student has to exhibit both analytical and practical skills through the project work

b. A student has to carry out project under the guidance of a faculty from the same discipline unless specifically permitted by the Department Program Committees (DPCs) of the concerned departments in case of interdisciplinary projects or DPC of the parent department in case of industry sponsored projects.

c. The B. Tech. project shall be done in the final year and is divided into two stages. Normally the first stage shall be carried out in Semester-VII while the second stage shall be carried out in Semester-VIII. The quantum of work expected to be carried out by a student in each stage shall be in accordance with the division of credits given in the respective program structure.

3.4 Facilitation to Students

3.4.1 Faculty Advisor:

On joining the institute, a student or a group of students shall be assigned to a faculty advisor who shall be mentor for a student. A student shall be expected to consult the faculty advisor on any matter relating to his/her academic performance and the courses he/she may take in various semesters / summer term. A faculty advisor shall be the person to whom the parents/guardians should contact for performance related issues of their ward. The role of a faculty advisor is as outlined below:

- ☐ Guidance about the rules and regulations governing the courses of study for a particular degree.
- ☐ Paying special attention to weak students.
- ☐ Guidance and liaison with parents of students for their performances.

3.4.2 Helping Weaker Students:

A student with backlog/s should continuously seek help from his/her faculty advisor, Head of the Department and the Dean Student Development. Additionally he/she must also be in constant touch with his/her parents/local guardians for keeping them informed about academic performance. The institute also shall communicate to the parents/guardians of such student at-least once during each semester regarding his/her performance in In-semester evaluation and Mid-semester examination and also about his/her attendance. It shall be expected that the parents/guardians too keep constant touch with the concerned faculty advisor or Head of the Department, and if necessary - the Dean Student Development.

3.5 Discipline and Conduct

1. Every student shall be required to observe discipline and decorous behavior both inside and outside the campus and not to indulge in any activity, which shall tend to bring down the prestige of the institute.

2. Any act of indiscipline of a student reported to the Dean, Student Development, shall be discussed in a Disciplinary Action Committee of the institute. The Committee shall enquire into the charges and

recommend suitable punishment if the charges are substantiated.

3. If a student while studying in the institute is found indulging in anti-national activities contrary to the provisions of acts and laws enforced by Government he/she shall be liable to be expelled from the institute without any notice.

4. If a student is involved in any kind of ragging, the student shall be liable for strict action as per Maharashtra anti-ragging act and its amendments from time to time.

5. If any statement/information supplied by the student in connection with his/her admission is found to be false/ incorrect at any time, his/ her admission shall be cancelled and he/she shall be expelled from the institute and fees paid shall be forfeited.

6. Student once admitted in the institute shall follow instructions issued from time to time.

7. If a student is found guilty of malpractice in examinations then he/she shall be punished as per the recommendations of the Student Grievances and Redressal Committee (SGRC). The maximum punishment may be expulsion from the institute.

8. Every admitted student shall be issued photo identification (ID) card which must be retained by the student while he/she is registered at RIT, Rajaramnagar. The students have valid ID card with him/her while in the institute. Any student who alters or intentionally mutilates an ID card or who uses the ID card of another student or allows his/her ID card to be used by another shall be subjected to disciplinary action.

9. The valid ID card must be presented for identification purpose as and when demanded by authorities. Any student refusing to provide an ID card shall be subjected to disciplinary action.

10. Students should switch off the Mobiles during the Instructional hours and in the Institute Building, Library, Reading room etc. Strict action will be taken if students do not adhere to this.

11. During the conduct of any Tests and Examination students must not bring their mobiles. A student in possession of the mobile whether in use or switched off condition will face disciplinary action and will be debarred from appearing for the Test / Examination.

3.6 Course Evaluation

Assessment of Theory Courses :

Evaluation of theory courses shall be on the bases of In semester evaluation **(ISE)**,two unit Tests **(UT1 and UT2)** and End semester examination **(ESE)**.The weightage for these components are shown in the table 3.6.1:

Table 3.6.1 Weightage of ISE, UT1 & UT2, ESE

ISE	Unit Test I (UT I)	Unit Test II (UT II)	ESE
20 %	15%	15%	50%

The students is required to secure minimum 40% marks in **ISE , UT1** and **UT2 combined** to become eligible for ESE and 40 % separately in ESE. The students are required to obtain 40% in Aggregate to pass the course for B Tech program.

3.6.1 In- Semester Evaluation (ISE):

In semester evaluation has two components as mentioned below:

i. **Attendance and class participation (10%)** The students for this component are evaluated based on regularity in attending class, participation in class room activities, discipline and behavior and initiative and punctuality in assigned work. The course teachers evaluate and submit the marks directly to COE. **These marks will not be displayed to the students.**

Table 3.6.2

Sr.No.	Attendance	Marks
I	Students having attendance > 90% and active participation in classroom activities	10
II	Students having attendance between 86% to 90% and active participation in classroom activities.	09
III	Students having attendance between 80% to 85% and active participation in classroom activities.	07
IV	Students having attendance between 75% to 79% and active participation in classroom activities.	05
V	Below 75% and no participation in classroom activities.	00

ii. **The Second Components of ISE is teacher designed assessment scheme which is pre announced by the course instructor. Teacher is required to use minimum two components. The weightage is 10 %.**

3.6.2 Unit Tests

A) Unit Test (UT1) 15 percent weightage

UT 1 is conducted tentatively in the 6th week of the semester. The test will be for 25 marks for 1 hour duration. Question paper will be set with one question each on unit 1 and unit 2 of the course syllabus. The marks obtained will be converted to 15 with no rounding of marks to the next digit.

B) Unit Test (UT2) 15 percent weightage

UT2 will be conducted tentatively in the 11th week of the semester. The test will be for 25 marks for 1 hour duration. Question paper will be set with one question each on unit 3and unit 4 of the course syllabus. The marks obtained will be converted to 15 with no rounding of marks. The UT1 and UT2 marks combined to be rounded to next integer as per the rules (> 0.5 to next integer value).

The schedule is mentioned in academic Calendar and test time table will be declared by CoE well in advance.

3.6.3 End Semester examination (ESE)

End Semester Examination (ESE) 50 % weightage. End Semester Examination is conducted after the end of instructions for the semester as specified in academic calendar the ESE for the course consists of two categories.

a) Course with no MCQ (ESE 50 Marks)

In such courses 2 questions, one each from unit 5 and unit 6 and one comprehensive question from unit 2 to unit 4 are set. Maximum marks are 50 and duration 2 hours. The student is required to secure 40% marks separately to pass the examination.

b) Courses with MCQ

The courses where there is an MCQ the weightage will be 50 %, 10% for multiple choice questions for ESE, and 3 questions in total are to be set one each from unit 5 and unit 6 and one from units 2, 3 and 4. The duration for the examination will be of 2 hours. The student is required to secure 40% marks separately to pass the examination including MCQ.

c) MCQ Examination

There will be MCQ examination of 10 % weightage for maximum of 3 courses in a semester should comprise 10 questions each i.e. Total 30 questions, 10 each from the selected 3 courses. The duration will be 45 minutes and GATE level questions will be included. The marks scored out of 10 in selected course will be added to the ESE marks. The BoS will decide which 3 courses will have MCQ. The courses which have a major focus in GATE examination should be included for MCQ and should be preannounced with notification.

MCQ will be only for regular semester examinations. For supplementary examination/ reexamination the ESE is of 50 marks without MCQ component.

3.6.4 Assessment of Laboratory Courses:

a) The assessment of laboratory course for First year shall be continuous and based on turn-by-turn supervision of the student's work and the quality of his/her work as prescribed through laboratory

journals and his/her performance in viva-voce or any other mode of evaluation examinations uniformly distributed throughout the semester. There shall be no ESE for laboratory courses of First Year. The entire assessment of a student shall be based on ISE.

b) The ISE component of the laboratory course is a continuous evaluation turn by turn by the course faculty and the assessment should be shown to the students.

Student has to get minimum 50% marks individually in ISE and ESE to pass and earn credits for laboratory course.

c) The Examiner for the lab course ESE, other than the course faculty can be competent faculty from the same or other department of Rajarambapu Institute of Technology. However, the CoE can appoint an examiner outside RIT, if required. For B.Tech. final year laboratory courses, it is mandatory to appoint an external competent examiner from industries/ research organizations / academic institutions of repute.

For UG project ESE examination, External examiner outside RIT is mandatory.

The assessment of laboratory course from the 1st semester onwards shall be carried out in two parts.

- ISE shall be based on turn-by-turn supervision of the student's work and the quality of his/her work as prescribed through laboratory journals and his/her performance in Practical-oral examinations uniformly distributed throughout the semester.
- ESE shall be based on performing an experiment followed by an oral examination.
- The relative weightage for ISE and ESE for assessment of laboratory courses shall be 50% and a minimum performance of 50% in both ISE and ESE separately shall be required to get the passing grade.

3.6.5 Assessment of Seminar, Mini-project, Project etc.:

Every student has to undertake seminar, mini-project, project of professional nature and interest at various levels of study. The topic of seminar or work related with mini-project/project may be related to theoretical analysis, an experimental investigation, a prototype design, new concept, analysis of data, fabrication and setup of new equipment etc. The student shall be evaluated for his/her seminar or mini-project/project through the quality of work carried out, the novelty in the concept, the report submitted and presentation(s) etc.

a) The Seminar/Project report must be submitted by the prescribed date usually two weeks before the end of academic session of the semester. It is desirable that the topics for seminar/project be assigned by the end of previous semester.

b) The seminar report and the presentation of seminar shall be evaluated by three departmental faculty members (decided by DPC).

c) The mini-project shall be evaluated jointly by supervisor and Examiner appointed by the DPC of the department

d) The assessment of B. Tech project work shall be carried out in two phases as prescribed in the respective program structure.

3.6.6 Course of action for students failed in ISE of project / Seminar Laboratory course:

a) The student who has failed in ISE of UG-Project phase shall be given an extension of a maximum period of one month for his/her improvement and then he/she shall be evaluated and the marks should be submitted to COE.

b) After satisfactory performance in ISE of Project phase, the student shall be allowed to appear for the project ESE at the time of Re-Exam and the ESE marks should be submitted to COE.

c) The same provision (1 & 2 above) shall also be made applicable for UG- Seminar courses.

d) For UG-Laboratory course (excluding project and seminar), if a student fails or falls in XX category for ISE then he/she should Re-register for the course in the immediate semester, complete the ISE work and the ISE work and the ISE marks should be submitted to COE.

3.6.7 Assessment during summer term:

The evaluation of a student undergoing summer courses, if offered shall be done in exactly the same way as the assessment of theory or laboratory course as explained above. The only difference shall be that the pace of teaching and evaluation shall be twice that for even or odd semester course.

3.7 Grading System

3.7.1 Award of Grade (Regular Semester Examination):

a) For every course registered by a student in a semester, he/she shall be assigned a grade based on his/her combined performance in all components of evaluation scheme of a course as per the structure. The grade indicates an assessment of the student's performance and shall be associated with equivalent number called a grade point. **Absolute grading system is followed.**

b) The academic performance of a student shall be graded on a ten point scale. The letter grades, the guidelines for conversion of marks to letter grades and their equivalent grade points are as given in Table 3.7-1

Table 3.7.1 Grade Table for Regular Semester

Theory			Laboratory Courses		
Letter Grade	Marks Obtained %	Grade Point	Marks Obtained %	Grade Point	Description of Performance
AA	>=90	10	>=90	10	Outstanding
AB	80-89	9	80-89	9	Excellent
BB	70-79	8	70-79	8	Very Good
BC	60-69	7	65-69	7	Good
CC	50-59	6	60-64	6	Above Average
CD	45-49	5	55-59	5	Average
DD	40-44	4	50-54	4	Below Average
FF	<40	0	<50	0	Fail
XX	-	0	-	0	Detained, Re-register for Course
II	-	-	-	-	Incomplete, eligible for makeup examination
PP	-	-	-	-	Passed (Audit Course)
NP	-	-	-	-	Not Passed (Audit Course)

c) The combined performance generally refers to performance in (as per the structures of the respective course) ISE, UT1, UT2 and ESE in theory courses and ISE and ESE for laboratory courses.

d) A student shall pass the course if he/she gets any grade in the range between "AA" to "DD".

e) "FF" grade shall be awarded to a student in a course if he/she gets less than 40% marks in ESE separately and 40% marks jointly in the ISE, UT1, and UT2 & ESE for a theory course and 50% marks in ISE & ESE separately for a laboratory course. Student failed in theory course shall then be eligible to apply for supplementary examination conducted along with re-examination conducted after regular examination of even semester. The students have an option to register for summer term for the courses if offered. A student failed in laboratory course shall be eligible to apply only for 100% examination conducted with the laboratory examinations of the subsequent semester. In both cases, a student has to suffer one grade penalty. The laboratory examination will be conducted after semester II regular examination along with supplementary/reexamination for both laboratory courses for semester I and semester II.

f) Grade "XX" in a regular course shall be given to a student if he/she falls in any of the following categories.

i. A student does not maintain the minimum attendance requirement for in any of the theory/laboratory/ seminar/min-project/project and summer internship/in plant training courses.

ii. A student has not completed most of the ISE, UT1 and UT2 due to non-medical reasons (e.g. when a student has missed all or most of the components of internal evaluation and unit tests conducted by the instructor in that semester).

iii. A student fails to obtain 40% marks in ISE , UT1 and UT2 combined together.

iv. A student is guilty of any academic malpractice during semester (Such cases shall be dealt by Student Grievances and Redressal Committee).

v. A student is guilty of any academic malpractice during examination.

Following rules apply to the student who has obtained grade "XX" in a regular semester:

i. If a student has XX grades in more than three courses, his term will be detained and he is not allowed to appear for ESE in any of the subjects. The student is required to take the fresh admission to the same class by paying all fees in the next academic year.

ii. Students having XX grades in 3 or less number of courses during odd semester can appear for 100% examination conducted at the end of the academic year along with supplementary examination of semester I or register for the courses during summer term, if offered.

iii. Students having XX grades in 3 or less number of courses during even semester can appear for 100% examination conducted at the end of the semester II of next academic year along with re examination of semester II (Even Semester) or register for the courses during summer term, if offered in the next academic year.

iv. ISE, UT1 and UT2 marks of such students will become null and void and they have to appear for 100% examination.

v. The reexamination shall be of 100 marks and shall be based on entire syllabus with equal weightage to all the units as mentioned in syllabus of the course. The grading used for 100 % examination shown in Table 3.7-2.

Table 3.7-2 Award Grades for 100% examination

Marks	Grades
00 to 39	FF
40 to 54	DD
55 to 69	CD
70 to 85	CC
> 86	BC

vi. In above two cases when a student gets "XX" grade in a course, then this shall be treated as "FF" for

the purpose of calculation of Semester Performance Index (SPI) and First Year Performance Index (FYPI) or Cumulative Performance Index (CPI). Refer Sec. 11 for calculation of Performance Indices.

vii. Grade "II" shall be declared in a theory/laboratory course if a student has satisfactory in-semester performance and UT1 and UT2 and has fulfilled the 75% attendance requirement, but has not appeared for ESE due to genuine reasons **Such students shall be eligible for the make-up examination of ESE only on medical grounds/valid reasons and on production of authentic medical certificate or other supporting document/s (as required by the institute) to the Exam Cell within 10 days after the respective examination is over.** The application form with requisite amount of fees must be submitted to the Exam Cell before the last date of filling such application forms for make-up examinations.

viii. A student with "II" grade when appears for the make-up examination shall be eligible to obtain a regular performance grade ("AA" to "FF") as per Table 10.1, depending on his/her overall performance in ISE, UT1 and UT2. If a student fails to appear for make-up examination too, a grade "XX" shall be awarded to him/her. Thus "II" is only a temporary grade and shall be replaced by a valid grade only after make-up examination.

ix. There shall be a few audit courses as per the policies of the institute or as decided by DPC of respective program. The grade "PP" (Passed)/ "NP" (Not Passed) shall be awarded for such courses depending upon the performance of a student evaluated by the course instructor. No grade points shall be associated with these grades and performance in these courses shall be not taken into account in the calculation of the performance indices (SPI, CPI). However, the award of the degree shall be subject to obtaining a "PP" grade in all such courses.

3.7.2 Award of Grades for Supplementary/Re-examinations:

a) A student who has obtained grade "FF" in regular semesters odd or even (semester I or Semester II) shall be eligible to appear for supplementary/re-examination conducted after regular examination of semester II, before the commencement of the next academic year.

b) In such cases In-semester and UT1 and UT2 performance of a student shall not be wiped out.

c) A student shall apply for supplementary/re examination before the last date of such application and shall appear for supplementary/re-examination.

The ESE examination pattern will be same as regular examination and **there will not be any MCQ as in regular semester.**

A student who is eligible for supplementary/re-examination, **but remains absent due to genuine reasons and taken prior permission shall be given grade "FF".**

d) A student shall be awarded a grade between "AB" to "DD", or "FF" or "XX" as given in Table 10.3 depending upon the cumulative marks obtained by him/her in ISE, UT1 and UT2 and supplementary/ Re-Examination of ESE. Here a student has to suffer one grade penalty by accepting one grade lower as compared with the regular grades.

Table 3.7.3 Grade Table for supplementary/re examination

Letter Grade	Marks Obtained %	Grade Point
AB	>=90	9
BB	80-89	8
BC	70-79	7
CC	60-69	6
CD	50-59	5
DD	40-49	4
FF	<40	0
XX	-	0

e) Award of Grade (Summer Term or 100% Examination):

A student who has obtained "FF" grade in ESE of a regular semester and has not availed supplementary/ re examination option or a student who has obtained "FF" grade in both ESE and supplementary/re examination shall be eligible to choose one of the two options below to clear his/her backlog:

- ☐ Registration for summer term (If offered)
- ☐ Re-registration for the next regular semester course whenever that course is offered.

A student detained in a regular semester due to either a) by obtaining "XX" grade or b) by involvement in academic malpractice or c) by breaking the institute code of conduct and discipline cannot apply for summer term for that academic year, but can appear for 100% examination to clear the backlog.

3.7.3 Grades for Summer Term:

a) A student registering for the summer course shall undergo all evaluations as per the structure of that course such as ISE, UT1, UT2 and ESE and shall be eligible to acquire any grade between "AB" to "DD" or "FF" or "XX" as per Table 10.3.

b) A student getting grade "FF" in summer course has to re-register and repeat the course whenever it is offered next or appear for 100% examination whenever it is held next. In both cases, a student has to suffer a grade penalty and accept the grades as per Table 10.2.

c) A grade "XX" shall be awarded to a student if he/she is found to be guilty of any disciplinary action during summer term, examination or assessment. Such cases shall be dealt by Student Grievances and Redressal Committee as and when required.

3.7.4 Award of Grade (Re-Registration):

Following rules apply for the course re-registered in any semester.

a) ISE and UT1 and UT2 performance of a student of a regular or summer term for a re-registered course in which he/she had obtained "FF" or "XX" grade during regular semester or summer term shall be treated as null and void.

b) A student shall undergo all evaluations consisting of ISE, UT1, UT2 and ESE applicable as per the structure of the respective course.

c) A student with "FF" grade when re-registers for that course in a regular semester or summer term has to suffer a grade penalty and shall be eligible to acquire grade as per.

d) A re-registered student eligible for ESE remains absent for ESE due to valid genuine reason as mentioned then he/she shall be treated in a similar way as "Grade II" cases in regular semester by giving a chance to appear for make-up examination held before the commencement of the next academic year with grade Table 10.3 being applicable to him/her.

3.7.5 Supplementary and Re- examination

Supplementary and Re-Examination will be conducted only in the second semester. There will not be any re-examination / make up examination at the end of first semester. The students will get two opportunities for semester I and Semester II in the academic year to pass the examination.

Table 3.7.4

Semester I	Regular examination of odd semester only
Semester II (Summer Examinations)	1 Regular examinations of even semester 2 Supplementary examination of odd semester 3 Re- examination of even semester. 4 Summer Term examinations if summer term is offered.

There will be only **one grade** penalty for the first three attempts and ESE and ISE, UT 1 and UT 2 marks are to be carried forward for three attempts in case of FF grade (Fail Grade). If the student fails to pass the courses in first three attempts, from 4th and subsequent chances, the grade penalty will be as per the table of 100% examination (Table 10.2). In case of XX grade, the students will not be allowed to appear for the re-examination conducted in the immediate semester. It is 100% comprehensive examination. The paper of 100 marks covering all units for 3 hours duration.

Mechanism of Re-Registration:

The mechanism to be followed for the process of Re-registration of Theory and Laboratory courses is as given below:

I) Theory Courses:

Following process shall apply for re-registration of theory course/s:

a) A student, who has obtained 'FF' Grade in more than three courses (odd or even semester) in an academic year, can re-register for the course/s immediately in the next academic year, whenever such course/s is offered.

b) Such student/s shall submit the application form in the prescribed format (available in the office) along with the copy of mark sheet and requisite re-registration fee to the office through Head of concerned Department within 15 days after declaration of examination results.

c) The student failing to re-register for the course/s within the specified duration shall have to apply for re-registration with late fee for the maximum period of 10 days. Thereafter, the student will have to re-register by paying prescribed super late fee of (in addition to late fee) till the date of commencement of new semester. A student failing to re-register until the date of commencement of new semester (as per the Academic Calendar) will not be eligible for re-registration.

d) After receiving the re-registration application and necessary fees from the student, the office shall communicate the information of such re-registered student/s to the Examination Center as well as the Head of concerned Department and ERP coordinator for further process. The concerned Head of Department will then display the list of such re-registered students on the department notice board and ensure that all the evaluation (ISE, UT1 & UT2) will be conducted along with regular student. After completion of the ISE, UT1 & UT2 by the student/s, the course instructor will submit the mark sheets to the Examination Center.

II) Laboratory Courses:

Following process shall apply for re-registration of laboratory course/s:

a) A student who has obtained "XX" grade in the Laboratory course/s of a semester (odd or even) shall have to re-register for that course/s immediately in the next semester. Such student shall submit the application form in the prescribed format (available in the office) along with the copy of mark sheet and prescribed re-registration fee per course to the office through Head of concerned Department within 15 days after declaration of examination results.

b) The student failing to re-register for the course/s within the specified duration shall have to apply for re-registration with late fee for the maximum period of 10 days. Thereafter, the student will have to re-register by paying prescribed super late fee till the date of commencement of new semester. A student

failing to re-register until the date of commencement of new semester will not be eligible for re-registration.

c) After receiving the re-registration application and necessary fees from the student, the office shall communicate the information of such re-registered student/s to the Examination Center as well as the Head of concerned Department and ERP coordinator for further process.

d) The concerned Head of Department will then display the list of such re-registered students on the department notice board and will prepare the schedule for ISE of Laboratory course as per the convenience of the faculty and student/s.

e) Thus, ISE of Laboratory course of such re-registered student/s will be conducted as per the schedule and after satisfactory completion of the ISE component by the student/s, the course in charge will have to submit the marks obtained by students to the Examination Center.

3.8 Calculation OF Performance Indices

The performance indices viz. Semester Performance Index (SPI), First Year Performance Index (FYPI), Cumulative Performance Index (CPI) represent the performance of a student in a semester (SPI), cumulated for two semesters of first year (FYPI) and cumulated over all semesters from the third semester onwards till current semester (CPI) on a scale of 10.

A) Semester Performance Index (SPI):

- The performance of a student in a semester shall be indicated by a number called SPI.
- SPI shall be the weighted average of the grade points obtained in all the courses registered by the student during a semester.
- If 'gi' shall be a grade with numerical equivalent as gi obtained by a student for the course with credits **'Ci'** then, SPI for that semester is calculated using formula.

$$SPI = \frac{\sum_i Cigi}{\sum_i Ci}$$

Where summation is for all the courses registered by a student in that semester, SPI shall be calculated and is rounded off to two decimal places.

- SPI shall get affected because of the grades "XX" and "FF" obtained by the student in any of the courses.

- For the students acquiring "II" grade (which is only a temporary grade) in any of the courses, SPI, CPI shall be calculated only after make-up examination.

- SPI once calculated shall never be modified.

B) First Year Performance Index (FYPI):

- For a student registered in autonomous RIT, Rajaramnagar right from the First semester, First-Year-Performance-Index (FYPI) shall be calculated as weighted average of the grade points obtained in all the courses registered by him/her in semesters I and II only.

$$\text{FYPI} = \frac{\sum_i Cigi}{\sum_i Ci}$$

Where, summation is for all the courses registered by a student in first two semesters. FYPI shall be calculated after calculating SPI for the second semester is calculated. FYPI shall be rounded off to two decimal places.

- FYPI shall reflect all the courses undergone by a student in the first year including the courses in which he/she has failed. FYPI may get modified in the subsequent semesters whenever a student clears his/her first year backlog courses.

- If a student has been awarded "II" grade in the regular semester course of the first year then, FYPI shall be calculated after the make-up examination on the basis of the grade obtained by that student in a make-up examination.

- If a student has obtained grade "FF" or "XX" at any time in any of the courses registered by him, then zero grade points corresponding to these grades shall be taken into consideration for calculation of FYPI.

- If a student has a backlog of first year, then his/her FYPI shall be recalculated only after he/she clears his/her backlog.

C) Cumulative Performance Index (CPI):

- An up-to-date assessment of the overall performance of a student for the courses from the third semester onwards till completion of the program shall be obtained by calculating an index called Cumulative Performance Index (CPI).

- CPI is the weighted average of the grade points obtained in all the courses registered by a student since the beginning of the third semester of the program.

$$CPI = \frac{\sum_{i} Cigi}{\sum_{i} Ci}$$

Where, summation is for all the courses registered by a student from third semester till that semester. CPI shall also be calculated at the end of every semester from the third semester onwards and shall be rounded off to two decimal places.

- CPI shall reflect all courses undergone by a student including courses in which he/she has failed. Thus, similar to SPI, "FF" and "XX" grade shall affect the CPI of a student.

- If a student is awarded with a pass-grade for a course in which he/she was awarded previously "FF" or "XX" grade then, CPI shall be calculated by replacing corresponding Ci and gi in both numerator and denominator of the above formula. Thus, a course shall be included only once in CPI calculation. The latest performance of a student in a course shall be considered for CPI.

3.9 Procedure to show theory ESE answer books

In order to introduce 100% transparency in evaluation system, UT1, UT2 and also ESE answer books are shown to students.

i. The Answer book (AB) showing activity for ESE is carried out after the approval for declaration of results in BoE meeting.

ii. After the ESE theory assessment and marks entry in prescribed format, the course teacher shall submit the ESE mark list and he/she shall collect the answer books from Exam Center for showing it to students.

iii. The DEC in consultation with DPC Chairperson shall prepare a time table for showing the ABs to concerned students. The time table shall be displayed on the department notice board and the same shall be submitted to Exam Center.

iv. The course teacher shall show the ABs to the students as per the schedule declared by the DEC/DPC Chairperson.

v. The course teacher shall review the ABs based on the queries from students. He/she shall keep record of attendance of students in this process.

vi. The course instructor shall submit the list of "change in ESE marks", student attendance sheet along with the ABs to Exam Center within stipulated time as decided by CoE.

3.10 Academic Progress Rules (ATKT rules)

a) A student shall be allowed to take admission for odd semester of next academic year, only if he/she has earned all the credits of previous year and maximum of three FF grades in the current year (semester I and Semester II together). Students who have FF grades in more than three courses in the current academic year will not be permitted to take admission for the odd semester of next academic year.

b) Maximum duration for getting B. Tech. degree for students admitted in the first semester of UG program shall be 12 semesters (six academic years) while for lateral entry students admitted in the third semester shall be 10 semesters (five academic years) from their date of admission. The maximum duration of the program includes the period of withdrawal, absence and different kinds of leaves permissible to a student but excludes the period of rustication of a student from the institute. However, genuine cases on confirmation of valid reasons may be referred to Academic Council for extending this limit by additional one year.

c) It is mandatory for a student to earn all credits specified for semester I and semester II or eligible for ATKT as per the rules to seek admission to Second Year in three years from the date of his / her admission to avoid NFTE. If a student fails to become eligible for admission to Second Year engineering in three years from the date of his / her admission, then he / she shall be declared as "Not Fit for Technical Education (NFTE)" leading to discontinuation of his / her registration with the institute. Depending upon the academic progress of a student, Academic Council may take a decision regarding continuation or discontinuation of his / her registration with the institute.

3.11 Semester Grade Report

3.11.1 Semester grade report reflects the performance of a student in that semester (SPI) and also his/her cumulative performance for the first year (FYPI) and also the cumulative 3.11.2 performance since the third semester of his/her study (CPI).

3.11.2 The semester grade card issued at the end of each semester/ summer term to each student shall contain the following.

- ☐ The credits for each course registered for that semester.
- ☐ Any audit course/s undertaken by a student in a Semester.
- ☐ The letter grade obtained in each course.
- ☐ The total number of credits earned by a student for the first year separately.
- ☐ The total number of credits earned by a student since the 3rd semester onwards.
- ☐ SPI, FYPI, CPI.

- ☐ A list of backlog courses, if any.
- ☐ Remarks regarding eligibility of registration for the next semester.

3.11.3 Semester grade card shall not indicate class or division or rank however a conversion from grade point index to percentage based on CPI shall be indicated on the final grade card of the program.

3.12 Award of Degree

Following rules prevail for the award of degree.

i) A student has registered and passed all the prescribed courses under the general institutional and departmental requirements.

ii) A student has obtained CPI ? 4.75.

iii) A student has paid all the institute dues and satisfied all the requirements prescribed.

iv) A student has no case of indiscipline pending against him/her.

v) Institute authorities shall recommend the award of B.Tech. degree to a student who is declared to be eligible and qualified for above norms. However, the final degree shall be conferred by Shivaji University, Kolhapur.

vi) A student who has joined an autonomous program in fifth semester (third year), his CPI is calculated based on his performance from fifth semester to eighth semester.

vii) A student who has joined an autonomous program in seventh semester (fourth year), his CPI is calculated based on his performance from seventh semester to eighth semester.

viii) **Grace Marks:** A student will be given maximum of two grace marks per course to obtain the passing grades in maximum of two theory courses provided he/she has passed in all the other courses for the semester. If a student has failed in more than two courses no grace marks will be applicable in any course.

ix) **A grace of 1% of maximum CPI of 10 (maximum 0.1 CPI)** is given to the student only at 8th semester CPI if such a provision will help to secure the higher class i.e. to secure minimum pass class (CPI 4.75, second class, first class /First class with Distinction). It is not given for any other reasons.

(Applicable for B. Tech. students admitted from 2014-15 onwards)

Table 3.12.1 Grade Point vs. Equivalent Percentages (as per AICTE)

Grade Point	Equivalent Percentage
6.25	55
6.75	60
7.25	65
7.75	70
8.25	75

Table 3.12.2 Proposed CPI vs. Class for B. Tech Program

Corresponding Class	Pass Class	Second Class	First Class	First Class with Distinction
CPI	CPI ≥ 4.75 &< 5.75	CPI ≥ 5.75 &< 6.75	CPI ≥ 6.75 & < 7.75	CPI ≥ 7.75

The formula for Converting CPI into Percentage marks for CPI ? 4.75 can be obtained using equation: Percentage marks = (CPI - 0.75) * 10

3.13 Grade /CPI Improvement Policy for Award of Degree

a) Students who have secured DD grade in course in an odd semester or even semester in an academic year can appear for supplementary/re-examination for the same academic year for improvement of grade.

b) If a student applies for appearing for such supplementary/re-examination for a course, ISE and UT1 and UT2 marks of the course shall be null and void. Also grades obtained in the course during regular semester odd or even shall be null and void.

c) An opportunity shall be given to a student who has earned all the credits required by the respective program with CPI greater than or equal to 4.00 but less than 4.75 (Refer Section 14.2), to improve his/ her grade by allowing him/her to appear for 100% examinations of maximum two theory courses of seventh and eighth semester. Such examinations shall be scheduled along with supplementary/ re-examinations of 8th semester. However, CPI shall be limited to 4.75 even though the performance of a student as calculated through modified CPI becomes greater than 4.75.

3.14 Grade Improvement Policy

Students who have secured DD grade in course in an odd semester or even semester in an academic year (i.e. applicable to students of all F.Y., S.Y.,T.Y.& Final Year B.Tech. class) can appear for such Grade Improvement examination for the same academic year for improvement of grade. If a student applies for appearing for such make-up examination for a course, ISE and UT1 and UT2 marks of the course shall be null and void. Also grades obtained in the course during regular semester odd or even shall be null and void. The result of such Grade Improvement examination will be treated as final provided there is an improvement in grade or else his/her grade before improvement will be considered for CPI/SPI calculation.

The student shall have to apply for such re-examination / supplementary (grade improvement) examination within 10 days after the declaration of regular ESE result and have to pay prescribed fees as examination fee along with undertaking in prescribed format.

3.15 CPI Improvement after Completion of Prerequisite Credits for the Award of Degree

Students who secure CPI between 4.75 and 6.75 after completing the pre-requisite credits for the award of degree, and wish to improve their CPI are permitted for CPI improvement. Such students be permitted to withdraw their grade in a given course with poor grade and permitted to reappear for the examinations for improving the grade and in turn CPI .

a) Student can appear for grade improvement examination within one year from the date of passing his/her UG Examination. He should not have taken (i) Leaving Certificate from the Institute and ii) Degree from Shivaji University through convocation. He/she will submit a written application to dean academics seeking his/her permission to register for class improvement within one month from the date of declaration of result or one week before the date of convocation of University of Pune whichever is earlier. This application will be forwarded to dean academics through the Head of the Department from where he/she has graduated. No student will be admitted once the course registration process of that semester ends.

b) For grade improvement student will have to take maximum 3 courses in which he/she has secured DD or CD grades from the same semester in one stretch.

c) Student can choose maximum three theory courses from a particular semester offered for T.Y and B. Tech (either odd or even) in which he/she has secured DD or CD grade. Student will have to register for these courses in a particular semester in which those courses are offered.

d) At the time of registration student will surrender all the original mark lists given to him by the institute He will have to give an affidavit on Rs.100/- judicial stamp paper that he/she will not do any use of surrendered mark lists till he/she gets official result of the subjects for which he/she wishes to appear for grade improvement. No change of courses or drop of courses will be allowed after registration.

e) Student wishing to improve his/her grade will have to pay appropriate fees as laid down by the institute time to time.

f) Student wishing to appear for grade improvement is exempted from attending regular classes as he/she has already undergone the course instructions but he/she will have to appear for all the evaluation tests conducted for the particular courses. No re-exam or retest will be allowed for the class improvement, in case such students miss any of the tests or examinations. Absentee for End Semester Examination will automatically lead to award of FF grade in that course.

g) The grading process as used for the regular students appearing for that course will be applicable and no concession of any sort will be granted on account of absentee for any of the examinations.

h) Student wishing to use the facility of grade improvement will have to pass in all the three subjects at a time for which he/she has registered for. He/she will not be entitled for the summer term or re-examination in such cases.

i) Only one attempt will be permissible for any candidate wishing to use the facility of grade improvement. If the student fails to secure higher grades resulting in reduction in overall CPI then the original result of the student before registering for grade improvement will be retained.

Student who improves his/her CPI will be issued fresh mark lists by the institute. These mark lists will have symbol against the course for which he/she has appeared for grade improvement and will state "Grade Improvement". The date on the new mark lists will be that as issued for other students appearing in those courses. The name of the student will be communicated to Shivaji University and he/she will have to apply for degree certificate from Shivaji University thereafter.

4. Student Counseling Cell

Student Counseling Cell Structure

- Dr. Mrs. S. S. Kulkarni - Director -Chairperson
- Dr. S. M. Sawant - Dean Student Development
- Mr. Kalidas Patil - Psychologist
- Dr. Mrs. Jigna Shah - Psychologist
- Mr. M. M. Mirza - Head

All class monitors are working as counselors.

It focuses on increasing the number of students completing the course in four years with good academic record. Cell is providing following facilities.

- **Personal Counseling :** facility to motivate the student towards good academic performance. It also helps those students who have examination stress or fear, depression due to familial, academic or any other problem. RIT conducts counseling sessions and workshops to address these problems and to motivate and help such students in their academic and personality development. The institute has hired Dr. Mrs. Jigna Shah & Mr. KalidasPatil as Personal counselors.

- **Awareness Programmes**

- **Merit Scholarship**

- **Parent Meet**

- **Seminars and workshops**

- **Group counseling**

5. Anti Ragging Committee

It is prestigious that RIT campus is free from ragging, but I want to remind you about the anti- ragging affidavit signed by you and your parent and hoping you will act accordingly. It has been rightly said that the end may not always justify the means. Behind the façade of 'welcoming' new students to college, ragging, in actuality, is a notorious practice wherein the senior students get an excuse to harass their junior counterparts, and more often than not, make them easy targets to satiate their own perverse sadistic pleasures. Apart from sustaining grievous physical injuries, those unfortunate students who succumb to ragging either develop a fear psychosis that haunts them throughout their lives, or worse, quit their college education even before it begins. For any student who slogs day and night to secure admission into a prestigious college, ragging can be his or her worst nightmare come true. It would not be an exaggeration to say that, today, ragging has taken the shape of a serious human rights violation with even the most respected and disciplined educational institutes falling prey to it.

How Ragging Affects the Victim

1. An unpleasant incident of ragging may leave a permanent scar in the victim's mind that may haunt him for years to come.

2. The victim declines into a shell, forcing himself into humiliation and alienation from the rest of the world

3. It demoralizes the victim who joins college life with many hopes and expectations.

4. Though incidents of physical assault and grievous injuries are not new, ragging also simultaneously causes grave psychological stress and trauma to the victim.

5. Those students who choose to protest against ragging are very likely to face isolation from their seniors

in the future.

6. Those who succumb to ragging may drop out; thereby obstructing their career prospects.

7. In extreme cases, incidents of suicides and homicide have also been reported.

How Ragging Affects the Victim's Family

One can imagine the plight of a ragging victim's family, especially his or her parents who see their child suffering in pain and stress. Besides incurring medical and other incidental expenses to rehabilitate their child, they also have to bear the trauma of seeing his or her prospective career coming to an end.

How Ragging Affects the Educational Institution

1. Severe media barrage in extreme cases of ragging lowers the character of the educational institution and destroys the respect and faith it commands from society.

2. Those who indulge in ragging bring a bad name to their college thereby hinder its reputation and goodwill in society.

How Ragging Affects the Raggers

1. Ragging does not spare even its perpetrators. Those found guilty of ragging may be suspended, blacklisted and even permanently expelled from college.

2. Raggers could be given rigorous imprisonment up to three years or a fine up to Rs.25000/-, or both. The educational institutions may prescribe other punishments such as suspension from classes, from the hostel, etc.

Anti-ragging Committee :

Anti-ragging committee headed by Honorable Director is taking care for making RIT campus ragging free. Anti-ragging committee does following things for students:

- ☐ Arrange lectures to create awareness about anti-ragging rules and regulations.
- ☐ Addresses complaints received through complaint register or any other way.
- ☐ At the institution level anti-ragging squad has been formed. The squad frequently visits places like hostels, canteen, library, play-ground, etc.

Sr. No	Name of Member	Designation		Contact Number
01	Dr. Mrs. S. S. Kulkarni	Chairman	Director	9970700701
02	Prof. M.T. Telsang	Member	Dean, Academic	9970700705
03	Dr. S. M. Sawant	Member	Dean, Students Development	9970700951
04	Dr. S.S. Gawade	Member	Rector	9970700945
05	Shri. S.G. Bhosale	Member	Dy. Warden	9890080723
06	Dr.Mrs. Jigna Shah	Member	Psychologist	02342224754
07	Prof. M.M. Mirza	Member Secretary	Head, Students Counseling	9970700795

Anti Ragging Squad

Sr.No	Name of Member	Designation	Contact Number
01	Prof. M.M. Mirza	Chairman	9970700795
02	Dr. S.S. Gawade	Member	9970700945
03	Prof. R. T. Patil	Member	8275029101
04	Prof. Mrs. S. S. Patil	Member	9970700918
05	Prof. Mrs. S. P. Patil	Member	9970700899
06	Prof. Mrs. S. N. Patil	Member	9890459955
07	Prof. Y. R. Patil	Member	8149240891
08	Prof. Subodh Ingaleshwar	Member	8600600278

6. Vishakha Cell

(Sexual Harassment Prohibitory Cell)

- Vishakha Cell has been established in 2002. It aims at:
- Building self - esteem & dignity among girl students &ladies faculty.
- Offering services such as counseling, legal aid in case of atrocities against women.
- Creating awareness regarding women rights.
- Arrange programs regarding health, personality development etc.
- Avoiding & prohibiting sexual harassment at workplace.

Vishakha Cell Organizes

- Expert lectures on Health Awareness
- Seminars on Gender Sensitization
- Workshops on Legal Aspects concerned with Women
- "Shardanyas" cultural event exclusively for girl Students

7. Code of Conduct for Students

- Maintain strict discipline in the college campus.
- Students must be in college uniform on Monday and Thursday and follow dress code (Formal dress), on other days with I-card around neck in the college campus.
- Students should be punctual while attending lectures and practicals and other programs.
- Cell Phone is to be used for academic purpose only and long calls/chats must be avoided.
- Students must follow etiquettes and manners while dealing with faculty, staff and students.
- Students should not loiter around in the corridors during the college working hours.
- No student can leave the College early without prior permission of the higher authorities (Gate pass issued needs to be produced).
- Smoking and consumption of tobacco / Gutakha / Pan masala is strictly prohibited in the College Campus.
- Students should maintain utmost silence in the library, digital library and reading rooms.
- Students should maintain professionalism while in college campus (Shouting, talking loudly, thrashing is strictly prohibited).
- Students should maintain proper discipline in the classrooms, laboratories, student waiting rooms / places.

8. Department Profile

Department: Electronics & Tele communication Engineering

Electronics and Telecommunication Engineering (E&TC) department of Rajarambapu Institute of Technology was established in the year 1991 with an undergraduate program in Electronics. The UG program was accredited in 2003, reaccredited in 2007 and 2013 by NBA Delhi. Currently, it offers two post graduate programmes in 'Electronics' and 'Digital Systems' which were introduced in the year 2002 and 2011 respectively. The Electronics PG program was accredited in 2009 and attained reaccreditation very recently in 2014. The department is recognized as Ph.D research center by Shivaji University, Kolhapur.

The department is unceasingly committed to the students to groom them as professionals. The teaching methodology offers the students a very systematically designed curriculum, imparting theoretical aspect by vibrant and dedicated faculty and testing the learned concepts in well equipped laboratories with state of the art equipments. Testing facility with a Network Analyzer has been set up and the professors and students from the surrounding areas are availing this. We provide quality education with emphasis on strong foundation,

fostering creativity and use of modern ICT tools, adopting Student focused Outcome Based Teaching Learning Process. The department has a close interaction with the industry and alumni and their feedback and suggestions are incorporated for the improvement of the curriculum and research facilities. The emphasis is on research publications, attending national and international conferences, patenting etc., and it has increased over the years.

Strengths of the department

- Dedicated, highly qualified, competent & hardworking faculty and technical staff.
- Well equipped laboratories with number of PCs & workstations hosting several software packages & state of the art equipments.
- Student focused Outcome Based Teaching Learning with the help of modern ICT tools.
- Testing and consultancy services by the department faculty and students.
- Active involvement of faculty in Research & Development activities with externally funded projects like MODROB, RPS etc. and through industry sponsored projects.
- MOU with reputed companies as a way to establish Industry Institute Interaction.
- Revamping the curriculum after every two years with the guidance from industry experts & technically proficient association academicians from renowned Institutions.
- Student centered Electronic and Telecommunication Engineering Students Association (EESA) to enhance students' creativity and skills development.
- Hosting workshops, seminars and conferences for students & teachers to enhance knowledge related to the advancement in technology & infrastructure.
- PG programs in Electronics & Digital system and Doctoral Research pave a way for conducting research of immense magnitude.
- Department has completed 01 RPS project of amount Rs. 08.55 Lac and 02 MODROB project of amount Rs. 18 Lac.
- Total 09 patents have been filed by department; however, 'An apparatus for preparing curd' and 'Electronic Baby cradle' are under commercialization process.

Laboratories in department

Advanced communication Laboratory	VLSI & Embedded System Laboratory
Communication, TV & Video Laboratory	Project Laboratory
Research Laboratory	Basic Electronics Laboratory
Microprocessor & Micro controller Laboratory	Design Laboratory
Linear Integrated & Circuit Laboratory	Digital Signal Processing Laboratory
Industrial & Power Electronics Laboratory	PCB Laboratory
Transducer Measurement & Control Laboratory	Intel Intelligent System Laboratory
Computer Laboratory	

9. Department Faculty Profile (Teaching and Non Teaching)

Teaching Faculty

Sr. No.	Name	Designation	Specialization	Experience in years	Email-Id
1.	Dr. M. S. Patil	Professor and Head of the Department	Power Electronics,	20	mahadev.patil@ritindia.edu
2.	Dr. S. A. Pardeshi	Professor and PG, PhD Convener	Image processing, Signal & System, DSP	22	sanjay.pardeshi@ritindia.edu
3.	Dr. A. B. Kakade	Associate Professor and Dean R&D	RF Communication	Teaching - 7 Industrial - 2	anandrao.kakade@ritindia.edu, kakadeanand@yahoo.com
4.	Prof.M.S. Kumbhar	Associate Professor and Deputy COE	Computer Networks, Wireless Sensor Networks	18	mahesh.kumbhar@ritindia.edu
5.	Prof. S. R. Jagtap	Associate Professor	Power Electronics, control system	18	satyawan.jagtap@ritindia.edu
6.	Prof.R.T. Patil	Associate Professor and Head of Program M.Tech.Electronics (Digital System) Engg	VLSI Signal Process, Embedded Systems, Microprocessor, Microcontroller	18	ramesh.patil@ritindia.edu , rtpatil1@ gmail.com
7.	Prof. S.S. Patil	Assistant Professor and Head of Program (M. Tech. Electronics)	Linear Integrated Circuits, Communication, Biomedical Engineering	Teaching - 14 Professional - 10	shaila.nalawade@ritindia.edu
8.	Dr. J. S. Awati	Assistant Professor	Wireless communication, Fuzzy Logic, Mechatronics,	12	jayashree.samai@ritindia.edu , jsa.awati@gmail.com

			Wireless Sensor Networks		
9.	Prof.V.S. Patil	Assistant Professor	Microprocessor, Digital design	7	vilabha.mane@ritindia.edu
10.	Prof. M. R. Jadhav	Assistant Professor	Communication, Industrial Electronics,	7	maruti.jadhav@ritindia.edu
11.	Prof. S. S. Ingaleshwar	Assistant Professor	VLSI Design, Embedded system	4	subodh.ingleshwar@ritindia.edu
12.	Prof.B.N. Holkar	Assistant Professor	Embedded System	2	bhagwan.holkar@ritindia.edu
13.	Prof. S.S. Sawant	Assistant Professor	Image Processing, PLC	6	shrutika.sawant@ritindia.edu
14.	Prof.B.S. Shete	Assistant Professor	Biomedical Engineering	4.5	bharat.shete@ritindia.edu
15.	Prof.S.M. Magadum	Assistant Professor	VLSI DESIGN, Embedded system, Sensors	2	sachin.magdum@ritindia.edu
16	Prof. S. S. Mane	Assistant Professor	Image processing, Neural Networks, Communication	Teaching - 01, Industrial - 02	sankets.mane@ritindia.edu , sanket_maness@yahoo.com
17.	Prof. U. A. Kamerikar	Assistant Professor	Image Processing, control system	Teaching - 14, Industry -1	umesh.kamerikar@ritindia.edu
18.	Prof. S. S. Joshi	Assistant Professor	Communication, Image Processing	6	swapnil.joshi@ritindia.edu
19.	Prof. Jayashri R. Dhage	Assistant Professor	Network Analysis, Analog Circuit	Teaching - 2.3,4 month English Translator	jayashri.dhage@ritindia.edu

Non-Teaching Staff:

Sr. No.	Name	Designation	Experience in years	Email-Id
1.	Mr. V. A. Patil	Laboratory assistant	Technical 13, industry 1	vijay.patil@ritindia.edu
2.	Mr. J. S. Jadhav	Laboratory assistant	Technical 10	jotiram.jadhav@ritindia.edu
3.	Mr. R. J. Jadhav	Laboratory assistant	Technical 06	rajendra.jadhav@ritindia.edu
4.	Mr. D. A. Khokade	Laboratory assistant	Technical 06	deepak4422@gmail.com

10. Department Advisory Board

The Industrial Advisory Board

IAB is an association of Industry Experts & Academicians to enhance the Industry- Institute interaction.

S.R. No.	Name	Designation	Associated with
1	Mr. Abhinay Jadhav	Member	Wire & Wireless Communication, B 8, Bahe Road, Islampur Sangli, Behind Krishna Dhudhsangh, Sangli – 415409 Cell No. 8888334388, 8888334377
2	Mr. Suryakant Dodmise	Member	Core Technologies, B/T-3,3rd Floor, Prabhakar Plaza, Station Road, Dabholkar Corner, Kolhapur-416001(India). Ph.(0231)2653059 Email: coretechnologies@coretechnology.co.in OR suryakant@coretechnology.co.in
3	Mr. Arvind M. Patil	Member	Bharat Sanchar Nigam Limited (BSNL) Islampur cell No. 9422409900
4	Dr. M. S. Patil	Chairman	Professor, HOD ETC Dept. Rajarambapu Institute of Technology, Sakharale
5	Dr. S.A.Pardeshi	Member	Professor, ETC Dept., PG Ph.D Convener Rajarambapu Institute of Technology, Sakharale
6	Prof. R. T. Patil	Member	Associate Professor, ETC Dept., HOP-M.Tech Digital System Rajarambapu Institute of Technology, Sakharale
7	Prof. Mrs. S.S. Patil	Member	Assistant Professor, HOP-M.Tech. Electronics Rajarambapu Institute of Technology, Sakharale

11. Board of Studies (BOS) Members

The Board of Studies is the basic constituent of the academic system of an autonomous institute. Framing the curriculum of various courses keeping in view the objectives of the institute, interest of the stakeholders and national requirement for consideration and approval of the Academic Council; evaluating and updating curriculum from time to time; introducing new courses of study; suggesting methodologies for innovative teaching and evaluation techniques; suggesting panel names to the Academic Council for appointment of examiners; and coordinating research, teaching, extension and other academic activities in the department/institute are functions of BOS.

Recommended Composition of the Board of Studies

No.	Name	Designation
1	Dr. S. N. Talbar (SGGS, Nanded)	External member from Academics
2	Prof. A. B. Patil (WCE, Sangli)	External member from Academics
3	Dr. D. S. More (WCE, Sangli)	University nominee
4	Mr. Rohan Gavali (Asst. Manager, Mitsubishi Electric India Pvt Ltd)	Industry representative
5	Mr. Pushkar Tawade (Project Engineer, CDAC Pune)	Postgraduate alumnus
6	Dr. S. A. Pardeshi	BOS chairman
7	Dr. M. S. Patil	Member
8	Prof. M. S. Kumbhar	Member
9	Prof. R.T. Patil	Member
10	Prof. S. R. Jagtap	Member
11	Dr. A. B. Kakade	Member
12	Prof. S. S. Patil	Member
13	Dr. J.S.Awati	Member
14	Prof. V. S. Patil	Member
15	Prof. M. R. Jadhav	Member
16	Prof. S. S. Ingaleshwar	Member
17	Prof. B. N. Holkar	Member
18	Prof. S.S. Sawant	Member
19	Prof. B. S. Shete	Member
20	Prof. S. M. Magadum	Member
21	Prof. S. S. Mane	Member
22	Prof. U. A. Kamerikar	Member
23	Prof. S. S. Joshi	Member
24	Prof. J. R. Dhage	Member
25	Mr. Shubham Tarade	UG Student Representative
26	Mr. Vaibhav Gursale	PG Student Representative

12. Vision, Mission, PEOs, POs

Vision

To develop competent professionals in Electronics and Telecommunication Engineering to face the current and future challenges of technological development

Mission

- ☐ To impart quality education to face national and global challenges
- ☐ To blend theoretical knowledge with practical skills and innovative mindset
- ☐ To inculcate right ethical values among students
- ☐ To seek continuous improvement of knowledge and skills

Programme Educational Objectives:

Graduates should be able to:

1. Establish successfully as an engineers in electronics, communication and allied industries
2. Become responsive to community needs
3. Conduct with high ethical standards in profession
4. Pursue higher studies to foster learning and understanding in an ever widening sphere of technology and management
5. Expand knowledge and capabilities through lifelong learning experiences

Programme Outcomes:

After completion of graduation in Electronics & Telecommunication Engineering, the graduates should be able to:

1. Solve complex engineering problems by applying knowledge of mathematics, science and engineering principles
2. Identify, formulate and analyze engineering problem methodically to reach proper conclusions
3. Design a system, component, or process to meet desired technical, safety, health and environmental specifications
4. Design and conduct experiment, analyze and interpret results to get appropriate conclusions
5. Design, simulate, analyze and implement electronics systems of varying complexity by using appropriate techniques and tools
6. Infer impact of health, safety, legal and societal issues on engineering profession
7. Assess the impact of technical decisions on sustainable development of society and environment
8. Adapt professional, ethical and moral responsibilities
9. Work as a leader or productive member of multi-disciplinary and multi-cultural teams
10. Communicate effectively through reports, presentations and discussions within both the technical domain and the community at large
11. Apply the principles of project management both as a member and a team leader for project development.
12. Learn independently and be ready for a lifelong learning to face increasing challenges and responsibilities

K.E.Society's

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute)

B. Tech. (Electronics & Telecommunication Engineering)

Second Year B. Tech- Semester III

(Implementation from Year 2014-15)

Sr. No	Course Code	Course Title	Teaching scheme			Credits	Evaluation Scheme					
			L	T	P		Scheme	Theory (Marks %)			Practical (Marks %)	
								Max	Min for Passing		Max	Min for Passing
1.	EC2011	Electronic devices and circuits	3	1	0	4	ISE	20		40	--	--
							MSE	30			--	--
							ESE	50	40		--	--
2.	EC2031	Analog Communication	3	0	0	3	ISE	20		40	--	--
							MSE	30			--	--
							ESE	50	40		--	--
3.	EC2051	Network Theory	3	1	0	4	ISE	20		40	--	--
							MSE	30			--	--
							ESE	50	40		--	--
4.	SH2111	Engineering Mathematics -III	4	0	0	4	ISE	20		40	--	--
							MSE	30			--	--
							ESE	50	40		--	--
5.	EC2071	C++ Programming	2	0	2	3	ISE	-	-	-	100	50
6.	EC2511	Basic Electronics Lab	0	0	2	1	ISE	-	-	-	50	50
							ESE				50	50
7.	EC2531	Analog Communication Lab	0	0	2	1	ISE	-	-	-	50	50
							ESE				50	50
8.	EC2551	Circuit Simulation and PCB design lab	0	0	2	1	ISE	-	-	-	100	50
9.	SH2511	Professional Skill Development –I	0	0	2	1	ISE	-	-	-	50	50
							ESE				50	50
Total			**15**	**02**	**10**	**22**						

Total Contact Hrs : - 27 Total Credits : - 22

ISE : - In Semester Evaluation. MSE : - Mid Semester Examination.

ESE : - End Semester Examination

K.E.Society's

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute)

B. Tech. (Electronics & Telecommunication Engineering)

Second Year B. Tech- Semester IV

(Implementation from Year 2014-15)

Sr. No	Course Code	Course Title	Teaching scheme			Credits	Evaluation Scheme					
							Scheme	Theory (Marks %)			Practical (Marks %)	
			L	T	P			Max	Min for Passing		Max	Min for Passing
1.	EC2021	Signals & Systems	3	1	0	4	ISE	20			--	--
							MSE	30		40	--	--
							ESE	50	40		--	--
2.	EC2041	Digital Design & Verilog HDL	3	0	0	3	ISE	20			--	--
							MSE	30		40	--	--
							ESE	50	40		--	--
3.	EC2061	Linear integrated circuits	3	0	0	3	ISE	20			--	--
							MSE	30		40	--	--
							ESE	50	40		--	--
4.	EC2081	Control System	3	1	0	4	ISE	20			--	--
							MSE	30		40	--	--
							ESE	50	40		--	--
5.	EC2101	Electronics Measurement & Instrumentation	3	0	0	3	ISE	20			--	--
							MSE	30		40	--	--
							ESE	50	40		--	--
6.	SH2011	Environmental Science	1	0	0	1	ISE	20				
							MSE	30		40		
							ESE	50	40			
7.	EC2521	Digital Design & Verilog HDL Lab	0	0	2	1	ISE	-	-	-	50	50
							ESE				50	50
8.	EC2541	Linear integrated circuits Lab	0	0	2	1	ISE	-	-	-	50	50
							ESE				50	50
9.	EC2561	Programming lab - II	0	0	2	1	ISE	-	-	-	100	50
10.	EC2581	Mini Project (Environmental Science)	0	0	2	1	ISE	-	-	-	100	50
Total			**16**	**02**	**08**	**22**						

Total Contact Hrs : - 26 Total Credits : - 22

ISE : - In Semester Evaluation. MSE : - Mid Semester Examination.

ESE : - End Semester Examination

B.TECH. ELECTRONICS & TELECOMMUNICATION
SECOND YEAR SEM-III
EC2011 ELECTRONIC DEVICES AND CIRCUITS

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION :

The course has been designed to introduce students with construction, theory and characteristics of various electronic devices. Also this course will lay a strong fundamental base of discrete electronics, and develop capacity to analyze and interpret different electronics circuits.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Describe fundamentals of semiconductor devices.
2. Explain working principle of diode, transistor and their applications.
3. Analyze transistor biasing circuits.
4. Analyze various frequency models of amplifier.
5. State working principle of power amplifier & its classification.

PREREQUISITE :

There are no prerequisites for this course; however basic knowledge of mathematics, semiconductor physics & basic knowledge of passive elements will be beneficial.

UNIT-I **6**

DIODE AND CIRCUITS: P-N junction diode and its characteristics, load line concept, piecewise linear diode model, Diode applications: Voltage Multiplier, Clipper and Clamper Circuits, Zener Diode Circuits.

UNIT-II **6**

BJT (BIPOLAR JUNCTION TRANSISTOR): NPN Transistor, PNP Transistor, Current-Voltage Characteristics, Transistor Configuration, Biasing and stability, h-parameters, transistor amplifier, Hybrid - ? parameter.

UNIT-III **6**

FET(FIELD EFFECT TRANSISTOR): JFET Characteristics, small signal model, MOSFET, low frequency Common Source and Common Drain amplifiers.

UNIT-IV **6**

TRANSISTOR APPLICATIONS: Classification of Amplifiers, Frequency response of cascaded amplifier, Feedback Amplifiers: classification of feedback amplifiers, concept, general characteristics of negative feedback amplifier, Oscillators: Barkhausen Criteria, Oscillators and Multi vibrators.

UNIT-V **6**

POWER AMPLIFIERS: Power Amplifiers, Power Transistors, Power BJTs, Power MOSFETs, Heat Sinks, design of heat sinks, Classes Of Amplifiers, Class A, Class B, Class AB, Class C, Class A Power Amplifiers, Class AB Push Pull Complementary Output Stag.

UNIT-VI **6**

POWER SUPPLIES: Need of voltage regulator, stabilization factors, Analysis of shunt regulator using zener diode and BJT, Series voltage regulator using BJT Series voltage regulator with pre regulator and overload Protection circuit, IC based voltage regulators.

TEXT BOOKS :

1. David A. Bell -'Electronic devices & circuits'- - Prentice- Hall India, Vth Edition, 2008.
2. Robert L. Boylsted, Louis Nashelsky- 'Electronic devices & circuit theory'-Pearson Education, -(IXth edition)-2006.
3. Allen Mottershed -'Electronic devices & circuits'-Prentice- Hall India, 1973.

REFERENCE BOOKS:

1. J. Millman & C.Halkias -'Electronic devices & circuits' - Tata McGraw Hill Publication, IInd Edition 2008.
2. N.C. Goyal & R.K. Khetan-' A Monograph on Electronics Design Principles'- Khanna Publishers , Vth Edition.

B.TECH. ELECTRONICS & TELECOMMUNICATION

SECOND YEAR SEM-III

EC2031 ANALOG COMMUNICATION

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

Analog Communication is a fundamental and core subject for B. Tech. E&TC programme. It introduces students to principles of communication systems.

COURSE OUTCOMES :

After successful completion of course students will be able to

1. Describe the basic concept of communication system
2. Apply Fourier analysis to different communication signals
3. Design simple systems for generating and demodulating AM and FM signals.
4. Explain different types of pulse modulation systems
5. Compare the performance of various modulation systems.

PREREQUISITE :

There is no prerequisite; however the basic knowledge of mathematics and electronics is beneficial.

UNIT-I **6**

INTRODUCTION TO COMMUNICATION SYSTEMS: Communication Systems, Need for modulation, Types of modulation, Bandwidth and information capacity. Sine wave and Fourier series review, Frequency spectra of non sinusoidal waves, Electromagnetic spectrum Noise analysis, Noise Calculations, Noise Figure.

UNIT-II **6**

AMPLITUDE MODULATION & DEMODULATION: Amplitude Modulation Theory, Frequency spectrum of the AM wave, Representation of AM, Power relation in the AM wave, Generation of AM- Basic requirement - comparison of levels, Grid modulated class C amplifier, Plate modulated class C amplifier, Modulated Transistor amplifier. AM detection types: using diode, practical diode detector, distortion in diode detector, Negative peak clipping & diagonal clipping

UNIT-III **6**

SINGLE SIDEBAND TECHNIQUES: Evolution and description of SSB, Suppression of Carrier - Effect of non

linear resistance on added signals, The balanced modulator, Suppression of Unwanted sideband- , The filter system, The phase-shift method, -=Extensions of SSB- Forms of amplitude modulation, Carrier reinsertion - pilot carrier systems, Independent sideband systems, Vestigial - sideband transmission. Demodulation of SSB using: product demodulator & diode balanced modulator.

UNIT-IV **6**

FREQUENCY MODULATION: Theory of frequency and phase modulation- Description of systems, Mathematical representation of FM, Frequency Spectrum of FM wave, Phase modulation, Intersystem comparisons, Noise triangle, Pre-emphasis and de-emphasis, Other forms of interference, Comparison of wideband and narrowband FM, Stereophonic FM multiplex system, Generation of Frequency Modulation- FM methods, Direct methods, Stabilize reactance modulator - AFC, Indirect method.

UNIT- V **6**

RADIO RECEIVERS: Simplified block diagram of AM receiver, receiver parameters: Sensitivity, Selectivity, BW, dynamic range, Tracking, fidelity, Receiver types - Tuned radio-frequency TRF receiver, Super heterodyne receiver, AM Receivers- RF section and characteristics, Frequency changing & tracking, Intermediate Frequencies & IF amplifiers. FM Receiver - Common circuits - Comparison with AM receivers, Amplitude limiting, Basic FM demodulators, Ratio Detector, FM demodulator comparison.

UNIT-VI **6**

PULSE MODULATION SYSTEMS: Types of pulse modulation PAM, PWM, PPM, Generation and Demodulation of PAM, PWM, PPM.

TEXT BOOKS :

1. Kennedy, Davis, Electronic Communication Systems Tata McGraw Hill, IVth Edition, 2006.
2. R.P.Singh , S.D.Sapre Communication Systems, Analog and Digital Tata McGraw Hill, IInd edition, 2008
3. Tomasi Electronic Communication system, Pearson Education. Vth edition 2009.

REFERENCE BOOKS:

1. Principles of communication systems , Taub, Schilling Tata McGraw Hill, IIIrd Edition 2008.
2. Behrouz A. Forouzan, Data Communications and Networking, Tata McGraw Hill IVth edition 2003.
3. Louis E Frenzel, Communication Electronics Principles & Applications, Tata McGraw Hill, IIIrd Edition, 2001.

B.TECH. ELECTRONICS & TELECOMMUNICATION

SECOND YEAR SEM-III

EC2051 NETWORK THEORY

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION :

The course has been designed to introduce fundamental principles of circuit theory commonly used in engineering research and science applications. It aims to establish a firm understanding of the laws of electric circuit which develops a working knowledge of the methods of analysis used most frequently in further topics of electronics engineering. The course deals with the DC and AC circuit analysis using network theorems, transient responses, network function and two port network.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Identify and draw network graphs and their parts.
2. Analyze DC & AC circuits using network theorems.
3. Plot the frequency response of RLC circuits.
4. Calculate the two port parameters of the two port networks.
5. Apply the knowledge of Laplace transformation to analyze the circuits.

PREREQUISITE :

There is no any prerequisite to study this course; however knowledge of identification and understanding the characteristics of basic passive components of electrical circuits will be beneficial.

UNIT-I **6**

NETWORK GRAPHS: Tree and Co-tree, Incidence Matrix, Tie-set Matrix, Cut-set Matrix, Mesh Analysis, Nodal Analysis.

UNIT-II **6**

DC & AC CIRCUIT ANALYSIS USING NETWORK THEOREMS: Superposition Theorem, Norton's Theorem, Thevenin's Theorem, Maximum Power Transfer Theorem. Complex impedance, Steady state AC analysis: Mesh analysis, Superposition Theorem.

UNIT-III **6**

RESONANCE: Series resonance- resonant frequency, variation of impedance, admittance, current & voltage across L & C w.r.t. frequency, Effect of resistance on frequency response, Selectivity, B.W. & Quality factor, Parallel resonance- resonance frequency, variation of impedance & admittance with frequency, Selectivity & B.W.

UNIT-IV **6**

TRANSIENT ANALYSIS: Differential equations, transient voltage response, DC response of RL circuit, DC response of RC circuit, DC response of RLC circuit, Sinusoidal response of RL, RC & RLC circuit.

UNIT-V **6**

TWO PORT NETWORKS: Open circuit impedance (Z) parameters, Short circuit admittance (Y) parameters, Hybrid (H) parameter, Transmission parameters (ABCD), Interrelation of different parameters, Interconnections of two port network, T & pi representation.

UNIT-VI **6**

NETWORK FUNCTIONS: Transfer functions of two port network, poles and zeros, time domain response from pole zero plot, amplitude and phase response from pole zero plot, Routh criteria.

TEXT BOOK :

1. A. Sudhakar, ShyammohanS.Palli 'Circuit & Network - Analysis & Synthesis' IIIrd Edition-Tata McGraw Hill Publication, 2003.
2. Soni Gupta 'Electrical Circuit Analysis', IIIrd Edition- DhanpatRai& Co,1992.
3. Alexander and Sadiku 'Fundamentals of Electric Circuit' IIIrd Edition -Tata McGraw HillPublication, 2010.

REFERENCE BOOKS :

1. A.Chakrabarti 'Circuit Theory (Analysis & Synthesis)'-DhanpatRai& co, IIIrd Edition 2010.
2. M.E.VanValkenburg ' Network Analysis', Pearson Education / PHI, IIIrd Edition 2006.
3. JosephEdministrar 'Theory & Problems of Electronic Circuit (Schaum's series) - Tata McGraw Hill, Publication, 1995.
4. Boylestad 'Introductory Circuit Analysis - Universal book stall, New Delhi, IXth edition, 2000.

B.TECH. ELECTRONICS & TELECOMMUNICATION
SECOND YEAR SEM-III
SH2111 ENGINEERING MATHEMATICS-III

L	T	P	Credits
4	0	0	4

COURSE DESCRIPTION :

Engineering mathematics-III is offered as the core science course at the first semester of second year of four year engineering degree course; consist of two sections. In section-I-topics are linear diff equations, Second topic focuses on Statistics which includes Coefficient of correlation, lines of regression, fitting of curves. Third topic focuses on probability which includes random variables and probability distributions namely binomial, Poisson and normal. In section-II topics are Laplace transform which focuses on Laplace transforms of various functions, Inverse Laplace transform and its applications to solve liner diff equations. Last topic is Fourier series and integral transform which includes Expansions of various types of Functions by using Fourier series and Fourier Sine and Cosine integrals

PREREQUISITE :

For this course are mathematical formulae including knowledge of first year mathematics.

COURSE LEARNING OUTCOMES :

After completion of this course students will be able to:

1. Apply linear differential equations to solve engineering problems.
2. Solve problems on probability Distributions by using different formula.
3. Find Laplace transform and Inverse Laplace transform of various functions by using properties of Laplace transform and apply Laplace transform to solve linear diff equations.
4. Find Coefficient of correlation, Lines of regression, fitting of curves.
5. Find Expansions of functions by using Fourier series.

UNIT-I **8**

LINEAR DIFFERENTIAL EQUATIONS: Introduction and definition, Complete Solution of Linear Differential Equations with Constant Coefficients, Complete Solution of Linear Differential Equations with Variable Coefficients

UNIT-II **8**

STATISTICS: Coefficient of correlation, lines of regression, fitting of curves (Line and Parabola) by least square method.

UNIT-III **8**

PROBABILITY: Random variable, Discrete variable and continuous probability Distributions, Binomial, Poisson and Normal.

UNIT-IV **8**

LAPLACE TRANSFORM I: Definition, Laplace transforms of standard functions, Properties of Laplace transform, Inverse Laplace transforms.

UNIT-V **6**

LAPLACE TRANSFORM II: Laplace transform of periodic functions, Laplace transform of Heaviside unit-step function, Laplace transform of Dirac-delta function, Applications of Laplace transform.

UNIT-VI **10**

FOURIER SERIES AND TRANSFORM: Euler's Formulae, Expansion of functions by using Fourier Series Fourier Sine and Cosine Integrals, Inversion Formula For Fourier Transforms.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna publishers, 39th edition,2005
2. N.P. Bali, & N. Ch. S. N. Iyengar, A Text Book of Engineering mathematics, Laxmi Publications, New Dlhi, sixth edition,2004

REFERENCE BOOKS:-

1. P. N. Wartikar & J. N. Wartikar, A Text Book of Applied Mathematics, Vol. II, Vidyarthi Griha Prakashan, Pune, Nineth Revised Edition, October 1984,Reprints:September 2005
2. Ch. V. Raman Murthy & N.C. Srinivas, Applied Mathematics, S. Chand & company Ltd. First edition,2001

B.TECH. ELECTRONICS & TELECOMMUNICATION

SECOND YEAR SEM-III

EC2071 C++ PROGRAMMING

L	T	P	Credits
2	0	2	3

COURSE DESCRIPTION :

C++ is a general purpose programming language that is free-form and compiled. It is regarded as an intermediate-level language, as it comprises both high-level and low-level language features. It provides imperative, object-oriented and generic programming features.

C++ is one of the most popular programming languages and is implemented on a wide variety of hardware and operating system platforms. As an efficient performance driven programming language it is used in systems software, application software, and device drivers, embedded software, high-performance server and client applications, and entertainment software such as games. The main objective of this course is to introduce students to the basic concepts of C++ and the ability to write simple correct programs. Students will demonstrate the ability to use C++ to design solutions to problems.

PRE-REQUISITES :

A working knowledge of C programming will be beneficial.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Differentiate between C & C++ and Explain object oriented principles.
2. Write, debug, and test basic C++ codes using the object oriented approaches introduced in the course.
3. Select appropriate methods for organizing data files and implement file-based data structures.
4. Analyze given problems and implement in object-oriented programming tool.
5. Compare types of basic data structures.

UNIT-I **4**

INTRODUCTION TO C++ : Introduction to C Programming, Variables, Keywords, Statements, Operators, Arrays, Object oriented programming [C++], applications of OOP & C++, Manipulators, scope resolution operators, dynamic and global initialization of variables, Functions in C++, function prototype, call & return by reference, inline function, recursive functions, pointers, dynamic memory allocation operators- new & delete.

UNIT-II **4**

CLASS & OBJECTS: Introduction, object and Memory allocation for objects, static data members & member functions, object as an argument, friend functions & friend class.

UNIT-III **4**

CONSTRUCTORS & DESTRUCTORS: Function overloading, Unary & binary operator overloading, Constructors, Types of constructors, destructors.

UNIT-IV **4**

INHERITANCE: Single, multiple, multilevel, Hybrid, Hierarchical inheritance, virtual base classes, abstract classes, pointers to derived class, virtual function, Templates: class template & function template.

UNIT-V **4**

FILE HANDLING: Classes for file stream operations, opening and closing of files, file modes, Exception handling, Graphics.

UNIT-VI **4**

DATA STRUCTURES: Introduction to data structures, stack, queue, linked list, bubble sort, searching techniques-linear & binary.

Programming Lab : Minimum 12 programs should be written & executed as per following list using

Programming Tool either Turbo C++ or Code blocks 13.12.

1. Programs based on conditional statements (if-else, switch).
2. Programs based on loop statements (while, do-while, for).
3. Programs based on array & functions (e.g. bubble sort, searching techniques etc.).
4. Programs based on functions with arguments and without arguments.
5. Programs based on class, functions declared inside and outside class, and objects declared in different types.
6. Programs based on Friend function.
7. Programs based on function overloading.
8. Programs based on Operator overloading.
9. Programs based on constructors and destructors.
10. Programs based on types of inheritance.
11. Programs based on Templates

12. Programs based on file handing.
13. Programs based on exception handling.(Use VC++ or Code blocks 13.12)
14. Programs based on graphics.
15. Program based on stack, queue, linked list.

TEXT BOOKS :

1. E Balgurusamy -'Object oriented programming with C++', Tata Mc- Graw Hill Publication, IIIrd Edition-2006
2. Ravichandran D.-'Programming with C++' - Tata McGraw Hill, IInd Edition 2002.
3. ISRD group -'Data structure using C 'Tata McGraw Hill, IInd Edition- 2007.

REFERENCE BOOK :

1. Herbert Schildt -'The Complete Reference C++' - Tata McGraw Hill Publication, IIIrd Edition - 1999.

B.TECH. ELECTRONICS & TELECOMMUNICATION
SECOND YEAR SEM-III
EC2511 BASIC ELECTRONICS LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

Course focuses on to understand nature & scope of electronics. It also describes physical model of basic components, construct simple electronic circuits to accomplish specific functions.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Build circuit as per the requirement.
2. Observe the voltage waveforms at various test points.
3. Plot the frequency response of amplifier.
4. Interpret results of experiment & compare with measured values.
5. Improve the ability to communicate effectively through written lab journals.

PRE-REQUISITES :

There are no prerequisite for this course; however knowledge of multimeter, CRO, breadboard, Knowledge of passive components will be beneficial.

LIST OF EXPERIMENTS :

1. To study of Voltage Regulation using Zener Diode.
2. To study Diode circuits (clippers, clampers and voltage multipliers).
3. To calculate h Parameter of PNP Transistor in Common Emitter mode.
4. To Implement Biasing Techniques of Transistor (BJT) (Fixed Bias Method, Collector to base bias, Emitter Resistor and Potential Divider Bias methods.)To Plot Transistor Characteristics in CE configuration.
5. To plot frequency response of Common Emitter Transistor Amplifier and calculate Bandwidth
6. To plot transfer characteristics of FET Amplifier
7. To plot VDS vs ID for different values of VGS MOSFET Characteristics Amplifier
8. To study of Frequency response of a FET in common source amplifier
9. To Implement Oscillators circuits
10. Design and analysis of transistorized shunt regulator
11. Design and analysis of series pass regulator with and without pre regulator
12. Mesh analysis
13. Thevenin's Theorem
14. Resonance circuit
15. Two port network

B.TECH. ELECTRONICS & TELECOMMUNICATION

SECOND YEAR SEM-III

EC2531 ANALOG COMMUNICATION LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

Analog Communication is a fundamental and core subject for B.Tech. E&TC programme. It introduces students to principles of communication systems.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Analyze & design simple analog communication system.
2. Illustrate amplitude and frequency modulation and demodulation methods.
3. Draw AM waveform & its spectrum.
4. Visualize AM & FM signals using MATLAB.
5. Demonstrate different types of pulse modulation systems

PREREQUISITE :

There are no prerequisite for this course; however knowledge of Engineering Mathematics, Basic Electronics, and Signals & Systems will be beneficial.

LIST OF EXPERIMENTS :

Minimum 10 experiments will be conducted as per following list.

1. Noise measurement
2. Amplitude Modulation
3. Balanced modulator
4. Amplitude demodulation
5. Frequency modulation
6. Frequency demodulation
7. Pre-emphasis & de-emphasis
8. AM receiver
9. Pulse Amplitude Modulation
10. Pulse Width Modulation
11. Pulse Position Modulation
12. Visit to AIR/ BSNL/ Radar station

B.TECH. ELECTRONICS & TELECOMMUNICATION

SECOND YEAR SEM-III

EC2551 CIRCUIT SIMULATION & PCB DESIGNLAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

The main objective of this lab is to introduce students to use different simulation software's & demonstrate ability to design PCB & manufacture it.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Analyze different analog electronic circuits using different simulation software.
2. Analyze different digital electronic circuits using different simulation software
3. Design the PCB layout using TINA.
4. Develop Electronics circuits on printed circuit board.
5. Test Electronics circuits on printed circuit board.

PREREQUISITE :

For this subject no any prerequisite required. But basic knowledge of electrical & electronics principles is beneficial.

LIST OF EXPERIMENTS :

1) Study of different simulation software's- Multisim, Proteus, V-sim/communication suit
2) Introduction to TINA 8 design suit.
3) Simulation of simple analog electronics circuits-I
4) Simulation of simple analog electronics circuits-II
5) Simulation of simple digital electronics circuits-I
6) Simulation of simple digital electronics circuits-II
7) Developing macros using TINA
8) PCB layout design of simple electronic circuit from schematic diagram such as voltage stabilizer, regulated supply, timer.
9) PCB layout design of integrated circuit
10) PCB fabrication

B.TECH. ELECTRONICS & TELECOMMUNICATION

SECOND YEAR SEM-III

SH2511 PROFESSIONAL SKILL DEVELOPMENT -I

L	T	P	Credits
0	0	2	1

COURSE LEARNING OUTCOMES :

Students will be able to:

1. Apply English as a language for specific purposes.
2. Prepare professional image perception as reality and develop personality traits.
3. Strategize and develop skills to build self-esteem and positive attitude.
4. Imbibe integrity and ethics.
5. Broaden think tanks on entrepreneurial skills.

Details of the Practical

1. **Communicative Concepts :** Greeting people; Inviting people; Leave taking; Likes and dislikes; Agreement and disagreement; Expressing - joy, fear, surprise, worry; Opinions, beliefs, disbeliefs; Possibility and ability; Prediction and probability; Permission.
2. **Natural English :** Begin the conversation, Keep the conversation moving, Ask questions, Receive visitors, Asking for information, Making offers, Friendly warnings and instructions, Giving advice and making suggestions.
3. **Interpersonal Skills :** Self-esteem and strategies for developing self-confidence; SMART goal setting; Dealing with emotions - anger, conflict, depression; Developing assertiveness.
4. **Lifelong Learning :** Steps in lifelong learning, Tips to achieve effective learning, Challenges in lifelong learning, Misconceptions about lifelong learning.
5. **Body Language :** Non verbal communication - Eye contact, Facial expressions, Gestures, Posture and body orientation, Proximity, Vocal; Non-verbal behaviour interpretation.
6. **Acting Ethically :** Ethics and self-righteousness, Right and wrong in the workplace, Striving for integrity.
7. **Creative and Critical Thinking :** Developing your creativity, Factors that block creativity, Creativity in workplace, Importance of critical thinking.
8. **Entrepreneurial Skills Development :** Entrepreneurial competencies, Entrepreneurship in daily life, Venture project planning.

Recommended Readings :

1. Masters, L. Ann et al. Personal Development for Life and Work, New Delhi: Cengage Learning, 2012. Print.
2. Gopalaswamy Ramesh et al. The ACE of Soft Skills: Attitude, Communication and Etiquette for Success, New Delhi: Pearson Education, 2012. Print.
3. Soft Skills: Module 1 to 5 (Infosys Campus Connect Programme)

B.TECH. ELECTRONICS & TELECOMMUNICATION
SECOND YEAR SEM-IV
EC 2021 SIGNAL AND SYSTEMS

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION :

In this modern age of technology, signals and systems play vital roles. It is a core subject in electronics and telecommunication field with diverse applications in the areas of science and technology such as signal and image processing, communications, control systems, circuit design etc. This course focuses on analyzing signals and the systems using various transforms.

COURSE OUTCOMES :

After completing this course, the students should be able to:

1. Understand mathematical descriptions and representations of continuous and discrete signals and systems.
2. Develop input-output relationships for Linear Time Invariant Systems
3. Understand the impulse response of a system and the convolution operation.
4. Use Fourier and Laplace Transform analysis for continuous-time LTI signals and systems.
5. Use z-Transform analysis for discrete time signals

PREREQUISITE :

Basic knowledge of Engineering Mathematics which includes differential and difference equations, Fourier series, Laplace and z-Transform.

UNIT-I **5**

INTRODUCTION TO SIGNALS AND SYSTEMS: Signals: Definition, Classification of signals: Continuous time/

discrete time, even/odd, periodic/non periodic, energy/power, deterministic/random signals. Operations on signals: folding, time shifting, time scaling, Amplitude scaling, addition, subtraction multiplication. Elementary signals: exponential, sine, step, impulse and its properties, ramp, rectangular, triangular, signum, sinc.

UNIT-II **7**

ANALYSIS OF LTI SYSTEMS: Systems: Definition, Classification of Systems: linear/non-linear, time variant/ invariant, causal/non-causal, static/dynamic, stable/unstable, invertible/non invertible. System modeling: Input output relation, impulse response, block diagram, Definition of impulse response, convolution integral, convolution sum, computation of convolution integral using graphical method, computation of convolution sum, Properties of convolution, system interconnection.

UNIT-III **6**

FOURIER SERIES ANALYSIS OF CT AND DT SIGNALS: Definition and necessity of CT and DT Fourier series, Analogy between CTFS and DTFS, amplitude spectrum, phase spectrum of the signal, Properties of Fourier series: linearity, time shifting, frequency shifting, time reversal, time scaling, convolution.

UNIT-IV **6**

FOURIER TRANSFORM: Definition and necessity of CT and DT Fourier transforms, Analogy between CTFT and DTFT. CT Fourier transform and its properties, Determination of CTFT and DTFT using properties, amplitude spectrum, phase spectrum of the signal.

UNIT-V **6**

LAPLACE TRANSFORM: Limitations of FT and need of Laplace Transform, Definition of LT and its properties, ROC and pole zero concept, Signal analysis using LT, Application of Laplace transforms to the LTI system analysis.

UNIT-VI **6**

Z-TRANSFORM: Definition, ROC, properties of ROC, Unilateral Z-transform, Inverse Z-transform: PFE method, long division method, Properties of Z transform: linearity, time shifting, time reversal, time scaling, convolution, differentiation, multiplication, Parsevals theorem, initial value & final value theorem.

TEXT BOOKS

1. Alan V.Oppenheim, Alan S.Willsky with S.Hamid Nawab, Signals & Systems, Pearson Education, 2nd Edition,1997
2. P. Rameshbabu, R. Anandanatarajan, Signals and Systems, Scitech Publications, IVth Edition, 2002.

REFERENCE BOOK

1. M.J.Roberts, Signals and Systems Analysis using Transform method and MATLAB, TMH 2003.
2. Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley, 1999.
3. Ashok Amhardar, "Analog and Digital Signal Processing", Thomson, 2nd Edition 2002.
4. H.A HSU, 'Signals & system' (Schaum's out lines), Tata McGraw Hill, 2012.
5. Smarajit Ghosh, 'Signals & system' Pearson Education 2, 2005.

B.TECH. ELECTRONICS & TELECOMMUNICATION
SECOND YEAR SEM-IV
EC2041 DIGITAL DESIGN & VERILOG HDL

L	T	P	Credits
3	0	0	3

COURSE DESCIPTION :

This course will familiarize the student with fundamental concept of digital system, numbering system & structure, truth table of flip flops. The course will provide students with basic skills in methods of design & analysis of digital system like counters, registers etc.

Hardware Description Language (HDL) is a Computer Aided Design (CAD) tool for the modern design and synthesis of digital systems. The recent, steady advances in semiconductor technology continue to increase the power and complexity of digital systems. Due to their complexity, such systems cannot be realized using discrete Integrated Circuits (IC's). They are usually realized using high density, programmable chips, such as Application Specific Integrated Circuits (ASICs) and Field Programmable Gate Arrays (FPGAs), and require sophisticated CAD Tools. HDL is an integral part of such tools. HDL offers the designer a very efficient tool for implementing and synthesizing designs on chips.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Use Boolean algebra, the Karnaugh maps to simplify and design logic circuits.
2. Design modular combinational circuits using decoders, encoders, Mux & Demux.
3. Describe digital system design by Hardware Description Language platform via Verilog HDL.
4. Write program in Verilog HDL using procedures, functions and different programming strategies
5. Develop and simulate combinational and sequential modules of digital system in Verilog HDL.

PREREQUISTE :

- ☐ Students should have the knowledge of different number systems
- ☐ Students should have the knowledge of digital signals.
- ☐ Students should have the knowledge of transistors & diodes.
- ☐ Students should have the knowledge of Programming in C.

UNIT-I **6**

LOGIC SIMPLIFICATION AND COMBINATIONAL LOGIC DESIGN: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps, Various Codes like Weighted, EXCESS-3, Grey codes, ASCII codes, Code Conversion, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder.

UNIT-II **6**

SEQUENTIAL LOGIC DESIGN: Building blocks like S-R, JK and Master Slave JK FF, Edge triggered FF, Ripple, Synchronous counters, Shift registers, State Diagram, State Table, Algorithmic State Machines charts. Basic Design Steps, State Assignment Problem, Mealy State Model, Moore State model.

UNIT-III **6**

INTRODUCTION TO HDL:History of HDL, Structure of the HDL, Operators, Data types, Types of description, Simulation and synthesis, Comparison of VHDL and Verilog, Structures of Data flow Description, Data type - vectors, (Examples like Comparators, Multiplexers, De multiplexers, Encoder, Decoder, Driver & Multiplexed Display, ALU)

UNIT-IV **6**

BEHAVIORAL AND STRUCTURAL DESCRIPTIONS: Structure of HDL Behavioral description, Sequential Statements, Organization of the structural description, Binding State Machines, Generate and Parameter, Procedures and Tasks with examples, Verilog Functions (Examples like Basic Latch, Gated SR Latch, Gated D Latch, Master Slave and edge-Triggered D flip flops, T Flip flop, JK Flip flop, Registers, Counters, Design Examples (Bus structure, Simple Processor).

UNIT-V **6**

LOGIC FAMILIES AND INTRODUCTION TO PROGRAMMABLE LOGIC DEVICES: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, MOS, CMOS families Brief overview of Programmable Logic Devices, Simple Programmable Logic Devices, Complex Programmable Devices, Field Programmable Gate Arrays.

UNIT-VI **6**

DESIGN FOR TESTABILITY AND DESIGN EXAMPLES: Boundary Scan, Built in Self Test, BCD to Seven Segment Display Decoder, A BCD Adder, 32-Bit Adder, Traffic light controller, Add and Shift Multiplier and Array multipliers.

TEXT BOOK

1. R. P. Jain,Modern Digital Electronics, TMH, (Edition III), 2003.
2. Anand Kumar, Fundamental of Digital Circuit by 2003.
3. Nazieh M. Botros , HDL Programming VHDL and Verilog, Dreamtech press, 2009 edition.
4. Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic Design with VHDL by The Mcgraw Hill, IInd edition, 2004
5. Roth and John , Principles of Digital Systems Design by, Cengage Learning, IInd edition.

REFERENCE BOOK

1. Digital Design: Morris Mano, PHI, IIIrd edition 2006.
2. Douglas-Hall,"Digital Circuits and Systems", Tata McGraw Hill
3. Malvino Leach,"Digital Electronics and Applications", Tata McGraw Hill, 2006.

B.TECH. ELECTRONICS & TELECOMMUNICATION
SECOND YEAR SEM-IV
EC2061 LINEAR INTEGRATED CIRCUITS

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

Course focuses on working principles of OPAMP & its applications, features & advantages of integrated circuits, theoretical concepts of multipliers & PLL.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Analyze and design differential amplifiers used in linear integrated circuits.
2. Distinguish and evaluate different parameters of various configurations of OP-AMP.

3. Evaluate and design different applications Using OP-AMP.
4. Analyze and design amplifiers and active filters.
5. Illustrate waveform generators and Timer using special ICs. Discuss different PLL and VCO ICs and its applications

PREREQUISITES :

There are no prerequisite for this course; however knowledge of Math's and passive components, Knowledge of discrete electronic components like diode and transistor will be beneficial.

UNIT-I **6**

OP AMP FUNDAMENTALS: Basic building blocks of op-amp .Differential amplifier fundamentals & types, DC and AC analysis, Current mirrors level translator, Op-amp parameters, review of datasheet open loop configurations

UNIT-II **6**

OPAM CIRCUITS WITH RESISTIVE FEEDBACK: Concept of feedback & their types, Inverting & non inverting configurations, current to voltage converters, voltage to current converters, summing amplifier, difference amplifier, instrumentation amplifier.

UNIT-III **6**

FREQUENCY RESPONSE OF OPAMP : Open loop and close loop frequency response, design of active filters and oscillators - HPF, LPF, BPF, BRF, All pass filter, phase shift oscillator, Wien bridge oscillator.

UNIT-IV **6**

OPAMP APPLICATIONS: Integrators & differentiators comparators, Schmitt triggers, precision rectifiers, peak detectors, sample & hold circuits. Triangular wave generators, Saw tooth generators, V to F and F to V converters.

UNIT-V **6**

PHASE LOCKED LOOPS & MULTIPLIERS: Voltage control oscillator, Block diagram of PLL free running frequency, lock range, capture range and Sample circuits for each block. Applications of PLL Frequency synthesizer, FM demodulator, AM demodulator, FSK demodulator. Multiplier, IC 565, IC 4046.

UNIT-VI **6**

SPECIALIZED IC: Study of IC 555, IC8038, OP07, LM 324, IC 566, IC 723.Various applications design on above IC

TEXT BOOKS :

1. Ramakant Gaikwad , "OP -AMP and linear Integrated Circuits", PHI, Vth edition, 2008.
2. S.SALIVAHANAN , "Linear Integrated Circuits", Mc Graw HIll.

REFERENCE BOOKS :

1. G.B.Clayton, "Operational Amplifiers", International Edition
2. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", Tata McGraw Hill., Third edition, 2003.

B.TECH. ELECTRONICS & TELECOMMUNICATION

SECOND YEAR SEM-IV

EC2081 CONTROL SYSTEM

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION :

The course studies feedback control systems encountered in a variety of Electronic systems and instrumentation. It will look at the modeling of such systems and the response of these systems to a disturbance. In addition, the control of linear systems using feedback and the design of control systems using different design techniques will be studied.

PREREQUISITES :

No any pre-requisite special course is required. However a basic knowledge of linear algebra, calculus, ordinary differential equations would be beneficial.

COURSE OUTCOMES :

After successful completion of course students will be able to

1. Identify the basic elements and structures of feedback control systems
2. Apply Routh-Hurwitz criterion, Bode and Polar plots to determine stability of linear system.
3. Design Lead-Lag compensators based on frequency data for an open-loop linear system.
4. Construct and recognize the properties of root-locus for feedback control systems
5. Modeling of linear systems using state-space representation.

UNIT-I **6**

CONTROL SYSTEM MODELLING: Definition of control system, Open loop and closed loop. Differential equations and transfer functions. Modeling of electric systems, translational and rotational mechanical systems, Block diagram representation of systems - Block diagram reduction methods - determination of signal flow graph. Mason's gain formula - Examples.

UNIT-II **6**

TIME DOMAIN ANALYSIS: Test signals - time response of first order and second order systems - time response specifications, steady state analysis: steady state error and error constants. Introduction to P, PI and PID controllers.

UNIT-III **6**

FREQUENCY DOMAIN ANALYSIS: Introduction - correlation between time and frequency response - Approximation of transient response from closed loop frequency response -stability analysis using Bode plots, Polar plots, Nichols charts.

UNIT-IV **6**

STABILITY OF CONTROL SYSTEM: Concepts of stability - Routh-Hurwitz stability, Root locus. Effect of pole, zero addition, Nyquist stability criterion - Gain margin, phase margin.

UNIT-V **6**

STATE SPACE ANALYSIS: Concept of state, state variables and state model, state space representation of transfer function system, transformation of system models with Matlab, solving the time invariant state equations, Controllability and Observability.

UNIT-VI **6**

COMPENSATORS: Realization of basic compensators - cascade compensation in time domain and frequency domain and feedback compensation - design of lag, lead, lag-lead compensator using Bode plot and Root locus.

TEXT BOOKS :

1. Ogata.K, Modern Control Engineering, Prentice Hall of India, 4th Edition, 2003.
2. Nagrath & Gopal, Control System Engineering, , New Age International Edition, 3rd Edition 2002.

REFERENCES BOOKS :

1. Benjamin.C.Kuo, Automatic Control Systems, Prentice Hall of India, 7th Edition, 2002.
2. M.Gopal, Control Systems, Tata McGraw-Hill, 1997

B.TECH. ELECTRONICS & TELECOMMUNICATION

SECOND YEAR SEM-IV

EC2101 ELECTRONICS MEASUREMENT & INSTRUMENTATION

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

This course will help to expose the students to a broad knowledge of experimental methods and measurement techniques & to train the students in the skill of operation of instruments in the electrical & electronic engineering applications. Students will understand the basic working of instruments used for measurement & the errors in measurements and their rectification. This course will help to gain proficiency in the use of common measuring instruments & to aware the students about the advances in Instrumentation.

COURSE OUTCOMES :

After completion of this course students should be able to:

1. Identify & classify error sources & explain how their effects can be minimized in measurement.
2. Explain the operating principle of common electronic measuring instruments & their application to testing.
3. Apply the knowledge of transducers & sensors for various applications.
4. Analyze different systems used in monitoring & data acquisition.
5. Choose & use particular analyzer for specific application.

PREREQUISITE :

No any course prerequisite for this course; however above points will be beneficial for studying this course.

UNIT-I **6**

INTRODUCTION TO ELECTRONIC INSTRUMENTS AND MEASUREMENTS: Introduction, Instrument Software ,Instruments, the signal flow of electronics Instruments, Instrument block diagram ,Measurement Systems, Concepts of Accuracy, Precision, Linearity, Sensitivity, Resolution, Errors in Measurement, Classification of Errors

UNIT-II **6**

TEST AND MEASURING INSTRUMENTS: RLC and Q-meter: Measurement of Low, Medium and High Resistance using Wheatstone bridge, Kelvin's Double Bridge, Measurement of Inductance using Maxwell Bridge and Hey Bridge; Measurement of Capacitance using Schering Bridge; Operating Principle and Applications of Q-Meter, PMMC Instruments, Ammeter shunt, Multi range Ammeters, Voltmeter multipliers, Multi range DC Voltmeters, Ohmmeter, Multimeters.

UNIT-III **6**

OSCILLOSCOPE: Block Diagram based Study of CRO, Sweep Modes, Role of Delay Line, Single- and Dual-Beam Dual-Trace CROs, Chop and Alternate Modes, Measurement of Voltage, Frequency, Lissajous Figures in Detection of Frequency and Phase, Digital Storage Oscilloscope (DSO): Storage Mode and Sampling Rate.

UNIT-IV **8**

BASICS OF TRANSDUCERS/SENSORS: Characteristics of Transducers; Requirement of Transducers; Classification of transducers; Selection Criteria of Transducers. DISPLACEMENT: Potentiometers; Linear Variable Differential Transformer, Resistance Strain Gauges, TEMPERATURE: RTD, Thermisters, Thermocouples. PRESSURE: Pressure gauges; Piezoelectric Transducer, Pressure transmitter, Differential pressure Transmitter. FLOW: Restriction type Flow meters-Orifice and Venturi, Flow transmitter, Real time Temperature Scanner, Photoelectric Transducers.

UNIT-V **4**

DATA ACQUISITION AND ADVANCES IN INSTRUMENTATION SYSTEMS: Monitoring Instruments: Indicators, Alarm, Recorders. Data Acquisition and Converters: Data logger; Data acquisition system (DAS)-Single channel, Multichannel.

UNIT-VI **6**

FUNCTION GENERATOR AND ANALYZER: Introduction, The sine wave generator, pulse and square wave generator, function generator, wave analyzer, harmonic distortion analyzer, spectrum analyzer, logic analyzer, Digital Equalizer.

TEXT BOOKS :

1. H. Oliver and J. M. Cage, Electronic Measurement and Instrumentation, McGraw Hill, IIIrd edition, 2009.
2. W. Cooper, A. Helfric, Electronic Instrumentation and Measurement Techniques, PHI, IVth edition, 2008.

REFERENCE BOOKS :

1. C. S. Rangan, G.R. Sarma, V.S.V. Mani, Instrumentation Devices and Systems, Tata McGraw Hill, IXth edition, 2006.
2. K. Sawhney, Electrical & Electronic Instruments & Measurement, Dhanpat Rai and Sons, XIth edition, 2000.
3. A.J. Bowens, Digital Instrumentation, McGraw-Hill, latest addition, 2008.

B.TECH. ELECTRONICS & TELECOMMUNICATION

SECOND YEAR SEM-IV

SH2011 ENVIRONMENTAL SCIENCE

L	T	P	Credits
1	0	0	1

COURSE DESCRIPTION :

The Environmental Science provides an integrated, quantitative and interdisciplinary approach to the study of environmental systems. The students of Engineering undergoing this course would develop a better understanding of human relationships, perceptions and policies towards the environment and focus on design and technology for improving environmental quality. Their exposure to subjects like understanding of earth processes, evaluating alternative energy systems, pollution control and mitigation, natural resource management and the effects of global climate change, will help the students to bring a systems approach to the analysis of environmental problems.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Understand the importance and sensitivity of environment.
2. Avoid over exploitation of natural resources and follow the environmental ethics.
3. Do the sustainable practices for sustainable development.
4. Protect environment and prevent environmental pollution.
5. Apply their knowledge and skills to solve their environment related problems.

PREREQUISITE : Nil.

UNIT I **2**

NATURAL RESOURCES: Renewable and Non-renewable resources, Forest resources, water resources, Mineral resources, food resources, Energy resources, alternative energy resources, Land resources(Use & overexploitation, Problems), Role of individual in conservation of natural resources, Equitable use of resources for sustainable life styles.

UNIT II **2**

ECOLOGY AND ENVIRONMENT: Definition, Principles and Scope of ecology, Ecosystem: Structure and Functions, biotic and abiotic components, energy flows, food chains, food web, ecological pyramids, Biodiversity, types of biodiversity, conservation of biodiversity.

UNIT III **2**

ENVIRONMENTAL POLLUTION AND CONTROL MEASURES: Environmental Pollution, types of pollution, Air pollution, Water Pollution, Noise Pollution, Soil Pollution, Marine Pollution, Radioactive Pollution, Thermal Pollution (Causes, sources and effects, abatement methods), Pollution Case studies-Bhopal Gas Tragedy, Chernobyl Accident: A nuclear Disaster, Ganga Water Pollution.

UNIT IV **2**

SOLID WASTE, HAZARDOUS WASTE AND DISASTER MANAGEMENT: Solid Waste management, Urban & industrial Waste Management,(Causes, sources, effects & control measures), Hazardous waste management, Plastic waste management, E-waste management, Waste minimization technology, Disaster management. Disaster management and risk analysis: Flood, Earthquakes, Cyclones, Landslides, Draught, Tsunami etc.

UNIT V **2**

ENVIRONMENTAL MANAGEMENT: Environmental impact assessment, Impact Assessment Methodologies, Environmental impact statement and environmental management plan, Environmental audit, Cost-benefit analysis, Role of Central Pollution Control Board (CPCB), State Pollution Control Board, Role of NGO's, Role of Information technology in environment & human health, Environmental Ethics: Issues & possible solutions, Awareness of Environmental Legislation.

UNIT VI **2**

SOCIAL ISSUES AND ENVIRONMENT: From unsustainable to sustainable development, Urban problems related to energy, Water conservation: Rainwater harvesting, Watershed management, Resettlement & rehabilitation of people: Problems & concerns, Climate change, Global Warming, Ozone layer depletion, Acid Rain, Consumerism & waste Products, Concepts of Eco-labeled products, Eco-mark, Public Environmental education & awareness regarding environmental issues.

TEXT BOOKS :

1. P. D. Sharma 'Ecology and Environment', Pearson, 2010.
2. Dr. J. S. Samant , 'Environmental Studies' Shivaji University, Kolhapur, 2008.
3. Deeksha Dave and S. S. Katewa, 'Environmental Science & Engineering' Cengage learning, 2009.
4. V. K. Ahluwalia and Sunita Malhotra, 'Environmental Science' Narosa Publication, 2010.
5. P. Anandan & R. Kumaravelan, 'Environmental Science & Engineering' Scitech, 2010

B.TECH. ELECTRONICS & TELECOMMUNICATION

SECOND YEAR SEM-IV

EC2521 DIGITAL DESIGN & VERILOG HDL LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

This course focuses on design of applications in Digital electronics using Verilog HDL. Digital design deals with designing of combinational & sequential circuits. Verilog HDL covers use of simulation software's for digital design & verilog HDL.

PREREQUISITE :

To study this course there are no prerequisites; however knowledge of following will be beneficial.

- ☐ Knowledge of simulation software Multisim, Proteus.
- ☐ Knowledge of number systems & working of basic gates

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Design & implement on hardware, different combinational & sequential circuits using Proteus & Altera kits.
2. Interpret the art of digital system design by Hardware Description Language platform via Verilog HDL and Xilinx 12.1 ISE tools.
3. Write program in Verilog HDL using procedures, functions and different programming strategies.
4. Program, test and simulate for both combinational and sequential modules of digital system in Verilog HDL.
5. Design the real time digital system applications by coding, simulating and synthesis.

Minimum 10 experiments will be conducted as per following list.

LIST OF EXPERIMENTS :

Experiments to be performed on Proteus (Simulation Software)

1. Binary and BCD adders and Subtractors using gates and IC's.
2. Comparator using IC 7485 and Parity generator and checker using X-OR gate.
3. Multiplexers, Encoders, Demultiplexers and decoders
4. Design and implementations of non sequential counter using D FF or JK FF ICs

Experiments to be performed on FPGA using Verilog HDL (Simulation and Synthesis)

5 Realization of n input logic gates using Verilog HDL.

6 Realization of combinational circuits using Verilog HDL-PART I.

a) 8 to 3 encoder with/without priority.

b) 2*4 Decoder.

c) 4 to 1 Multipexer.

d) 1 to 4 Demultiplexer.

7 Realization of combinational circuits using Verilog HDL-PART II.

a) 1 bit full adder using behavioral description. (if statement).

b) HDL description for full adder using structural description.

8 Realization of combinational circuits using Verilog HDL-PART III.

a) Binary to gray conversion and vice versa.

b) 2 bit comparator.

c) VHDL code for 32 bit ALU.

9 Multi level inheritance in Verilog HDL: Construct 4 bit parallel adder using two half adders.

10 Develop Verilog code for the following flipflops.

a) S R Flipflop b) J K Flipflop c) D Flipflop

11 Design following counters with Synchronous and Asynchronous RESET.

a) 3 bit Binary Synchronous Counter with Active low reset

12 Design following counters with Synchronous and Asynchronous RESET.

b) BCD counter

STUDY EXPERIMENTS :

13 Write Verilog HDL code for seven segment display .

14 Write Verilog HDL code for interface 2 liner LCD display .

15 Write Verilog HDL code to interface wireless module (GSM Modem, Zigbee) to FPGA.

B.TECH. ELECTRONICS & TELECOMMUNICATION

SECOND YEAR SEM-IV

EC2541 LINEAR INTEGRATED CIRCUITS LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

Course focuses on working principles of OPAMP & its applications, features & advantages of integrated circuits, theoretical concepts of multipliers & PLL.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Analyze and design differential amplifiers used in linear integrated circuits.
2. Evaluate and design different applications Using OP-AMP.
3. Analyze and design amplifiers and active filters.
4. Illustrate waveform generators and Timer using special ICs.
5. Discuss different PLL and VCO ICs and its applications.

PRE REQUISITES :

There are no prerequisite for this course however; however knowledge of Math's and passive components, discrete electronic components like diode and transistor will be beneficial.

LIST OF EXPERIMENTS : (minimum 10 practical's)

1) Build & test inverting & non-inverting configurations of OPAMP.
2) Build & test voltage follower.
3) Build & test summing amplifier.
4) Build & test instrumentation amplifier.
5) Build & test V to I converter.
6) Build & test I to V converter.
7) Build & test integrator.
8) Build & test differentiator.
9) Build & test Schmitt trigger.

10) Build & test Triangular wave generators.

11) Build & test Saw tooth generators.

12) Build & test phase shift oscillator.

13) Build & test low pass & high pass filters.

14) Build & test comparator.

15) Build & test frequency synthesizer using PLL.

B.TECH. ELECTRONICS & TELECOMMUNICATION
SECOND YEAR SEM-IV
EC2561 PROGRAMMING LAB - II

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

MATLAB is one of the most widely used high level computing languages; it provides users a friendly and interactive environment for algorithm development, data visualization, data analysis, and numeric computation. With its extensive libraries of mathematical and graphical routines, MATLAB is widely used in areas such as signal processing, control system.

This course provides a progressively gentle introduction to Matlab. It is designed to give students fluency in Matlab, including fundamentals of Matlab, programming, solving mathematic equations with Matlab, data visualization etc.

PREREQUISITES :

No any pre-requisite special course is required; however basic knowledge of 'C' language, linear algebra, calculus and ordinary differential equations would be beneficial.

COURSE OUTCOMES :

After successful completion of course students will be able to

1. Become familiar with fundamental operations in Matlab.
2. Write programs using Matlab.
3. Perform statistical data analysis, data interpolation by Matlab, solve differentiation equation with Matlab.
4. Apply standard signals in various mathematical operations of continuous and discrete systems operations.
5. Design and simulate time domain and frequency domain control system problem.

LIST OF EXPERIMENTS :

Following Signals and Systems Assignment should be performed on MATLAB

1. Generate any four waveforms out of the following

   Periodic waveforms such as sine wave, square wave, triangular wave. Non-periodic Waveforms such as ramp, step, impulse, exponential (rising and decaying)

2. Find output of a LTI system to a given input from its impulse response.(Hint: use convolution)
3. Find frequency response of a LTI system from given impulse response
4. Generate a square wave of given frequency from fundamental frequency and its Harmonics. (Apply concept of Fourier series).
5. Using transfer function of an LTI discrete-time system obtain impulse response

Following Control Systems Assignment should be performed on MATLAB

1. Constructs standard input signals such as Step, ramp and parabolic.
2. Obtain open loop and closed loop poles using simple transfer function.
3. Transformation of given transfer function into state space and vice-versa
4. Obtain bode plot, Nyquist plot of given transfer function.
5. Convert the transfer function into Simulink model and verify results using conventional MATLAB procedure.

Following Signal Systems/Control Systems Assignment should be performed on SCILAB

1. Obtain Fourier transform of a rectangular pulse
2. Perform convolution of two triangular pulses.
3. Simulate given LTI system and find its transfer function.
4. Simulate and write the space state representation of the RLC circuit

B.TECH. ELECTRONICS & TELECOMMUNICATION
SECOND YEAR SEM-IV
EC2581 MINI PROJECT (ENVIRONMENTAL SCIENCE)

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

Mini project has been incorporated to enhance high potential in the student and built research and positive attitude towards environment related issues, which will help them in their social and technical life ahead. The mini project is designed to make them apply practical knowledge with relevant tools and techniques to solve real life problems related to the environment & industry. It will help students in developing eco-friendly approach to achieve sustainable development.

COURSE LEARNING OUTCOMES :

1. Experiential Learning.
2. Development of research attitude regarding the environment related problems.
3. Improved teamwork, Environmental awareness, communication, customer awareness, project management.
4. Have insight of interdisciplinary project.
5. Community involvement.

GUIDELINES FOR MINI PROJECT :

1. Subject teacher will be project coordinator.
2. The distribution of project group will be done by project coordinator and respective Head of the department to the faculty.
3. Mini project will be a team work, consisting min. 3 to max. 5 students
3. The faculty can guide to student more than one batch (3 to 5 students-one batch) with consideration to load specification. (2 hrs. per week)
4. Project topic should be application oriented and with consideration to Environmental Science problems in their respective stream. Selection and finalization will be through project guide.
5. Prepare project report as per guidelines provided for first year mini project.
6. Project group must provide complete solution to the selected problem with conceptual clarity.
7. The project will be evaluated by respective branch HOD and project guide and senior faculty.
8. The mini projects should be presented before the committee, which shall evaluate for 100 marks.

K.E.Society's

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute)

B. Tech. (Electronics & Telecommunication Engineering)

Third Year B. Tech- Semester V

(Implementation from Year 2015-16)

Course code	Course	Teaching scheme				Evaluation Scheme					
							Theory (Marks %)			Practical (Marks %)	
		L	T	P	Credits	Scheme	Max	Min for passing		Max	Min for passing
EC3011	Electromagnetic Field Theory	3	1	0	4	ISE	20				
						MSE	30		40		
						ESE	50	40			
EC3031	Electronics Communication System	3	0	0	3	ISE	20				
						MSE	30		40		
						ESE	50	40			
EC3051	CMOS Digital Integrated Circuit Design	4	0	0	4	ISE	20				
						MSE	30		40		
						ESE	50	40			
EC3071	Digital Signal Processing	3	1	0	4	ISE	20				
						MSE	30		40		
						ESE	50	40			
EC3091	Microcontroller	4	0	0	4	ISE	20				
						MSE	30		40		
						ESE	50	40			
EC3511	Electronics Communication System Lab	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC3531	CMOS Digital Integrated Circuit Design Lab	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC3551	Microcontroller Lab	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC3571	Digital signal processing lab	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC3591	Professional Skill Development Lab–II	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
Total		17	02	10	24						

ISE: In Semester Evaluation, **MSE: Mid Semester Examination,**

ESE: End Semester Examination **Total Contact Hours/Week = 29**

Total Number of Credits = 24

K.E.Society's

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute)

B. Tech. (Electronics & Telecommunication Engineering)

Third Year B. Tech- Semester VI

(Implementation from Year 2015-16)

Course code	Course	Teaching scheme				Evaluation Scheme					
		L	T	P	Credits	Scheme	Theory (Marks %)			Practical (Marks %)	
							Max	Min for passing		Max	Min for passing
EC3021	Antenna & wave propagation	4	0	0	4	ISE	20			-	-
						MSE	30				
						ESE	50	40	40		
EC3041	Mixed Mode Controller	3	0	0	3	ISE	20			-	-
						MSE	30		40		
						ESE	50	40			
EC3061	Digital Communication	3	1	0	4	ISE	20			-	-
						MSE	30		40		
						ESE	50	40			
EC3081	Mobile Communication	3	1	0	4	ISE	20			-	-
						MSE	30		40		
						ESE	50	40			
EC3101	Industrial Organization and Management	3	1	0	4	ISE	20			-	-
						MSE	30				
						ESE	50	40	40		
EC3121	Java Programming	2	0	0	2	ISE	100	50		-	-
EC3521	Antenna Lab	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC3541	Mixed Mode Controller Lab	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC3561	Digital Communication Lab	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC3581	Mini-project	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
Total		18	03	08	25						

ISE: In Semester Evaluation, **MSE: Mid Semester Examination,**

ESE: End Semester Examination **Total Contact Hours/Week = 29**

Total Number of Credits = 25

Note: (***): Student should undergo training in an industry for at least 15 days after completion of VIth semester examination. The training report should be submitted to the department with duly signed completion certificate taken from industry. Student should deliver seminar on the training undertaken and evaluation will be carried out on the basis of submitted report and performance in the seminar. The evaluation will be carried in the VIIth semester under the course Industrial Training.

B.TECH. ELECTRONICS & TELECOMMUNICATION
THIRD YEAR SEM-V
EC3011 : ELECTROMAGNETIC FIELD THEORY

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION :

Electromagnetic Field Theory is offered as the core course at the fifth semester of Electronics and telecommunication Engineering undergraduate programme; consist of six units. The first three units constitute the study of Vector algebra, Coordinate system, Electrostatics, and boundary conditions. The last three units constitute the study of Steady Magnetic fields, Transmission lines and Transients on transmission lines.

This course intends to build the competency in the students to understand basics of Electromagnetic Engineering. The good basic knowledge of this subject is useful to understand the courses like Antennas and wave propagation (offered at the sixth semester) and Microwave Engineering (offered at the seventh semester). In addition syllabus of this course is included in competitive examination like GATE.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Apply the knowledge of vector algebra and Co-ordinate system to formulate and solve electromagnetic field problems.
2. Use and apply basics of steady electric and magnetic fields to solve the electrostatics and magneto-statics problems
3. Use the Boundary conditions and Method of Images to solve electromagnetic problems.
4. Use Smith chart to solve transmission line problems and analyze transients on transmission lines.
5. Solve the objective questions in competitive examinations by applying basic knowledge.

PREREQUISITE :

The prerequisite for this course is good background of Engineering Mathematic course offered at the F. Y. B. Tech and S.Y. B. Tech. Students should have clear understanding of the vector algebra, gradient, divergence, curl, complex numbers and differential equations.

UNIT I **06**

VECTOR ANALYSIS : Vector Algebra, Co-ordinate systems, line, Surface & Volume Integral, Curl, Divergence & Gradient, Electric Charge, Coulomb's law, Charge distribution, Electric Field Intensity, field due to distributed charges.

UNIT II **06**

ELECTRIC FLUX & POTENTIAL : Flux density, Gauss's law, Gauss's law in point form, Applications of Gauss's law, Divergence Theorem, Energy of a moving charge in Electric Field, Potential & potential Difference , Potential field of a point charge, potential Gradient, Dipole.

UNIT III **06**

BOUNDARY CONDITIONS : Boundary condition in perfect dielectrics, Method of Images, Point charge near an Infinite Grounded conducting plane, Laplace's Equations.

UNIT IV **06**

STEADY MAGNETIC FIELDS : Current & current Density, Biot-Savart law, Stokes' Theorem, Ampere's Law, Magnetic flux & flux density, vector magnetic potential, Faraday's law, Magnetic field boundary conditions.

UNIT V **06**

TRANSMISSION LINES : Transmission Line equations, Line parameters, Input impedance, The terminated uniform Transmission Line, VSWR, characteristic impedance of Coaxial line, Micro-strip Transmission Line, CPW transmission line.

UNIT VI **06**

GRAPHICAL SOLUTIONS AND TRANSIENTS ON TRANSMISSION LINE : Smith chart, Applications of Smith Chart, Transients on transmission line.

TEXT BOOKS :

1. W. H. Hayt, Engineering Electromagnetics - Publisher- Tata McGraw-Hill.
2. Matthew N. O. Sadiku- Elements of Electromagnetics
3. Clayton R. Paul, Introduction to Electromagnetic Compatibility, Publisher- Wiely Interscience, Second Edition.

REFERENCE BOOKS

1. J. D. Kraus. , Electromagnetics with applications- Publisher- Tata McGraw-Hill
2. Davis K Cheng , Field & Wave Electromagnetics- (Pearson Education)

B.TECH. ELECTRONICS & TELECOMMUNICATION

THIRD YEAR SEM-V

EC3031 : ELECTRONICS COMMUNICATION SYSTEM

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

Electronics Communication Systems is offered as the core course at the fifth semester of Electronics & Telecommunication branch of engineering undergraduate programme; consist of two parts - The first part focuses on basic radar system & navigation, digital modulation techniques & spread spectrum modulation. The Second module constitutes optical fibers, the structures, fabrication and waveguides of optical fibers, optical networks, optical sources and detectors.

Optical communication is most important part in the telecommunications. This subject introduces the fundamentals of optical fibers. It also emphasize on the networks used in industry for communications.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Define spread spectrum modulation and describe its general purpose and its applications.
2. Explain basic concepts of RADAR system & basic elements of optical fiber transmission link, fiber modes configurations & structures.
3. Differentiate between different modulation techniques such as PAM, PWM, PPM.
4. Calculate radar range equation, numerical aperture & losses in optical fiber.
5. Compare different types of photodiodes & photo detectors.

PREREQUISITE :

The prerequisite for this course is the knowledge of basics of communication.

UNIT I **08**

RADAR : Basic radar systems, Radar performance factors, radar cross section,-simple targets, basic pulsed radar systems, antennas and scanning, display methods.

UNIT II **06**

NAVIGATION & PULSE MODULATION : Moving target indication, radar beacons, CW Doppler radar,

FMCW radar, Sampling process, PAM, TDM, PWM, PPM.

UNIT III **06**

SPREAD SPECTRUM MODULATION : Introduction, Direct sequence spread spectrum, use of spread spectrum with CDMA, ranging using DSSS, frequency hopping spread spectrum, generation and characteristics of PN sequences.

UNIT IV **10**

OPTICAL FIBERS : Elements of Optical Fiber Transmission Link, The nature of Light, Basic Optical Laws and Definitions, Single Mode Fibers, Graded Index Fiber Structures, Fiber Materials, Fiber Fabrication, Mechanical Properties of Fibers, Fiber Optic cables.

UNIT V **08**

SIGNAL DEGRADATION IN OPTICAL FIBERS : Attenuation, Signal Distortion in Optical Waveguides, Pulse Broadening in Graded-Index Waveguides, Mode Coupling, Design Optimization of Single Mode Fibers.

UNIT VI **10**

OPTICAL SOURCES & DETECTORS : Topics from Semiconductor Physics, Light-Emitting Diodes (LEDs), Laser Diodes, Light Source Linearity, Modal, Partition and Reflection Noise. Physical Principal of Photodiodes, photodetector Noise, Detectors Response Time, Avalanche Multiplication Noise, Structure for InGaAs APDs, Temperature effect of Avalanche Gain, Comparision of Photodetectors.

TEXT BOOKS :

1. Keneddy Davis, Electronics Communication System,TMH publication- 4th edition
2. Gerd Keiser, Optical Fiber Communication - (TMH), Third Edition
3. R.P.Singh , S.D.Sapre , Communication Systems, Analog and Digital, Tata McGraw Hill
4. Taub, Schilling Principles of communication systems , Tata McGraw Hill, Second Edition

REFERENCE BOOKS :

1. John Senior. , Optical Communication , Pearson Publication.
2. Roddy, Coolen, Electronic Communications, Tata McGraw Hill.

B.TECH. ELECTRONICS & TELECOMMUNICATION

THIRD YEAR SEM-V

EC3051 CMOS DIGITAL INTEGRATED CIRCUIT DESIGN

L	T	P	Credits
4	0	0	4

COURSE DESCRIPTION :

Course is dedicated for advanced Digital VLSI design technique for high performance and low power. As the technology is scaling down, more and more devices are being implemented on a single chip leading to more complex systems on a chip is a challenging design task as millions/billions of transistors are integrated. Design methodology such as top-down synthesis approach & other design issues such as clocking, interconnect, power delivery, testing will also be covered

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Carry out transistor level hand calculation based design of the most important building blocks used in digital CMOS VLSI circuits.
2. Complete a significant VLSI design flow having a set of objective criteria and design constraints & describe the general steps required for processing of CMOS integrated circuits.
3. Create models of moderately sized CMOS circuits that realize specified digital functions & have an understanding of the characteristics of CMOS circuit construction.
4. Estimate and optimize interconnect delay and noise.
5. Introduce the concepts and techniques of modern integrated circuit design and testing using Computer Aided Design (CAD) Tool.

PREREQUISITE :

Basic knowledge of CMOS & CAD tools used in the lab.

UNIT I **08**

MOS DESIGN : Pseudo NMOS Logic - Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT II **08**

COMBINATIONAL MOS LOGIC CIRCUITS : MOS logic circuits with NMOS loads, Primitive CMOS logic

gates - NOR & NAND gate, Complex Logic circuits design - Realizing Boolean expressions using NMOS gates and CMOS gates , AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT III **08**

SEQUENTIAL MOS LOGIC CIRCUITS : Behavior of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flipflop.

UNIT IV **08**

DYNAMIC LOGIC CIRCUITS : Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT V **08**

DATA PATH SUBSYSTEMS : Single bit addition, carry propagate addition, one Zero detectors, comparators, counters, shifters,

UNIT VI **08**

SEMICONDUCTOR MEMORIES : Types, RAM array organization, DRAM - Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory-NOR flash and NAND flash.

TEXT BOOKS :

1. Ken Martin, Digital Integrated Circuit Design -Oxford University Press, 2011.
2. Sung-Mo Kang, Yusuf Leblebici, CMOS Digital Integrated Circuits Analysis and Design -TMH, 3rd Ed., 2011.
3. Principles of CMOS VLSI Design **Solution Set** Version 1.0 Prepared by N. Weste Electronics

   Macquarie University Sydney 2109 NSW Australia (for Units I to III)

REFERENCE BOOKS :

1. Ming-BO Lin, Introduction to VLSI Systems: A Logic, Circuit and System Perspective -CRC Press, 2011
2. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, Digital Integrated Circuits - A Design Perspective, 2nd Ed., PHI.

B.TECH. ELECTRONICS & TELECOMMUNICATION

THIRD YEAR SEM-V

EC3071 DIGITAL SIGNAL PROCESSING

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION :

Signal processing is a technology that spans an vast spectrum of disciplines including entertainment, communication, robotics, space exploration, medicine, seismology, just to name a few. Sophisticated signal processing algorithms and hardware are prevalent in a wide range of systems, from highly specialized military systems through industrial applications to consumer electronics.

The present course covers the concepts and techniques of modern digital signal processing which are fundamental to all the above applications. The course starts with sampling theory of continuous-time signals followed with introduction of discrete Fourier transform and overview of fast algorithms for its computation. The principal methods for design of FIR and IIR filters are covered subsequently. The use of differential equation for description of discrete filters is explored followed with their implementation. Finally, issues related with hardware implementation of discrete systems are discussed.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Relate effect of computation accuracy on performance of digital signal processing system.
2. Describe techniques available for implementation of digital signal processing system.
3. Explain techniques available for implementation of digital signal processing system.
4. Design and simulate the working of given digital signal processing system.
5. Differentiate between techniques available for implementation of digital signal processing system.

PREREQUISITE :

Student should have knowledge of signals and systems.

UNIT I **04**

SAMPLING : A to D conversion, sampling and aliasing, Impulse sampling, sampling theorem, signal reconstruction, band pass signals, sampling of band pass signals

UNIT II **08**

DFT AND FFT : Definition of DFT, Relation between DFT and Z Transform. Properties of DFT, IDFT, Circular

convolution, Linear convolution using circular convolution, Linear convolution of long data sequences-Overlap Save & Overlap-Add algorithm, FFT algorithms: Decimation in time FFT (DIT FFT), Decimation in frequency (DIF FFT), IFFT.

UNIT III **06**

FIR FILTER DESIGN : Introduction, Comparison between Analog and Digital Filters, Characteristics of FIR filter, linear phase FIR filters, FIR filter design using Frequency Sampling and Windowing methods.

UNIT IV **08**

IIR FILTER DESIGN : Introduction, IIR filter design using Impulse invariant method and Bilinear Transformation Method, Butterworth filter approximation, Frequency Transformations.

UNIT V **06**

REALIZATION of DIGITAL FILTERS : Introduction, Basic realization block diagram, Direct form, Cascade and parallel realization of IIR filters, Direct form, Cascade realization structures of FIR filters, Realization of Linear Phase FIR filters.

UNIT VI **04**

DSP SYSTEM IMPLEMENTATION CONSIDERATIONS : computation accuracy: fixed and floating point format, dynamic range, precision and resolution, effect of amplitude quantization

TEXT BOOKS :

1. John G.Proakis, D.G.Manolakis, "Digital Signal Processing", Pearson Education, 1st edition
2. Apte S D., "Digital Signal Processing", Wiley India Pvt Ltd, 2nd edition.
3. P. Ramesh Babu, "Digital Signal Processing" Scitech publication, 4th edition

REFERENCE BOOKS :

1. S.K. Mitra, "Digital Signal Processing Computer Based Approach", Tata MacGraw Hill , 3rd edition
2. D. Defatta, "Digital Signal Processing", A System Design Approach.
3. Salivahanam, A Vallavaraj, C. Guanapriya , "Digital Signal Processing", Tata MacGraw Hill , 1st edition

B.TECH. ELECTRONICS & TELECOMMUNICATION

THIRD YEAR SEM-V

EC3091 MICROCONTROLLER

L	T	P	Credits
4	0	0	4

COURSE DESCRIPTION :

The course has been designed to introduce fundamentals of 8085 and 8051 microcontroller which is one of the most popular general purpose microcontrollers especially designed for embedded systems. It aims to establish a firm understanding about the concepts and basic architecture of 8051, assembly language programming, Embedded C language programming and interfacing of peripherals to the Microcontroller.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Explain the fundamentals of microprocessor, microcontroller and programming related terms.
2. Describe the instructions of microprocessor.
3. Write the programming of microcontroller 8051.
4. Interface peripherals to the microcontroller 8051.

PREREQUISITE :

Student should have introductory knowledge of Digital system. C programming would be helpful but not necessary.

UNIT I **08**

INTRODUCTION TO MICROPROCESSOR : 8085 Microprocessor architecture, Assembly Language programming, Machine cycles. Memory and I/O interfacing, serial communication

UNIT II **08**

8051 ARCHITECTURE : 8051 architecture, Microprocessors and Microcontrollers, Harvard and Von Neumann Architectures, CISC and RISC Processors, Pin description, Internal and external memories, Stack and Stack Pointer, special function registers.

UNIT III **08**

EMBEDDED 'C' : Introduction to ANSI C, Basics of ANSI C, Control Structures, branching and Looping, pointers, arrays, structures, Cx51 Language extensions: Keywords, memory types, memory models, data types, bit manipulation, Preprocessor directives, Cx51 Compiler Library reference.

UNIT IV **08**

PROGRAMMING 8051 : Application Development tools - Keil Cx51 Compiler and compiler control directives. (Assembly language programming). Counters and Timers, Serial communication, Port Structure and Interrupts.

UNIT V **10**

ON CHIP RESOURCE PROGRAMMING AND INTERFACING : Memory Interfacing, Port structure & interfacing with keypad, Seven-Segment display, ADC, DAC, LCD interfacing.

UNIT VI **06**

CASE STUDIES : Design of Microcontroller based Systems (A Hardware & Software approach)

REFERENCE BOOKS :

1. R. S. Gaonkar, Microprocessor Architecture1 Programming and Application with the 8085/8080A.
2. A. P. Mathur, Introduction to Microprocessor
3. Kenneth Ayala, "The 8051 Microcontroller", Cengage Learning.
4. Mazidi , "8051 microcontroller and embedded systems using assembly and C", 2nd edition,Pearson education.
5. C and the 8051: Programming and Multitasking, Schultz, P T R Prentice-Hall,

B.TECH. ELECTRONICS & TELECOMMUNICATION
THIRD YEAR SEM-V
EC3511 ELECTRONICS COMMUNICATION SYSTEM LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

The subject presents practical aspects related to optical communications. The aim of the laboratory programme for the subject is to clarify the theoretical concepts previously studied through their application by using transmitter-fiber-receiver optical fiber equipment.

COURSE OUTCOMES :

After completion of this lab students will be able to:

1. Arrange proper set up for given communication system
2. Predict output of given communication system

3. Test & analyze given communication system for various inputs
4. Sketch waveforms of input & output of given communication system
5. Write relevant conclusion on the performance of given communication system

PREREQUISITE :

The prerequisite for this course is the knowledge of basic communication and optics.

EXPERIMENT LIST :

1. Study of pulse position modulation.
2. Study of pulse width modulation.
3. Study of pulse amplitude modulation.
4. Study of sampling theorem.
5. Set up of fiber optical analog link/ digital link.
6. Study of losses in optical fiber.
7. Study of characteristics of optical fiber LED.
8. Measurement of numerical aperture of optical fiber.
9. Study of frequency modulation and demodulation using fiber optical link.
10. Study of pulse width modulation and demodulation using fiber optical link.
11. Study of pulse position modulation and demodulation using fiber optical link

B.TECH. ELECTRONICS & TELECOMMUNICATION

THIRD YEAR SEM-V

EC3531 CMOS DIGITAL INTEGRATED CIRCUIT DESIGN LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

The goal of the course is to cover fundamentals in CMOS VLSI design. The course practicals have been designed in digital area using software and hardware tools. The goal of the course is to cover fundamentals in CMOS VLSI design. After successfully completing the course, it is expected that students will gain the necessary knowledge and hands-on experiences to design MOSFET basic circuit building blocks to a broad view of both combinatorial and sequential circuits.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. To provide experience designing CMOS VLSI systems using Computer Aided Design (CAD) tools.
2. To introduce the concepts and techniques of modern tools for testing of VLSI systems.
3. Design an application using CMOS inverter.
4. Document and present design solutions in a team environment.
5. Design and implement software solutions to the more complex circuits.

PREREQUISITE :

Basic knowledge of CMOS & CAD tools used in the lab.

EXPERIMENT LIST :

1. Half Adder design VHDL Code, Xilinx Tool
2. Full Adder design VHDL Code, Xilinx Tool
3. Solving Equation: ((A.B) +C) D bar VHDL CODE, Xilinx Tool
4. Counter Design, PROTEUS VSM
5. 4:1 MUX Design, PROTEUS VSM
6. Barrel shifter design using PROTEUS VSM/ Xilinx Tool
7. Design of 2-Input NAND gate using SBT, TINA Tool
8. Clock Design using CMOS inverter chain, TINA Tool
9. Calculation of Propagation delay & Transition for given circuit using TINA Tool
10. L-EDIT Using Tanner Tool, Inverter chip level design
11. S-EDIT Using Tanner Tool, Inverter chip level design
12. W-EDIT Using Tanner Tool, Inverter chip level design

B.TECH. ELECTRONICS & TELECOMMUNICATION

THIRD YEAR SEM-V

EC3551 MICROCONTROLLER LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

Microcontroller is offered as the core course at the fifth semester of Electronics & Telecommunication branch of engineering undergraduate program; consist of minimum twelve experiment. This involves programming which is developed using Assembly language and Embedded C language. The various peripherals interfacing which are used in many applications

COURSE OUTCOMES :

After completion of this lab student will be able to:

1. Write programs in assembly language.
2. Write program in C language.
3. Test and Debug the program
4. Interface various peripheral.
5. Write report and analyze the result

PREREQUISITE : NIL

EXPERIMENT LIST :

1. Develop a program to perform addition, subtraction, multiplication and division using 8085 .
2. Develop a program to flash leds using port1.
3. Develop a program to develop AND gate combinational logic
4. Develop a program to study addressing modes
5. Develop a program to generate square wave using timer.
6. Develop a program to generate time delay using timer.
7. Develop a program for serial communication between microcontroller and PC.
8. Develop a program to Interface Keyboard
9. Develop a program to interface stepper motor

10. Develop a program to interface ADC
11. Develop a program to interface DAC
12. Develop a program to interface seven segment
13. Develop a program to interface LCD

B.TECH. ELECTRONICS & TELECOMMUNICATION
THIRD YEAR SEM-V
EC3571 DIGITAL SIGNAL PROCESSING LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

Signal processing is a technology that spans an vast spectrum of disciplines including entertainment, communication, robotics, space exploration, medicine, seismology, just to name a few. Sophisticated signal processing algorithms and hardware are prevalent in a wide range of systems, from highly specialized military systems through industrial applications to consumer electronics. The present course allows practical implementation of theoretical concepts learned in Digital Signal Processing course.

COURSE OUTCOMES :

After completion of this lab students will be able to:

1. Design and simulate the working of given digital signal processing system
2. Evaluate the performance of designed digital signal processing system
3. Write relevant conclusion on the performance of designed digital signal processing system
4. Present and Write laboratory reports in desired format in grammatically correct language

PREREQUISITE: NIL

EXPERIMENT LIST:

Following experiments should be conducted with C-language by assigning separate problem to each student

1. Calculation of DFT and IDFT of a given signal
2. Calculation of convolution of large data sequence with overlap add/overlap save method
3. Calculation of 8-point DFT of given signal with FFT algorithm

Following experiments should be conducted with MATLAB by assigning separate problem to each student

1. Implementation of Low pass of given specifications filter with Fourier series method and checking its performance by convolving input signal with filter response
2. Implementation of High pass filter of given specifications with window design method and checking its performance by convolving input signal with filter response
3. Implementation of band pass filter of given specifications with Frequency sampling method and checking its performance by convolving input signal with filter response
4. Conversion of given analog transfer function to discrete transfer function with impulse invariance and bilinear transformation method and checking responses of analog and discrete transfer functions for given specifications
5. Implementation of Low pass filter of given specifications with Butterworth Approximation technique and checking its performance by convolving input signal with filter response
6. Implementation of High pass/Band pass /Band reject filter of given specifications with frequency transformation technique and checking its performance by convolving input signal with filter response
7. Implementation of filter structures with FDA tool to understand effect of coefficient rounding
8. Simulation of any experiment, out of experiment 4 to 9, on Simullink and target digital signal processor.

B.TECH. ELECTRONICS & TELECOMMUNICATION
THIRD YEAR SEM-V
EC3591 PROFESSIONAL SKILL DEVELOPMENT LAB-II

L	T	P	Credits
0	0	2	1

COURSE PREREQUISITE :

A Student, who is going to enroll himself for this course, should have following English language abilities:

1. A student should have an ability to interact with others in English.
2. A student should have adequate skills of oral and written communication.
3. A Student should have good reception (listening and reading) skills.

COURSE OBJECTIVES :

To highlight the skills required for successful, lifelong professional development.

To suggest strategies and methodologies that can assist in the acquisition of professional development skills.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Interact with others observing etiquettes in the context.
2. Incorporate leadership traits while heading activities in personal and professional life.
3. Develop meeting styles, planning and participation.
4. Hone team work skills in diverse groups and working creatively.
5. Enhance presentations in academic and professional writings

DETAILS OF THE PRACTICAL

1. **INTRODUCTION TO CORPORATE ETIQUETTES :** Business dress and grooming - Office etiquettes - Telephone etiquettes - Dining etiquettes - Meeting etiquettes - Travel etiquettes - Students will be given case studies or will be asked to perform role plays and will be assessed in presence of the student
2. **LEARN TO EXCEL AS A LEADER :** Leader as visionary - Leader as a problem solver - Leader as a team builder - Leader as a manager - Leader as a communicator - Leader as a power distributor - Leader as a liaison - Leader as a planner
3. **BUILDING SUCCESSFUL TEAMS :** Improving team effectiveness (Characteristics of an effective team) - Effective recruitment - Developing, coaching and motivating your team - Managing different types of people at workplace
4. **FORMAL MEETING AND DECISION MAKING :** Set objectives - Assemble attendees - Create an agenda - Maintain control - Minutes of meeting - Follow-up - Mock meeting of students on an issue will be conducted and assessed - Decision making models - Choosing between options - Deciding whether to go ahead - Financial decisions - Improving decision making - Impact of ethics and values - Group decision making
5. **HOW TO WRITE PROPOSALS :** Executive summary - Need - Objectives - Methods - Evaluation - Timetable - Budget - Items in the proposal will be discussed with students with the help of one or two sample proposals
6. **WRITING PROJECT REPORTS :** Structuring your document effectively (title page, introduction, summary, analysis) - Use of figures, graphs and tables - Conclusion and recommendations - Appendices - References
7. **WRITING SCIENTIFIC ARTICLES AND RESEARCH PAPERS :** General form - Title page - Abstract - Introduction - Materials and methods - results - Literature cited - Proof reading - Grammar and spelling - Common mistakes - Students will be asked to select a paper and analyse it on the basis of discussed items
8. **AN INTRODUCTION TO RTI :** A General overview of the RTI Act, 2005 - RTI movement in India: A historical perspective - RTI legislations in states - Key terms and concepts in the act - Public authorities and their obligations under the act - Accepting an information request, processing and disposing it - Exemptions

from disclosure of information, partial disclosure and "Third Party" information - Information commission: Powers and functions

REFERENCE TEXT (FOR TEACHER) :

1. David A. McMurrey and Joanne Buckley, Handbook for Technical Writing; Cengage Learning, 2011.
2. John Seely, Oxford Guide to Effective Writing and Speaking; Oxford University Press, 2009.
3. Thomas N. Huckin and Leslie A. Olsen, Technical Writing and Professional Communication for Nonnative Speakers of English; Tata McGraw Hills, International Edition, 1991.
4. S. Hariharan, et.al. Soft Skills; MJP Publishers, 2010.

B.TECH. ELECTRONICS & TELECOMMUNICATION
THIRD YEAR SEM-VI
EC3021 ANTENNA & WAVE PROPAGATION

L	T	P	Credits
4	0	0	4

COURSE DESCRIPTION :

Antennas and Wave Propagation course is offered as the core course at the sixth semester of Electronics and telecommunication Engineering undergraduate programme; consist of two modules - The first module constitute the study of antenna fundamentals, wave propagation, various types of antennas, such as, dish antenna, Yagi-Uda antenna, helical antenna etc. The Second module constitutes the study of, radiation, broadband and frequency independent antennas, and specific applications of antennas.

This course intends to build the competency in the students to understand fundamentals of antennas and wave propagation

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Explain the basic parameters of the antennas.
2. Develop the expressions of the fields radiated by the wire antennas.
3. Analyze, compare and describe the various types of antennas and their characteristics
4. Select the antennas for specific wireless communication applications
5. Solve the objective questions in competitive examinations by applying basic knowledge.

The prerequisite for this course is good background of Electromagnetic Engineering course offered at the fifth semester of Electronics and telecommunication Engineering undergraduate programme. Students should have clear understanding of the boundary conditions and transmission line analysis.

UNIT I **09**

ANTENNA BASICS : Omni-directional and isotropic antennas, Basic Antenna parameters: Antenna pattern, Half power beam width, Beam area, Radiation intensity, Beam efficiency, Directivity and Gain, Resolution, Front to Back ratio, Antenna aperture, Effective height, Reflection coefficient, Impedance bandwidth, pattern bandwidth, Antenna Temperature. Field from oscillating dipole, Antenna field zones, The radio communication Link, Wave polarization, Poynting vector for elliptically and circularly polarized wave, Poincare Sphere, Comparison of loop, dipole and slot antennas.

UNIT II **08**

ELECTROMAGNETIC WAVES : Equation of continuity, Maxwell's Equations in point form & Integral Form, Wave equation in free space, Wave propagation through different media, skin depth, Poynting theorem, Poynting vector, Reflection of Plane wave and Standing wave ratio.

UNIT III **08**

DIFFERENT ANTENNAS : Dish Antenna, Flat sheet reflector Antenna, Yagi Uda antenna, folded dipole, Helical antenna, Micro-strip patch antennas: Feed methods, Bandwidth improvement, size reduction. Slot antenna, Horn Antenna, Broadband basics, Infinite and finite Bi-conical antennas, Rumsey's principle, Planar Log-Spiral antenna.

UNIT IV **07**

RADIATION : Retarded potential, Far field due to alternating element (instantaneous and phasor form), Power radiated by current element, Radiation resistance of current element, Field radiated by half wave dipole. Two ray ground reflection model(overland microwave communication circuits).

UNIT V **08**

ANTENNA ARRAYS : Arrays of two isotropic point sources: same amplitude and phase, same amplitude and opposite phase, same amplitude and in phase quadrature, same amplitude and any phase difference, Unequal amplitude and any phase difference. Nonisotropic but similar point sources and the principle of pattern multiplication, Nonisotropic and Dissimilar point sources, Linear arrays of n isotropic point source of equal amplitude and spacing. Null direction and half power beam width of linear arrays of n isotropic point source of equal amplitude and spacing. Binomial arrays.

UNIT VI **08**

ANTENNAS FOR SPECIAL APPLICATIONS : Electrically small antennas, Antenna sitting and the effect of

the ground, Ground plane antennas, Turnstile antenna, circularly polarized antennas, Submerged antennas, Mobile handset antennas (PIFA), Satellite Link Antennas, On chip antennas, Smart Antenna system.

TEXT BOOKS

1. John D Kraus -Antenna for all Application- TMH publication, third edition.
2. Constantine A. Balanis, Antenna Theory- Wiley Publication ,Third edition
3. Kin Lu Wong, Planar Antennas for wireless communications- Wiley Publication.

B.TECH. ELECTRONICS & TELECOMMUNICATION

THIRD YEAR SEM-VI

EC3041 MIXED MODE CONTROLLER

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

The MSP430 micro controller is ideally suited for development of Low-power embedded systems that must run on batteries for many years. There are also applications where MSP430 & 8500D microcontroller must operate on energy harvested from the environment. This is possible due to the ultra-low power operations. The fact that it provides a complete system solution including a RISC CPU, flash memory, on-chip data converters and on-chip peripherals.

COURSE OUTCOMES :

After learning the course the students will able to

1. Identify the basics of TI MSP430 controller architecture with its hardware specifications. & Low power comparative study with other microcontrollers.
2. Study complete system solution with minimum system design issues (Data sheet) including a RISC CPU, flash memory, on-chip data converters and on-chip peripherals
3. Understand how to use IDE for Assembly language & C language by writing different programs.
4. Demonstrate an ability to use on chip peripherals for interfacing a microcontroller with peripheral devices & develop software for microcontroller systems using a high-level programming language.
5. Design and Simulate embedded system for the given specifications

PREREQUISITE :

The students should have an understanding of Digital systems, Microprocessor, & Microcontrollers. They know how to write computer programs, and had some exposure to "C" language programming in general. In this course the students know how to design mix signal systems

UNIT I **06**

INTRODUCTION : Motivation for MSP430microcontrollers, Comparison between Microcontroller & MSP430 controller, Low Power embedded systems, On-chip peripherals (analog and digital), and low-power RF capabilities. Target applications (Single-chip, low cost, low power, high performance system design). Low power comparative study with other microcontrollers

UNIT II **06**

ARCHITECTURE : CPU & MEMORY: MSP430 RISC CPU architecture, Compiler-friendly features,, Memory subsystem, reset sources, Reset conditions, Interrupts & use of interrupts , Clock sources, clock controls & Clock uses.

UNIT III **06**

ADDRESSING MODES & INSTRUCTION SET : Register Mode, Immediate Mode, Symbolic mode/Absolute mode, indirect mode & indirect auto increment mode, Core instructions & Emulated Instructions. More about Software, Sophisticated Programming Languages How Parts of a Processor Perform Their Functions, Memory and Input / Output

UNIT IV **06**

ON-CHIP PERIPHERALS : GPIO, Hardware multipliers, ADC, LCD Driver, D/A converter- Pulse width Modulation, Watchdog Timer, Basic Timer, Real Time Clock (RTC) Using the Low-power features. Clock system; low-power modes, Clock request feature

UNIT V **06**

IDE : Understanding how to use IDE for Assembly, C, Assembly projects for MSP430 microcontrollers. Interrupt programming .Digital I/O - I/O ports programming using C and assembly, Understanding the mixing scheme of the MSP430 pins. Brief introduction about MSP430 Development kit

UNIT VI **06**

LOW POWER DESIGN : MSP430 low power characteristics, MSP 430 Low power Modes, Periodic interrupts & Low power design, Processors: Understanding the mixing scheme of the MSP430 pins. Brief introduction about MSP430 Development kit, The Development kit MSP430F449, JTAG emulation debug & Programming tools, Flash Emulation tool (FET) allows application Development on MSP430 kit.

TEXTBOOKS :

1. Editor C P Ravikumar, "MSP430 Microcontroller in Embedded Systems Projects", Elite Publishing, and DEC.2011.IISBN: 978-81-88901-46-3
2. John Davies, "MSP430 Microcontroller Basics", Elsevier, 2008.
3. Jerry Luecke ,Analog & Digital circuits for Electronics Control system applications using TI MSP430 microcontroller Elsevier publications (Newnes is an imprint of Elsevier)

REFERENCE BOOKS :

MSP430 Teaching CD-ROM, Texas Instruments, 2008 (can be requested http://www.uniti.in)

B.TECH. ELECTRONICS & TELECOMMUNICATION
THIRD YEAR SEM-VI
EC3061 DIGITAL COMMUNICATION

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION :

This course discusses the principles of digital communication which can be applied to different communication systems. It makes students get acquainted with use of statistical techniques, source coding and error control in digital communication.

COURSE OUTCOMES :

After successful completion of course students will be able to

1. Compare analog and digital communication systems,
2. Solve numerical on statistical theory, source coding and channel coding.
3. Apply various theorems of encoding, error control etc on signals.
4. Analyze various digital modulation techniques.
5. Evaluate performance of different modulation techniques.

PREREQUISITE :

Knowledge of mathematics and statistics (Probability Theory) is essential

UNIT I **06**

RANDOM SIGNAL THEORY: Discrete random variables - Probability mass function, statistical averages. Continuous random Variables- PDF & Statistical averages, Random Processes: Time average, Ergodicity, Power Spectral density of Stationary random processes.

UNIT II **06**

INFORMATION THEORY: Entropy, Information Rate, Shannon's encoding theorem, communication channels- Discrete & Continuous, Rate of information transmission over a discrete channel, Shannon-Hartley theorem, Implication of Shannon's Theorem, Huffman's coding & Shannon-Fano Coding techniques.

UNIT III **06**

SOURCE CODING : Quantization - Uniform, Non- Uniform, Pulse code modulation (PCM), Differential pulse code modulation (DPCM), Delta Modulation (DM), Adaptive Delta Modulation (ADM). Noise performance of PCM and DM. Comparison of PCM, DPCM and DM.

UNIT IV **06**

DIGITAL MODULATION TECHNIQUES AND DATA FORMATS : Data Formats-RZ, NRZ, AM. ASK, FSK, PSK - coherent, Non- coherent, BPSK, DPSK, QPSK, 16-QAM, Comparison of modulation schemes. GMSK

UNIT V **06**

BASEBAND TRANSMISSION AND OPTIMAL RECEPTION OF DIGITAL SIGNAL : Baseband transmission and Optimal Reception of Digital Signal: Pulse shaping for optimum transmissions. A Baseband Signal Receiver, Probability of Error. Optimum Receiver, optima! of Coherent Reception. Signal Space Representation and Probability of Error, eye diagrams, Cross talk.

UNIT VI **06**

CHANNEL CODING : Types of Errors & codes, linear block codes, error detection & correction, Hamming codes, Look-up table decoding. Binary Cyclic codes, Encoding using (n-k) bit shift registers, Syndrome calculation. BCH, Burst codes, Convolution codes, Encoders, Decoders, Code tree. viterbi algorithm. Trellis coded modulation (TCM).

TEXT BOOKS :

1) K.Sam Shanmugan "Digital & Analog Communication Systems" Wiley India Edition

2) R P Singh, S D Sapre 'Communication System-Analog & Digital'-Tata Mc Graw Hill Publication, IInd Edition

3) Simon Haykin "Digital Communication" Wiley India Edition

REFERENCE BOOKS :

1. Bernard Sklar "Digital Communication-Fundamentals and Applications",Pearson Education, IInd Edition
2. Taub & Schiling "Principles of communication System", Tata McGRAW Hill, IInd Edition
3. John Prokis "Digital Communication" Pearson Education.
4. B.P. Lathi "Modern Digital & Analog Communication System".

B.TECH. ELECTRONICS & TELECOMMUNICATION
THIRD YEAR SEM-VI
EC3081 MOBILE COMMUNICATION

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION :

With the rapid growth and innovations witnessed in the mobile industry, the communication field has greatly transformed. The mobile telecom industry in India is certainly a growing market. Continued innovation in the industry, such as mobile Internet and social networking applications such as Twitter, has further had a measurable impact in the communication field. Mobile communications has become a force to reckon with in personal communication. Business communication has greatly eased with the advent of mobile communication. The mobile industry has scaled dramatically over the last decade. At the end of 2003, there were a little over one billion unique subscribers globally, equivalent to just under one in six people. By the end of 2013 this figure had increased more than threefold to 3.4 billion, equivalent to a unique subscriber penetration rate of 47%. By 2020, the majority of the world's population (56%) is expected to have their own mobile subscription. Multi-SIM ownership means that at the end of 2013 there were a total of 6.9 billion SIM connections, with an average of 1.8 active SIM cards per unique subscriber.

This course will address the technical concepts which are at the core of design, implementation, research and invention of wireless communication systems that is conducive to understanding general concepts as well as those specific to current and evolving wireless communication systems and standards such as GSM and CDMA. The different kinds of mobile communication channels is taken up and large scale path loss model as well as small scale fading effects are dealt. Three main signal processing techniques at the receiver, namely, equalization, diversity and channel coding are considered. Finally, different kinds of multiple access techniques are covered at length with the emphasis on how several mobile communication techniques evolve via this.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Describe the evolution of wireless communication systems, major modern wireless communication of 21st century, the cellular radio concepts and the most common analog and digital communication techniques used in wireless communication.
2. Identify techniques to improve coverage and capacity in cellular systems, which describes how to model and measure large scale and small scale fading effects and choose the multiple access schemes which allow many mobile users to share a finite amount of spectrum simultaneously.
3. Evaluate speech quality in existing and proposed cellular, cordless communication, etc.
4. Analyze frequency reuse principles for the 1st generation cellular systems, coding and modulation techniques for the 2nd generation cellular systems and CDMA technology for the 3rd generation cellular systems.
5. Explain the need of coding and describe current and future cellular mobile communication systems (GSM, IS95, CDMA, LTE, etc.)

PREREQUISITE :

Analog Communication (EC2031)

UNIT I **06**

INTRODUCTION TO MOBILE COMMUNICATION : Introduction to wireless Communication Systems: Evolution of Mobile Radio Communication, Examples of Wireless Communication Systems, Requirements for the Services and Economic and Social Aspects. Modern Wireless Communication System: Second Generation (2G), Third Generation (3G) cellular networks and Fourth Generation (4G). The Cellular Concepts: Introduction, Frequency reuse, Channel Assignment, Handoff, Interference & System capacity, Trunking & Grade of Service, Improving coverage & capacity.

UNIT II **06**

MOBILE RADIO PROPAGATION : Propagation Mechanism: Free space loss, Reflection, Diffraction, Scattering. Fading & Multipath: Small scale multipath propagation, Impulse response model of multipath channel, Small scale multipath measurements, Parameters of mobile multipath channels, Types of small scale fading.

UNIT III **06**

SPEECH CODING & MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATIONS : Speech Coding: Vocoders, Linear Predictive Coders, Selection of Speech Coders for Mobile Communication, GSM Codec. Multiple Access Techniques: FDMA, TDMA, FHMA, CDMA, SDMA, OFDM, Packet Radio, Capacity of Cellular Systems.

UNIT IV **06**

GSM : Introduction to GSM systems, GSM architecture System Overview, The air interface, Logical & Physical

channel, Synchronization, Coding, Equalizer, Circuit Switched data transmission, Establishing connection and handover, GSM services.

UNIT V **06**

IS-95 CDMA AND CDMA 2000 : System overview, Air interface, Coding, Spreading and modulation, Logical and physical channels, Handover.

UNIT VI **06**

THIRD AND FOURTH GENERATION SYSTEMS : Quality of Services in 3G ; Wireless Local Loop: Wireless Local Loop Architecture; Deployment Issues; TR-45 Service Description, UMTS: Basic Architecture, UTRA FDD mode, UTRA TDD mode, LTE: Goals, Network architecture. WiMAX: WiMAX versus Existing Cellular Systems, Frequency Bands, Network Architecture

TEXT BOOKS :

1. Theodore S Rappaport, "Wireless Communications Principles & Practice", Pearson Education, Second Edition
2. Andreas F Molisch, "Wireless Communications", Wiley India, Second Edition
3. Krzysztof Wesolowski, "Mobile Communication Systems", Wiley publication

REFERENCE BOOKS :

1. Vijay K Garg, Joseph E Wilkes, "Principles & Applications of GSM" Pearson Education
2. Vijay K Garg, Joseph E Wilkes, "IS-95 CDMA and CDMA 2000 Cellular/PCS Systems Implementation" Pearson Education
3. W.C.Y. Lee, "Mobile Communications Engineering: Theory and applications", McGraw- Hill International, Second Edition

B.TECH. ELECTRONICS & TELECOMMUNICATION

THIRD YEAR SEM-VI

EC3101 INDUSTRIAL ORGANIZATION AND MANAGEMENT

L	T	P	Credits
3	1	0	4

COURSE DESCRIPTION :

To develop competencies and abilities to work in an industrial organization by effectively study the concepts of Planning, Organizing,Managing, Staffing and Control. Idea is to change their opinions from job seeker to job provider by enhancing their abilities to plan and formulate business (entrepreneurship) plans and capacity building to uptake engineering projects without having cost and time overruns.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Determine relevance of various different industrial organization structures.
2. Discover practical importance of planning and management.
3. Determine the appropriate staffing and controlling techniques, how to motivate the staff with specific traits.
4. Capable of planning an entrepreneurship with understanding of being rich vs. powerful.
5. Solve case studies related with project management and plan risk reward balance.

PREREQUISITE : NIL

UNIT I **06**

ORGANIZATION : Nature and purpose of organization, process of organizing - Principles of organization, Departmentalization, organization structure - Types of organization. Committees - Centralisation Vs Decentralisation of authority and responsibility - Span of control - MBO

UNIT II **07**

MANAGEMENT & PLANNING : Introduction - Meaning - nature and characteristics of Management, Scope and functional areas of Management - Management & Administration - Roles of Management, Levels of Management, Modern Management Approaches Nature, importance and purpose of planning process - Objectives - Types of plans (Meaning only) - Decision making - Importance of planning - steps in planning & planning premises Hierarchy of plans

UNIT III **05**

STAFFING AND CONTROLLING : Nature and importance of Staffing - Process of Selection & Recruitment (in brief). Leadership styles, Motivation Theories, Communication - Meaning and importance - Coordination, meaning and importance and Techniques of Co - ordination.

UNIT IV **06**

ENTREPRENEUR : Meaning of Entrepreneur; Functions of an Entrepreneur, Types of Entrepreneur, Intrapreneur - an emerging Class. Concept of Entrepreneurship, Development of Entrepreneurship; Stages in entrepreneurial process; Role of entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship - its Barriers & its application

UNIT V **06**

SMALL SCALE INDUSTRY : Definition; Characteristics; Need and rationale: Objectives; Scope; role of SSI in Economic Development. Advantages of SSI Steps to start an SSI - Government policy towards SSI; Different Policies of S.S.I.; Government Support for S.S.I. during 5 year plans, Impact of Liberalization, Privatization, Globalization on S.S.I., Effect of WTO/GATT Supporting Agencies of Government for S.S.I Meaning; Nature of Support; Objectives; Functions; Types of Help; Ancillary Industry and Tiny Industry (Definition only).

UNIT VI **06**

PREPARATION OF PROJECT : Meaning of Project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; formulation; Guidelines by Planning Commission for Project report; Network Analysis; Errors of Project Report; Project Appraisal. Identification of Business Opportunities - Market Feasibility Study; Technical Feasibility Study; Financial Feasibility Study & Social Feasibility Study.

TEXT BOOKS :

1. P. C. Tripathi, P. N. Reddy, Principles of Management - Tata McGraw Hill
2. O.P. Khanna , Industrial Organization and management
3. Vasant Desai, Dynamics of Entrepreneurial Development & Management - Himalaya Publishing House.
4. Poornima M Charantimath , Entrepreneurship Development - Small Business Enterprises -- Pearson Education - 2006.

REFERENCE BOOKS :

1. Telsang , "Industrial and Business management" S Chand Publications
2. Robert Lusier - Thomson, Management Fundamentals - Concepts, Application, Skill Development
3. S S Khanka - Entrepreneurship Development - S Chand & Co

B.TECH. ELECTRONICS & TELECOMMUNICATION

THIRD YEAR SEM-VI

EC3121 JAVA PROGRAMMING

L	T	P	Credits
2	0	0	2

COURSE DESCRIPTION :

This course deals with the basics of Java Language which are essential to understand the difference in Java with huge API base (Application Programmers Interface) and Other Object oriented programming Language. It also deals with brief introduction to available technologies such as J2EE, J2SE and J2ME which are used to develop real time applications.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Differentiate between Simple Programming Language and Object Oriented Programming Language.
2. Define predefined packages and create user defined packages.
3. Describe the different platforms of programming Languages.
4. Classify the Java Language to database connections types.

PREREQUISITE : Nil

UNIT I **05**

INTRODUCTION & OBJECT ORIENTED PROGRAMMING IN JAVA : Java buzzwords, The Java Virtual Machine, Variables and data types ,Conditional and looping constructs ,Arrays Fields and Methods , Constructors , Overloading methods , Garbage collection , Nested classes, Overriding methods , Polymorphism , Making methods and classes final , Abstract classes and methods, Interface.

UNIT II **04**

PRE DEFINED PACKAGES (COLLECTION & UTIL : List, Set, Map (Hash Table, Hash Map, Concurrent Map),Queues, Array, Vector, Operation on String. event model, date and time facilities, internationalization.

UNIT III **03**

USER DEFINED PACKAGES : Organizing Classes and Interfaces in Packages, Package as Access Protection Defining Package, CLASSPATH Setting for Packages, Naming Convention For Packages.

UNIT IV **04**

EXCEPTION HANDLING : The Idea behind Exception, Exceptions & Errors, Types of Exception, Control Flow In Exceptions, JVM reaction to Exceptions, Use of try, catch, finally, throw, throws in Exception Handling. In-built and User Defined Exceptions, Checked and Un-Checked Exceptions

UNIT V **04**

THE JAVA PROGRAMMING LANGUAGE PLATFORM (J2SE,J2EE, J2ME,JAVAFX) : Java Platform, Standard Edition (Java SE), Java Platform, Enterprise Edition (Java EE), Java Platform Micro Edition (Java ME), Java FX, Overview of Enterprise Applications, Java EE Servers.

UNIT VI **04**

DATABASE CONNECTIVITY AND SQL : Different types of Drivers, Basic design of JDBC, JDBC Programming Concepts, and Executing Queries.

TEXT BOOKS

1. Herbert Schildt, "Complete Reference JAVA 2", TMGH Publication.
2. SCJP Sun Certified Programmer for Java 6 Exam 310-065 by Kathy Sierra and Bert Bates
3. OJAVA_firstcup.pdf, Your First Cup: An Introduction to the JavaTM EE Platform (http://docs.oracle.com/javaee/6/firstcup/doc/firstcup.pdf)

B.TECH. ELECTRONICS & TELECOMMUNICATION
THIRD YEAR SEM-VI
EC3521 ANTENNA LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

Antennas and Wave Propagation course is offered as the core course at the sixth semester of Electronics and telecommunication Engineering undergraduate programme; consist of two modules - The first module constitute the study of antenna fundamentals, wave propagation, various types of antennas, such as, dish antenna, Yagi-Uda antenna, helical antenna etc. The Second module constitutes the study of, radiation, broadband and frequency independent antennas, and specific applications of antennas.

This course intends to build the competency in the students to understand fundamentals of antennas and wave propagation

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Measure and analyze the parameters of the different antennas
2. Design and Simulate different types of Antennas using Electromagnetic Field solver
3. Analyze the performance of the different types of antennas
4. Demonstrate ability to work effectively in a team

PREREQUISITE :

The prerequisite for this course is good background of Electromagnetic Engineering course offered at the fifth semester of Electronics and telecommunication Engineering undergraduate programme. Students should have clear understanding of the boundary conditions and transmission line analysis.

EXPERIMENT LIST :

1. Dipole Antennas.
2. A) Measurement of Current and voltage Distribution on the dipole antennas B) Measurement of Frequency response of the Antennas using Network Analyzer.
3. Yagi-Uda and Slot Antennas.
4. Simulation of dipole and Yagi Uda Antennas using CAD-FEKO software.
5. Simulation of Monopole antenna using CAD-FEKO software.
6. Polarization of a wave.
7. Study of antenna sitting and the effect of perfect and imperfect ground on the radiation pattern of the antenna.
8. Study of Broadside and Ordinary End-Fire arrays using MATLAB.
9. Simulation of Micro-strip Patch Antenna using CAD-FEKO software.
10. Simulation of PIFA Antenna using CAD-FEKO software.

B.TECH. ELECTRONICS & TELECOMMUNICATION

THIRD YEAR SEM-VI

EC3541 MIXED MODE CONTROLLER LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

The mixed mode controller i.e.MSP430 micro controller is ideally suited for development of Low-power embedded systems that must run on batteries for many years. There are also applications where MSP430 microcontroller must operate on energy harvested from the environment. This is possible due to the ultra-low power operations. After successfully completing the course, it is expected that students will gain the necessary knowledge and hands-on experiences to design Low-power embedded systems using MSP430 Microcontroller.

PREREQUISITES :

Basic knowledge of use of IDE for Assembly language & C language programs used in the lab.

COURSE OUTCOMES :

After learning the course the students will able to

1. Understand how to use IDE for Assembly language & C language by writing different programs.
2. Study complete system solution with minimum system design issues including a RISC CPU, flash memory, on-chip data converters and on-chip peripherals
3. Demonstrate an ability to use on chip peripherals for interfacing a microcontroller with peripheral devices & develop software for microcontroller systems using a high-level programming language.
4. Design and Simulate embedded system for the given specifications.
5. Document and present design solutions in a team environment.

EXPERIMENT LIST :

Part-(A) Programs to be carried on MSP 430 Teaching Kit based on MSP430FG4618 Processor with Cross Works IDE

1. Data Transfer - Block move, Exchange, Sorting, Finding largest element in an array.
2. Arithmetic Instructions - Addition/subtraction, multiplication and division, square, Cube - (16 bits Arithmetic operations - bit addressable).
3. Counters.

4. Boolean & Logical Instructions (Bit manipulations).
5. Conditional CALL & RETURN.
6. Code conversion: BCD - ASCII; ASCII - Decimal; Decimal - ASCII; HEX - Decimal and Decimal - HEX.
7. Programs to generate delay, Programs using serial port and on-Chip timer / counter.

   Part (B) Write C programs to interface MSP chip to Interfacing modules to develop single chip solutions on Cross Works Development Environment.
8. Write a Program to test the ADC Signal by using 8-LEDs arrays.
9. Write a program to study on board relay.
10. External ADC and Temperature control interface to MSP
11. Stepper and Bi directional DC motor control interface to MSP
12. Alphanumeric LCD panel and Hex keypad input interface to MSP.
13. Generate different waveforms Sine, Square, Triangular, Ramp etc. using DAC interface to MSP; change the frequency and amplitude.
14. Simple Calculator using 6 digit seven segment display and Hex Keyboard Interface to MSP

B.TECH. ELECTRONICS & TELECOMMUNICATION
THIRD YEAR SEM-VI
EC3561 DIGITAL COMMUNICATION LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

Digital Communication is a fundamental and core subject for TY B.Tech. E&TC program. It introduces students to principles of Digital Communication. The course provides a thorough knowledge of use statistics in digital communication, different digital modulation schemes, digital transmission methods and analysis of errors etc.

COURSE OUTCOMES :

After completion of this lab students will be able to:

1. Calculate PDF, CDF, Mean and Variance of continuous and discrete random variables
2. Differentiate and Illustrate different types of Modulation techniques.

3. Explain different data formats.
4. Analyze and demonstrate different shift keying techniques.
5. Conduct the experiments in group.

PREREQUISITE :

There is no prerequisite; however the basic knowledge of mathematics and electronics is beneficial.

EXPERIMENT LIST :

1. Study of Probability.
2. Write a MATLAB Program to calculate PMF, CDF and PDF for discrete and continuous random variable.
3. Write a MATLAB Program to calculate Mean, Variance and Standard deviation for discrete and continuous random variable.
4. Study of Amplitude Shift Keying.
5. Study of Frequency Shift Keying.
6. Study of Phase Shift Keying
7. Study of Pulse Code Modulation.
8. Study of Differential Pulse Code Modulation.
9. Study of PCM Companding.
10. Study of Delta Modulation.
11. Study of Adaptive Delta Modulation.
12. Study of Error Control codes.

B.TECH. ELECTRONICS & TELECOMMUNICATION
THIRD YEAR SEM-VI
EC3581 MINI-PROJECT

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

A mini-project is a short, practical problem which requires for its solution the application of the knowledge and skills developed in previously completed set experiments. The main intention of Mini Project is to make student enable to apply the knowledge and skills learned out of courses studied to solve/implement predefined practical problem. The students undergo various laboratory/tutorial/simulation laboratory/work shop courses in which they do experimentation

based on the curriculum requirement. The mini Project may be beyond the scope of curriculum of courses taken or may be based on the courses but thrust should be on

- ☐ Learning additional skills
- ☐ Development of ability to define and design the problem and lead to its accomplishment with proper planning
- ☐ Learn the behavioral science by working in a group

COURSE OUTCOMES :

After completion of this course student will be able to:

1. Identify & formulate problems which can be resolved by engineering solutions.
2. Analyze, design, implement & test electronics system by using advanced tools and techniques.
3. Develop professional, ethical and moral responsibilities.
4. Communicate effectively through reports, presentations and discussions.
5. Apply project management skills (scheduling work, procuring parts, and documenting expenditures and working within the confines of a deadline).
6. Work as a member and a team leader for project development.

PRE-REQUISITES :

Students should have knowledge and skills that students have gained from previous coursework in their professional engineering degree.

Following topics to be discussed with Guide/Supervisor

1) System design philosophy, design consideration for reliability, Criterion and precaution in selection of components, devices and ICs, PCB art work and lay out preparation.

2) Introduction to project management, requirement engineering, risk management, detailed project definition, resource planning and scheduling, software quality assurance.

Guidelines for Project :

1) Students should submit synopsis of mini-project at the beginning of semester.

2) Project topic should encompass System/Product design and Development with reasonable hardware/software content.

3) Project topic, once approved, shall not be changed throughout the semester.

4) Writing Device drivers, Systems Programs, Communication Protocol deployments/, Mobile/Wireless Computing related software development etc. are a few indicative areas/domains where in only software projects are allowed.

5) Theoretical/Review /Survey type projects are not allowed.

6) Group size of maximum FIVE students is allowed depending upon complexity and scope of the work.

7) The group should maintain a log book of activities. It should have entries related. To the work done, problems faced, solution evolved etc., duly signed by project guide.

8) Student will present and demonstrate mini project at the end of semester in front of DPC Panel members.

9) Project reports shall be written, documented and bound strictly as per the format provided by the department.

10) Hardcopy of project report shall be submitted to the Department. (Along with soft copy (CD)).

B.TECH. ELECTRONICS & TELECOMMUNICATION
THIRD YEAR SEM-VI
INDUSTRIAL TRAINING

Two weeks Industrial Training is mandatory in summer vacation & will be evaluated in 7th semester.

Course Objectives :

1. To make student proficient in latest technologies used in industries.
2. To increase students employability.

The "Industrial Training" Credit Course is introduced in the curriculum to increase interactions with Industries and improve professional skills of students. As part of this course, each student needs to complete industrial training in one latest technology used in the Industries. The industrial training has to be taken by TY students during summer vacation. The Institute will announce list of offered training programs with details. The student may choose any training program given in the list and complete it as per schedule given for corresponding training. The registration fee for training is to be paid by students.

This is mandatory course for all students of autonomous batch. The course being "Credit Course"; the student will be awarded with 2 credits in the course on successful completion of training.

"Successful completion of training" means fulfillment of following commandments.

1) The student should submit certificate in the area of training which is recognized internationally or issued by Industry with either Private limited Registration or should have any CMMI level rating.

2) The student implements a project / technical case study / tool which demonstrate the skills acquired by him/ her during the training.

K.E.Society's

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute)

B. Tech. (Electronics & Telecommunication Engineering)

Final Year B. Tech- Semester VII

(Implementation from Year 2016-17)

Course code	Course	Teaching scheme				Evaluation Scheme					
							Theory (Marks)			Practical (Marks)	
		L	T	P	Credits	Scheme	Max	Min for passing (%)		Max	Min for passing (%)
EC4011	RTOS based Embedded System Design	3	0	0	3	ISE	20	40	40	-	-
						UT1	15				
						UT2	15				
						ESE	50	40			
EC4031	Computer Communication and Network	3	0	0	3	ISE	20	40	40	-	-
						UT1	15				
						UT2	15				
						ESE	50	40			
EC4051	Electronics System Design & optimization	3	0	0	3	ISE	20	40	40	-	-
						UT1	15				
						UT2	15				
						ESE	50	40			
PE-I	Program Elective-I	3	0	0	3	ISE	20	40	40	-	-
						UT1	15				
						UT2	15				
						ESE	50	40			
OE-I	Open Elective-I	3	0	0	3	ISE	20	40	40	-	-
						UT1	15				
						UT2	15				
						ESE	50	40			
EC4511	Computer Network Lab	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC4531	Embedded System Lab	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC4551	Industrial training(***)	0	0	0	2	ISE	-	-	-	50	50
EC4571	Employability Enhancement Skill-I	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC4591	Project Phase - I	0	0	4	4	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
Total		**15**	**0**	**10**	**24**						

***** Industrial Training to be completed after completion of VIth semester examination**

ISE: In Semester Evaluation, UT: - Unit Test

ESE: End Semester Examination Total Contact Hours/Week = 25

Total Number of Credits = 24

K.E.Society's

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute)

B. Tech. (Electronics & Telecommunication Engineering)

Final Year B. Tech- Semester VIII

(Implementation from Year 2016-17)

Course code	Course	Teaching scheme				Evaluation Scheme					
							Theory (Marks)			Practical (Marks)	
		L	T	P	Credits	Scheme	Max	Min for passing (%)		Max	Min for passing (%)
EC4021	Microwave Engineering	3	0	0	3	ISE	20	40	40	-	-
						UT1	15				
						UT2	15				
						ESE	50	40			
EC4041	Video Engineering	2	0	0	2	ISE	50	-	50	-	-
EC4061	Power Electronics	3	0	0	3	ISE	20	40	40	-	-
						UT1	15				
						UT2	15				
						ESE	50	40			
PE-II	Program Elective- II	3	0	0	3	ISE	20	40	40	-	-
						UT1	15				
						UT2	15				
						ESE	50	40			
OE-II	Open Elective-II	3	0	0	3	ISE	20	40		-	-
						UT1	15				
						UT2	15				
						ESE	50				
EC4521	Advanced Communication Lab	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC4541	Power Electronics Lab	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC4561	Employability Enhancement Skill-II	0	0	2	1	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
EC4581	Project Phase -II	0	0	8	8	ISE	-	-	-	50	50
						ESE	-	-	-	50	50
Total		**14**	**0**	**14**	**25**						

ISE: In Semester Evaluation, UT: - Unit Test

ESE: End Semester Examination Total Contact Hours/Week = 28

Total Number of Credits = 25

PROGRAM ELECTIVE-I & II LIST:-

Course Name			
Course Code	**Program Elective-I**	**Course Code**	**Program Elective-II**
EC4071	Programmable Logic Controllers	EC4081	Automation with SCADA
EC4091	Computer organization and Architecture	EC4101	Embedded LINUX
EC4111	Biomedical Signal processing	EC4121	Biomedical image processing
EC4131	Satellite Communication	EC4141	Broadband Access Network
EC4151	Wireless sensor network and IoT	EC4161	Machine vision
EC4171	Neural networks	EC4181	Fuzzy logic
		EC4201	System Verilog

Open Electives :

Open Elective-I	**Open Elective -II**
Image processing	Robotics

B.TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH. SEM-VII

EC4011 RTOS BASED EMBEDDED SYSTEM DESIGN

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

This course provides an introduction to Embedded Systems and the fundamentals of embedded real time systems & RTOS concepts. Through the use of simulation software, real devices interfaced to a PC and with embedded devices. This course will give detail knowledge about ARM7 which will help to develop competence in microprocessor based digital system design and interfacing. The use of computer systems based on real time & embedded technologies has already touched every facet of our life & still growing. Students will familiarize with fundamentals of COS-II: real time OS Installation & its configuration.

COURSE OUTCOMES :

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

1. Distinguish a real-time system from other systems.
2. Implement the real-time operating system principles.
3. Appreciate the use of multitasking techniques in real-time systems
4. Evaluate the need for real-time operating systems.
5. Compare performance of RTOS based systems

PREREQUISITE :

The prerequisite for this course is good background of Microcontroller and Peripherals, normal operating systems & basics of 'C' Programming.

UNIT-I **06**

EMBEDDED SYSTEMS INTRODUCTION : Design Metrics, Processor Technology, Design Technology, Single purpose Processor Design, RT level design, Optimization, Components of an embedded system, embedded system design issues & Design flow.

UNIT-II **06**

EMBEDDED SYSTEM ARCHITECTURE : CISC and RISC, Basic Embedded Processor/Microcontroller Architecture: RISC Example, Memory Management Unit and Address Translation Processor. Performance

Enhancement: Pipelining, Architectural features of ARM, Processor modes, Register organization, Exceptions and its handling, ARM and THUMB instruction sets, Addressing Modes,

UNIT-III **06**

EMBEDDED 'C' PROGRAMMING & RTOS CONCEPTS : Review of data types -scalar types-Primitive types-Enumerated types-Sub ranges, Structure types-character strings -arrays- Functions Introduction to Embedded C-Introduction, Data types Bit manipulation, Overview of C programming- Tasks & Interrupts Foreground and background systems, Critical section, Shared Resources, Tasks, Multitasking, Context Switching, Kernels, Pre-emptive and non pre-emptive Schedulers, Static and Dynamic Priorities, Priority Inversion, Mutual exclusion, Synchronization , Inter task communication mechanisms, Interrupts: Latency, Response and recovery, Clock Tick, Memory Requirements

UNIT-IV **06**

STRUCTURE OF COS-II: Kernel Structure : Tasks, Task States, TCB, Ready List, Task Scheduling, Task Level Context Switching, Locking and unlocking of scheduler, Idle Task, Statistics Task, Interrupts, Clock Tick, Initialization, Starting the OS. Task Management: Creating/ Deleting and Suspending/ Resuming Tasks, Task Stacks and checking, Changing Tasks Priority. Time Management: Delaying/Resuming Task, System Time. Event Control Blocks: Initialization of ECB, Placing/Removing Task from ECB waitlist, Finding Highest Priority Task, List of Free ECB, Task State Management

UNIT-V **06**

COMMUNICATION IN COS-II : Message Mailbox Management: Creating / Deleting a Mail Box, Waiting / Sending / Getting without waiting a Message from Mail Box, Status of Mail Box, Alternate uses of Mail Box, Message Queue Management: Creating / Deleting / Flushing a Message Queue, Waiting / Sending / Getting without waiting a Message from Queue, Status and Alternate use of Message Queue.

UNIT-VI **06**

MEMORY MANAGEMENT AND PORTING OF COS-II : Memory Management: MCB, Creating a partition, Obtaining / returning / Waiting for a memory Block, Partition Status. Porting of COS-II: Development Tools, Directories and Files, Configuration and testing of Porting Real time applications using COS-II

TEXT BOOKS :

1. Wayne Wolf,"Computers as components: Principles of Embedded Computing System Design", Morgan Kaufman publication 2000
2. Andrew N. Sloss, Dominic Symes, Chris Wright, " ARM System Developer's Guide, Designing and Optimizing System Software", Elseveir-2002

3. Kernighan, Brian W, Ritchie, Dennis M , 'C' Programming language.

4. Jean Labrosse "MicroC/OS-II The Real Time Kernel", CMP Books, 2nd Edition

5. "Embedded Systems- Architecture, Programming and Design", Raj Kamal, TMH

REFERENCE BOOKS

MC/OS-II TM **User's Manual,** ***the Real-Time Kernel by*** Jean J. Labrosse

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VII
EC4031 COMPUTER COMMUNICATION AND NETWORK

L	T	P	Credits
3	0	0	3

COURSE INTRODUCTION :

Computer Communication Network is offered as core course at the seventh semester of Electronics & Telecommunication Engineering undergraduate program. This course covers fundamental concepts of data and computer communications. The course will introduce basic networking concepts, including: protocol, network architecture, reference models, and different layers with services. Topics covered in this course include: Internet (TCP/IP) architecture and protocols, network applications, congestion/flow/error control, routing and internetworking, data link protocols, error detection and correction, channel allocation and multiple access protocols, basics of network security & cryptography.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Explain & evaluate reference models- OSI & TCP/IP.
2. Summarize network components & protocols with their roles.
3. Discuss different errors detection & correction techniques in data link layer.
4. Analyze the routing, congestion control & prevention polices.
5. Illustrate networking standards & packet formats.

PREREQUISITE :

The prerequisite for this course is an understanding of analog and digital signal representation, signal modulation and

demodulation for transmission and reception, bandwidth and data rates, analog to digital conversions, transmission modes etc. Student should have knowledge of 'C' programming.

UNIT-I **06**

INTRODUCTION TO COMPUTER NETWORKS : Network definition& requirements, Network topology, Types of networks, reference models - OSI, TCP/IP. Addressing types, Network Devices: Connectors, Hubs, Switches, Routers and Bridges; Data transmission, switching techniques.

UNIT-II **06**

DATA LINK LAYER : Design issues, error detection and correction techniques, data link protocols, sliding window protocols, HDLC.

UNIT-III **06**

MEDIUM ACCESS SUB LAYER : Channel allocation problem, multiple access Protocols, Networking Standards: IEEE 802.3 ETHERNET, IEEE 802.11, IEEE 802.16

UNIT-IV **06**

NETWORK LAYER : Design issues, IPv4- addressing, Network address hierarchy, NAT, IPv6 structure & address space, IP protocol and it's header format, ARP, RARP, ICMP, IGMP, Routing algorithms - shortest path, distance vector routing, link state routing

UNIT-V **06**

TRANSPORT AND APPLICATION LAYER : TCP/IP and Internet, TCP, UDP, Congestion control & prevention policies-leaky bucket algorithm, token bucket algorithm, Domain name System, Electronic mail, World Wide Web

UNIT-VI **06**

NETWORK SECURITY : Basics of Cryptography, ciphers ,symmetric key and public key algorithm ,email security digital signature, entity authentication, key management, Security for Wi-Fi systems , Malicious Software .

TEXT BOOKS :

1. Behrouz A. Foruzan, "Data communication and Networking", Tata McGraw-Hill, Fourth Edition, 2006.
2. Bernard Menezes, "Network Security & Cryptography", Cengage Learning, First Edition, 2010.

REFERENCE BOOKS :

1. Andrew S. Tannenbaum, "Computer Networks", Pearson Education, Fourth Edition, 2003
2. W. Stallings, "Data and Computer Communications", Prentice Hall, (7th edition), 2003.
3. James F. Kurose and Keith W. Ross , " Computer Networking: A Top-Down Approach", And Addison Wesley, 6th Edition, 2012.

B.TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VII

EC4051 ELECTRONICS SYSTEM DESIGN & OPTIMIZATION

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

This course will provide different aspects of electronics product design. It will enable students to design and make quality electronic products with creativity, originality and flair using a wide range of electronic components..The content covered in the course makes the students understand concepts like design research, Ergonomics, Design Process etc. It also provides the students the opportunity to design and optimize an electronic product using new technologies and modern electronic devices and software.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Discuss the concept of electronic product design, and the inter-relationship between different phases of product design cycle.
2. Explain the basic tools for electronic design.
3. Analyze the use of basic electronic components in designing electronic circuit.
4. Compare between analog and digital electronics and apply them to circuit/product design.
5. Design an electronic product as per the specifications.

PREREQUISITES: Nil

UNIT-I **06**

INTRODUCTION : Stages in product design - Market survey, Product Specifications, R&D and Engineering Prototypes, Pilot Production Batch, Environmental testing, Documentation, Manufacturing. Electronic Products

Classification- Consumer, Industrial and Military. Their peculiarities in terms of Cost/performance ratio and Reliability. Reliability- Bath tub curve, Measures taken to improve reliability. Fundamentals of Communication System Design, criteria for selection of frequency bands, requirements of Voice and Multimedia Applications.

UNIT-II **06**

HARDWARE DESIGNS- ANALOG : Analog Signal Conditioning- Factors affecting choice of OPAMPs in signal conditioning applications. Need for Instrumentation Amplifiers- Case study. Error budget analysis with Case study. ADCs- Interpretation of ADC specifications from design view point. Considerations in selecting References .DACs- Interpretation of DAC specifications from design view point.

UNIT-III **06**

HARDWARE DESIGN- DIGITAL : Interface examples for- LED, LCD, Keyboard, and Touch Screen. Microcontrollers - Comparative study of different Microcontroller Architectures, Factors affecting choice of Microcontroller for particular application with Case study of one application. Introduction to buses and protocols used in Electronic Products- I2C, SPI.

UNIT-IV **06**

SOFTWARE DESIGN AND TESTING FOR ELECTRONIC PRODUCT : Different approaches to development of application software for Electronic Product. Factors affecting choice between Assembly language and High level language like C and C++. Documentation practices and templates for above software. Debugging tools and techniques for software- Features and limitations of- Debuggers, Simulators, ICE, and IDE. Hardware Test Programs.

UNIT-V **06**

PCB DESIGN AND EMI/EMC : PCB Design practices for Analog and Mixed signal circuits- Ground Loops, Precision circuits, shielding and guarding. PCB Design Practices for High Speed Digital Circuits, Signal integrity and EMC. EMI/EMC testing standards and compliance.

UNIT-VI **06**

COMMUNICATION SYSTEMS DESIGN : Implementing Radio link, Path profile. RF path loss calculations, Transmitter/Receiver sensitivity, Signal to Noise Ratio and SINAD, Fade Margin. Study and evaluation of Performance parameters like- Bit and Symbol error rates. Spectral bandwidth calculations. Design of various blocks of communication systems such as- Phase-locked Loop, Equalizer and Interleaver.

TEXT BOOKS :

1. Bernhard E. Bürdek, "History,Theory and Practice of Product Design", Springer Science, Ist, 2005

2. Paul Horowitz, "Art of Electronics", Cambridge University Press, IInd edition 1989.

3. "High-speed Digital design- A Handbook of Black Magic", Prentice Hall Publication, Ist edition 1993.

4. Proakis and Salehi, "Contemporary Communication Systems Using Matlab", PWS Publishing Company, IIIrd edition 2011

5. G. Pahl andW. Beitz J. Feldhusen and K.-H. Grote, "Engineering Design - A Systematic Approach", Springer, IIIrd edition 2007.

6. Tim Williams, "EMC for Product Designers", Elsevier, IVth edition 2007.

7. R.G.Kaduskar, V.B.Baru, "Electronic Product Design", Wiley India, IInd edition 2011

REFERENCE BOOKS :

1. David Bailey, "Practical Radio Engineering and Telemetry for Industry", Elsevier, ISBN 07506 58037, Ist edition 2003

2. Bernard Sklar , Digital Communication, Pearson Ed, IInd edition 2009

3. Software Engineering - A Practitioner's Approach", Pressman ,VIIth edition 2009

4. Domine Leenaerts, Johan van der Tang , Cicero S. Vaucher , "Circuit Design for RF Transceivers" , Kluwer Academic Publishers, Ist edition 2002

B. TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VII

PROGRAM ELECTIVE-I

EC4071 PROGRAMMABLE LOGIC CONTROLLERS

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

The course provides comprehensive coverage of Programmable Logic Controller (PLC) components, industrial detection sensors and their interfacing, fundamental programming language and advanced programming techniques used in industrial automated systems. A PLC or Programmable Controller or Logic box is an electronic device used for automation of industrial processes. Unlike general-purpose computers, the PLC is designed for multiple inputs and output arrangements, extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact. Programs to control machine operation are typically stored in battery-backed or non-volatile memory. A PLC is an example of a real time system.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Explain major components of PLC and their interfacing with sensors and motors in industrial application.
2. Predict response of given system based on its ladder logic diagram.
3. Apply advanced programming techniques for specialized applications.
4. Develop HMI & explain configuration of SCADA.
5. Design ladder logic diagram for given problem statement.

PREREQUISITE : Knowledge of sensors and transducers will be helpful.

UNIT-I **04**

LADDER DIAGRAM FUNDAMENTALS : Basic Components and their Symbols, fundamentals of Ladder Diagrams, Machine Control Terminology.

UNIT-II **08**

THE PROGRAMMABLE LOGIC CONTROLLER : A Brief History, PLC Configurations, I/O modules (interfaces), Memory, selection criterion, System Block Diagram, Update-Solve the Ladder-Update, Solve the Ladder.

Fundamental PLC programming: Physical Components vs. Program Components, Example Problem-Lighting Control, Internal Relays, Disagreement Circuit, Majority Circuit, Oscillator, Holding Contacts, Always-ON and Always-OFF Contacts, Ladder Diagrams Having More Than One Rung

UNIT-III **06**

ADVANCED PROGRAMMING TECHNIQUES : Ladder Program Execution Sequence, ladder programming for Flip Flops, One Shot, Counters, Sequencers, Timers, arithmetic functions, comparison functions, Master Control Relays and Control Zones, PID control of continuous process.

UNIT-IV **06**

INDUSTRIAL DETECTION SENSORS AND INTERFACING : Fundamental Operational Amplifiers, Signal Processors, potentiometer, Comparator Devices, Optoelectronic Interface Devices, Digital-to-Analog Converters, Analog-to-Digital Converters, Timing devices. Switches, Proximity Detectors, Hall-Effect Sensor, Methods of Detection, Photoelectric, Ultrasonic Sensors, Sensor Interfacing, Operating Specification.

UNIT-V **06**

MOTOR CONTROLS : AC Motor Starter, AC Motor Overload Protection, Specifying a Motor Starter, DC Motor controller, Variable Speed (Variable Frequency) Ac Motor Drive. Case studies: Conveyers, hoist.

UNIT-VI **06**

SCADA : Development of front end (HMI), and interfacing with field devices, Selection, wiring, commissioning, Introduction to SCADA, and configuration for the SCADA, architecture of SCADA, importance of SCADA in critical infrastructure.

TEXT BOOKS :

1. John R. Hackworth and Frederick D. Hackworth Jr, "Programmable Logic Controllers Programming , Methods and Applications", Pearson Publication, 2011.
2. Terry Bartelt, "Industrial Electronics, Circuits, instruments and Control Techniques," Cengage Learning, 2009.
3. Stuart A Boyer, "SCADA supervisory control and data acquisition", ISA, 4th Revised edition

REFERENCE BOOKS :

1. J. W. Webb & R. A. Reis, "Programmable Logic Controllers", PHI company- Fifth Edition, 2005.
2. Ronald L. Krutz, "Securing SCADA System", Wiley Publications.

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH. SEM-VII
PROGRAM ELECTIVE-I
EC4091 COMPUTER ORGANIZATION AND ARCHITECTURE

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

This course will help the B. Tech students for their course on Computer Organization and Architecture. The students, who study Computer Organization and Architecture, generally study the introductory course on Digital Systems. The students should have some knowledge on Digital Logic Circuit Design course. Student should have also some preliminary idea about computer programming (in high level language), which will help them to understand how to program a computer to solve a problem; and how the program is executed in the computer. Computer Architecture refers to those attributes of a system visible to a programmer. Computer Organization refers to the operational units and their interconnections that realize the architectural specifications.

COURSE OUTCOMES :

After successful completion of the course, students will be able to;

1. Identify high performance architecture design.
2. Realize the architectural specifications of the operational units & their interconnections.
3. Evaluate the impact of instruction set architecture on cost-performance of computer design.
4. Create an assembly language program to program a microprocessor system.
5. Review & implement the different computer architectures and hardware of a system visible to a programmer.

PREREQUISITE :

The prerequisite for this course is basic operational units of computer & their interconnections.

UNIT-I **06**

INTRODUCTION : Introduction to computer System and its sub modules, Number System and Representation of information, Brief History of Comp. Evolution, Arithmetic and Logic Unit, Arithmetic and logical operation and Hardware implementation, Implementation issues of some operation.

UNIT-II **06**

MACHINE INSTRUCTIONS AND PROGRAMS : Instruction Set & Addressing, Various addressing modes, Machine Instruction, Instruction Format.

UNIT-III **06**

CPU DESIGN : Introduction to CPU Design, Processor Organization, Execution of complete Instruction, Design of control unit, Micro programmed control - I & Micro programmed control - II.

UNIT-IV **06**

INPUT/OUTPUT OPERATIONS : Introduction to I/O, Program Controlled I/O, Interrupt Controlled I/O, Direct Memory Access, Connecting I/O Devices, I/O Buses, External Storage Devices, Disk Performance.

UNIT-V **06**

BASIC PROCESSING UNIT : Reduced Instruction Set Programming, Introduction to RISC, Design issues of a RISC, Pipeline, Introduction to Pipeline Processor, Performance Issues, Branching.

UNIT-VI **06**

INTEL 8086 MICRO-PROCESSOR : Organization of Intel 8086 Micro-Processor, Instruction set of Intel 8086 Micro-Processor, Programming of Micro-processor.

REFERENCE BOOKS :

1. William Stallings, "Computer Organization and Architecture - Designing for Performance", Pearson Education, 6th Edition, 2003
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky ,"Computer Organization", Publisher: McGraw Hill
3. John L. Hennessy and David A Patterson, "Computer Architecture A quantitative Approach", Morgan Kaufmann / Elsevier, Fourth Edition, 2007
4. Use web course developed for NPTEL.

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH. SEM-VII
PROGRAM ELECTIVE-I
EC4111 BIOMEDICAL SIGNAL PROCESSING

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

Biomedical signal processing is the application of engineering principles and design concepts to medicine and biology for healthcare purposes (e.g. diagnostic or therapeutic). This field seeks to close the gap between engineering and medicine. It combines the design and problem solving skills of engineering with medical and biological sciences to advance healthcare treatment, including diagnosis, monitoring, and therapy.

Biomedical signal processing has only recently emerged as its own study, compared to many other engineering fields. Such an evolution is common as a new field transitions from being an interdisciplinary specialization among already-established fields, to being considered a field in itself. Much of the work in biomedical engineering consists of research and development, spanning a broad array of subfields. Prominent biomedical instrumentation applications include the development of bio compatible prostheses, various diagnostic and therapeutic medical devices ranging from clinical equipment to micro-implants, common imaging equipment such as MRIs and EEGs etc.

COURSE OUTCOMES :

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

1. Interpret technical aspects of medicine.
2. Solve Engineering Problems related to medical field.
3. Recognize medical diagnosis and therapy.
4. Explain the types Bio Signal and process it with different tools.
5. Compare the different preamplifiers used for amplifying the Bio Signals and do the measurement.

PREREQUISITE :

Students have studied chemistry, biology and physics. Students should be familiar with Types of Bio signals. Students should be familiar with measurement and processing of bio signals in time as well as frequency domains. Also students should know about various instruments used in the hospitals. Students without this preparation may be required to take additional efforts to prepare themselves for the course.

UNIT-I **06**

HUMAN ANATOMY, PHYSIOLOGY OF SYSTEMS AND ELECTRODES : Human Anatomy,Man Instrument system, Physiology systems of the body. Bioelectric potential , Resting and action potential ,Biopotential electrodes, different types of electrodes ,MEMS materials,Applications of BIOMEMS Equivalent circuits for electrodes, Biochemical Transducers.

UNIT-II **06**

CARDIOVASCULAR AND RESPIRATORY SYSTEM AND ITS MEASUREMENTS : Cardiovascular system, Blood pressure, characteristics of blood flow, Heart sounds , ECG , Measurement of blood pressure, blood flow, heart sounds and cardiac output ,Plethysmography. Physiology of Respiratory system, Tests and Instrumentation for the mechanics of breathing, Respiratory therapy Equipment.

UNIT-III **06**

ANALYSIS OF BIO SIGNALS : Automatic analysis and classification of ECG, P-wave detection, QRS complex detection, Correlation analysis of ECG signals, Signal averaged ECG, Analysis of Heart Rate variability, Synchronized averaging of PCG envelopes, envelogram, Analysis of PCG signal, Analysis of EMG signal

UNIT-IV **06**

NERVOUS SYSTEM AND ITS MEASUREMENTS : Nervous system : Neuronal communication organization of the brain , Neuronal receptors , somatic nervous system , spinal reflexes , Autonomic nervous system , Neuronal firing measurements , EEG , EMG , Psycho physiological measurements.

UNIT-V **06**

ASSISTING DEVICES, THERAPEUTIC DEVICES AND BIO TELEMETRY : Pacemaker, Defibrillators, Heart lung machine, Ventilator, Diathermy, Dialysing Unit. Bio telemetry, Introduction, Physiological parameters, Components, Implantable units, Applications.

UNIT-VI **06**

MEDICAL DATA STORAGE AND AUTOMATION : Representation of Data, Data modeling Techniques, Relational Hierarchical and network Approach, Normalization techniques for Data handling - Plug-in Data

Acquisition and Control Boards - Data Acquisition using Serial Interface - Medical Data formats - Signal, Image and Video Formats, Image processing - Medical Databases - Automation in clinical laboratories - Intelligent Laboratory Information System -PACS

TEXT BOOK

1. Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, "Biomedical Instrumentation and Measurements", PHI, 2 nd Edition, 2011

REFERENCE BOOKS

1. Khandpur R.S., "Hand book of Biomedical Instrumentation", Tata McGraw Hill, 3rd Edition, 2014.
2. L.A. Geddes and L.E. Baker, "Principles of Applied Biomedical Instrumentation", John Wiley &Sons,Inc, 1989.
3. Richard Aston, "Principles of Biomedical Instrumentation and Measurement", Merrill PublishingCompany, 2002.
4. Jacobson B. and Webster J.G., "Medical Clinical Engineers", Prentice Hall Inc., 2002

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VII
PROGRAM ELECTIVE-I
EC4131 SATELLITE COMMUNICATION

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

Satellite Communication is offered as the program elective course for final year of Electronics and Telecommunication Engineering undergraduate programme. It covers orbital mechanics, launchers and launch vehicles and satellite subsystems. Satellite link design deals with design of satellite's uplink and downlink. It also discusses VSAT systems, low earth orbit and non geo-stationary satellite systems, direct broadcast satellite television and radio, satellite navigation, global positioning system and recent explorations.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Discuss the fundamentals of satellite communication.

2. Explain different satellite subsystems and satellite applications.
3. Design link budget for a satellite.
4. Compare different satellite systems.
5. Compile recent explorations by India.

PREREQUISITE :

The prerequisite for this course is the knowledge of analog and digital communication, and applied physics.

UNIT-I **06**

ORBITAL MECHANICS AND LAUNCHERS : History of Satellite Communication, Orbital Mechanics, Look angle determination, Orbital perturbations, Orbital determination, Launchers and Launch Vehicles, Orbital effects in communication system performance.

UNIT-II **06**

SATELLITE SUBSYSTEMS : Attitude and control systems, Telemetry, Tracking, Command and Monitoring, Power systems, Communication subsystems, Satellite antennas, Equipment reliability and space qualification.

UNIT-III **06**

SATELLITE LINK DESIGN : Basic transmission Theory, System Noise Temperature and G/T Ratio, Design of Downlinks, Satellite Systems using Small Earth Stations, Uplink Design, Design of Specified C/N: Combining C/N and C/I values in Satellite Links, System Design Examples.

UNIT-IV **06**

VSAT SYSTEM, LEO AND NGSO SYSTEMS : Introduction, Overview of VSAT Systems, Network Architecture, VSAT Earth Station Engineering, Orbit considerations, Coverage and frequency Consideration, Delay and Throughput consideration.

UNIT-V **06**

SATELLITE APPLICATIONS : Home Satellite TV, Digital DBS TV, Satellite Radio Broadcasting, Radio and Satellite Navigation, GPS

UNIT-VI **06**

RECENT EXPLORATIONS BY ISRO : Earth Observation, Satellite Communication, Disaster Management, Satellite Navigation, Climate and Environment, Mars orbiter mission, Satellite Debris.

TEXT BOOKS :

1. Timothy Pratt, Charles Bostian, Jeremy Allnutt, "Satellite Communications", John Wiley & Sons, IInd Edition, 2010.

REFERENCE BOOKS :

1. Dennis Roody, "Satellite Communications", McGraw Hill, IIIrd edition, 2001,
2. www.isro.gov.in

B.TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VII

PROGRAM ELECTIVE-I

EC4151 WIRELESS SENSOR NETWORK AND IoT

L	T	P	Credits
3	0	0	3

COURSE INTRODUCTION :

Wide range of applications such as disaster management, military and security have increased the interest in sensor networks during the past few years. Sensors are typically capable of wireless communication and are significantly constrained in the amount of available resources such as energy, storage and computation. Such constraints make the design and operation of sensor networks considerably different from contemporary wireless networks, and necessitate the development of resource conscious protocols and management techniques. This course provides a broad coverage of challenges and latest research results related to the design and management of wireless sensor networks. Covered topics include network architectures, node discovery and localization, deployment strategies, node coverage, routing protocols, medium access arbitration, fault-tolerance, and network security.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Categorize sensor networks for various applications.
2. Select suitable medium access protocols for WSN hardware.
3. Design and simulate small sensor nodes
4. Illustrate quality of service, fault-tolerance, and security resource constraints of WSN.
5. Evaluate the performance of sensor networks with IoT and identify bottlenecks.

PREREQUISITE : Nil

UNIT-I **06**

INTRODUCTION TO WSN : Issues in Adhoc Wireless Networks, Service Discovery Energy management, Scalability, Ad Hoc Wireless Internet, Sensor Networks Comparison with Adhoc wireless networks-Challenges for WSNs, Types of Applications, Single Node Architectures -Hardware Components Energy Consumption of Sensor Nodes, Issues in Designing a Multicast Routing Protocol.

UNIT-II **06**

SENSOR NETWORK ARCHITECTURE : Sensor Network Architecture Data Dissemination-Flooding and Gossiping- Data gathering Sensor Network Scenarios -Optimization Goals and Figures of Merit -Design Principles for WSNs- Gateway Concepts - Need for gateway - WSN to Internet Communication

UNIT-III **06**

MAC PROTOCOL : MAC Protocols MAC Protocols for Sensor Networks -Location Discovery-Quality of Sensor Networks-Evolving Standards, Low duty cycle and wake up concepts- The IEEE 802.15.4 MAC Protocols Energy Efficiency -Geographic Routing Mobile nodes

UNIT-IV **06**

WSN ROUTING : Routing Gossiping and Agent based unicast Forwarding-Energy Efficient Unicast-Broadcast and Multicast Geographic Routing-Mobile nodes-Security-Application Specific Support - Target detection and tracking-Contour/ edge detection-Field Sampling.

UNIT-V **06**

IOT PLATFORM OVERVIEW : Overview of IoT supported Hardware platforms, Network Fundamentals, working principle of Wireless Networking equipment's - Access Points, Hubs etc. Linux Network configuration Concepts: Networking configurations in Linux Accessing Hardware & Device Files interactions

UNIT-VI **06**

IOT ARCHITECTURE: IoT Architecture : History of IoT, M2M - Machine to Machine, Web of Things, IoT protocols, The Layering concepts, IoT Communication Pattern, IoT protocol Architecture, WPAN Applications: Remote Monitoring & Sensing, Remote Controlling, Performance Analysis, IoT applications in home, infrastructures, buildings, security, Industries, Home appliances

REFERENCE BOOKS :

1. Zach Shelby, Carsten Bormann, "WPAN: The Wireless Embedded Internet", Wiley2009

2. Dr. Ovidiu Vermesan, Dr. Peter Friess, "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", River Publishers 2009

3. Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann "Interconnecting Smart Objects with IP: The Next Internet", 2010

4. Holger Karl and Andreas Wiilig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons Limited, 2008.

5. I.F .Akyildiz and Weillian, "A Survey on Sensor Networks", IEEE Communication Magazine, August 2007.

6. "Sensor Technology hand book," Wilson, Elsevier publications 2005.

7. Anna Hac, "Wireless Sensor Networks Design", John Wiley& Sons Limited Publications 2003.

8. C.Siva Ram Murthy and B.S.Manoj, "Ad Hoc Wireless Networks", Pearson Edition2005.

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VII
PROGRAM ELECTIVE-I
EC4171 NEURAL NETWORKS

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

The course provides a comprehensive foundation to Neural Networks and machine learning with several applications. The goal of neural network research is to realize an artificial intelligent system using the human brain as the model. This course introduces the basic neural network architectures learning algorithms for applications in pattern recognition, image processing, and computer vision. After learning this course, students will be able to know how to use neural networks for solving different problems related to pattern recognition, function approximation, data visualization, and so on.

Neural networks provide a model of computation drastically different from traditional computers. Typically, neural networks are not explicitly programmed to perform a given task; rather, they learn to do the task from examples of desired input/output behaviour. The networks automatically generalize their processing knowledge into previously unseen situations, and they perform well even when the input is noisy, incomplete or inaccurate. These properties are well-suited for modeling tasks in ill-structured domains such as face recognition, speech recognition and motor control.

COURSE OUTCOMES :

After successful completion of this course students should be able to;

1. Describe models, processes and network architectures used in neural network.
2. Illustrate principles of learning processes and algorithms used in pattern recognition.
3. Evaluate learning algorithms and architectures for given application.
4. Assess the utility of neural network for linear and non-linear network.
5. Summarize the neural network applications for image processing, remote sensing and military etc.

PRE-REQUISITES :

The course requires that the students have previously taken courses on programming, data structures, calculus and linear algebra. Courses on image processing, computer vision, machine learning, artificial intelligence, and genetic algorithms are recommended, but not required.

UNIT-I **06**

INTRODUCTION TO ARTIFICIAL NEURAL NETWORK : Introduction of ANN, Trends in computing, Biological neural networks and its features, Performance comparison between BNN and ANN, ANN: Terminology, Implementation of logical AND, OR, XOR functions Soft Topologies of neural networks, Models of neuron: McCulloch-Pitts model, Perceptron, Adaline model, Topologies of NN architecture.

UNIT-II **06**

LEARNING PROCESS : Node functions: Step, Ramp, Sigmoid, linear, Gaussian, Basic learning laws: Hebb's law, Perceptron learning law, Delta Learning Law, Widrow and LMS, correlation law, instar and outstar learning law, Error-correction learning, Memory Based Learning, competitive learning, Learning with and without teacher, Learning tasks.

UNIT-III **06**

NN ARCHITECTURES : Architecture of feed forward network, single layer ANN, multilayer perceptron, back propagation learning, input - hidden and output layer computation, backpropagation algorithm, applications, selection of tuning parameters in BPN, Numbers of hidden nodes, learning.

UNIT-IV **06**

BASIC FUNCTIONAL UNITS OF ANN FOR PATTERN RECOGNITION TASKS : Basic feedforward, Basic feedback and basic competitive learning neural network. Pattern association, pattern classification and pattern mapping tasks.

UNIT-V **06**

FEEDFORWARD AND FEEDBACK NN : Feedforward neural networks: Linear responsibility X-OR problem

and solution- Analysis of pattern mapping networks summary of basic gradient search methods. Feedback neural networks : Pattern storage networks, stochastic networks and simulated annealing, Boltzmann machine and Boltzmann learning, generalized radial basis function networks.

UNIT-VI **06**

APPLICATIONS OF ANN : Multisensor image classification, Pattern recognition and classification: Recognition of Olympic games symbols, Image shape and texture analysis, Image compression, Remote sensing, Military applications, Nuclear magnetic resonance spectroscopy and Case studies.

TEXT BOOK :

1. Simon Haykin, "Neural networks A comprehensive foundations", Pearson Education 2nd Edition 2004
2. B.Vegnanarayana "Artificial neural networks", Prentice-Hall of India, 2005

REFERENCE BOOKS :

1. Jacek M. Zurada, "Introduction to Artificial Neural System", JAICO Pub. House, Ed.2006.
2. Li Min Fu ,"Neural networks in Computer intelligence", TMH , 2003
3. James A Freeman David M S Kapura, "Neural networks", Pearson Education 2004

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VII
EC4511 COMPUTER NETWORK LAB

L	T	P	Credits
0	0	2	1

COURSE INTRODUCTION :

Computer Communication Network is offered as the core course at the seventh semester of Electronics & Telecommunication branch of engineering undergraduate program; consist of ten experiments. Experiments designed for this lab involves simulation of various algorithms related to networking using MATLAB tool. Also this includes design and simulation of different networks using GNS3 and Wireshark tool for the understanding of working of network protocols.

COURSE OUTCOMES :

After completion of this course students will be able to:

6. Develop logic for implementation of different algorithms used in networking.
7. Design proper topology and configure each network device using GNS3.
8. Test code for implementation of different networking algorithms.
9. Analyze IP protocol and capture packets using Wireshark.
10. Combine the knowledge of networking to design code for different protocol.

PREREQUISITE :

Student should have knowledge of 'C' programming & MATLAB tool.

LIST OF EXPERIMENTS :

1. Design star topology with the help of switch by setting given IP address and perform file sharing between them.
2. Design and simulate the transmission of ping messaged over a given network topology consisting of 3 nodes using GNS3
3. Design and simulate Local Area Computer Network by configuring router with password security using GNS3 and capture packets using Wireshark.
4. Design and simulate given network using Static Routing and Routing Information Protocol (RIP) routing Protocol.
5. Implementation of shortest path routing algorithm
6. Implementation of Hamming code for Error detection and correction using MATLAB
7. Implementation of congestion control using leaky bucket algorithm
8. Implementation of cryptographic algorithms-RSA
9. Program to understand & classifying IP addressing
10. Flow control protocols (Stop and wait protocol, Go Back N Protocol)

B.TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH. SEM-VII

EC4531 EMBEDDED SYSTEM LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

This course will cover the basics of embedded system organization and real-time systems. It provides the advance knowledge required for embedded computer design and development as well as real-time operating systems. Students are introduced to software development concepts applicable to real-time embedded systems. Particularly ARM LPC2184 will be studied as a embedded processor and embedded software development is carried out for ARM 7 & above CPUs. The students will be able to grasp the main principles of embedded system design and understand the RTOS concepts and scheduling techniques. Embedded hardware-software design and development tools (such as COS-II OS/ IDE (Keil or WinARM) and ARM7 (LPC2148) Boards with peripherals) will be introduced.

COURSE OUTCOMES :

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

1. Summarize the features and structures of practical implementation of real- time operating system COS-II.
2. Explain the need for real-time operating systems.
3. Identify the real-time operating system principles.
4. Classify different Real time operating systems.
5. Review & implement the protocols used by controllers to communicate with external sensors & actuators in real world.

PREREQUISITE :

The prerequisite for this course is fundamental understanding of operating systems & a working knowledge in C & Keil or WinARM tool.

LIST OF EXPERIMENTS :

1. Study of Task creation using OS Task Create ()
2. Study of Task creation using OSTask Create Ext()
3. Exploring multitasking features of ?C/OS-II.
4. Porting ?C/OS -II for running LEDs with different tasks
5. Study of Semaphore Service of ?C/OS-II.
6. Study of Mutex Service of ?C/OS-II.

7. Exploring Mailbox management Services of ?C/OS-II.
8. Exploring Message Queue Services of ?C/OS-II.
9. Study of ISR
10. Integrated peripheral application using ?C/OS-II

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH. SEM-VII
EC4551 INDUSTRIAL TRAINING

L	T	P	Credits
0	0	0	2

1week /2 weeks Industrial Training/Certificate Course is mandatory in summer vacation & will be evaluated in 7th semester.

COURSE DESCRIPTION :

Industrial training course is introduced to enhance graduates current and relevant knowledge, practical experience, soft skills and a positive attitude to allow them to be competitive in the job market. They must possess the necessary knowledge and skills before they go out into the working world. In line with this, the Industrial Training course of the undergraduate program constitutes a vital component in the drive to strengthen the key competencies required to improve the graduates' ability to work.

The "Industrial Training" Credit Course is introduced in the curriculum to increase interactions with Industries and improve professional skills of students.

COURSE OUTCOMES :

1. Communicate effectively in both verbal and written form.
2. Demonstrate the skills to use modern engineering tools, software's and equipment to analyze problems.
3. Apply the knowledge of professional and ethical responsibilities.
4. Verify the Presentation skills.
5. Generate a report based on the training experiences and modules undertaken.

What is Industrial Training ?

Industrial Training refers to a program which aims to provide supervised practical training within a specified timeframe. This training can be carried out either in government organizations or in the private sector.

Need of Industrial Training :

The main aim of the Industrial Training program is to produce graduates who are ready to face the working world. The program also aims to produce the knowledgeable, skilled and experienced graduates, demanded by employers, who are able to apply the knowledge acquired at Institute to the working world. The Industrial Training program provides exposure to the working world, which will make graduates more aware of the hopes and expectations that industry has of them. The program will also equip students with real work experience. Placing students in industry also increases their chances of employment after graduation, as there is a strong possibility that they will be offered a job in the same place where they do their training..

Selection of Industry

- ☐ Student need to identify the domain in which he/she would like to do the training.
- ☐ For the better understanding about industrial training students should contact the Training and placement officer of the Department.
- ☐ Department shall provide list of some industries as well as government organizations who provide the training on different technologies.
- ☐ Apart from the provided industries/organizations if students want to do the training at other place then students should discuss with the departmental Training and placement officer.
- ☐ Departmental Training and placement officer shall provide the Industrial training request letter as per the demand from student.
- ☐ It is advised to the students to look at the different company's websites for the internship programs and let the departmental TPO know.

Role of Students :

- ☐ Identify the domain in which student would like to do training.
- ☐ Meet Departmental TPO about better understanding.
- ☐ Choose the Industry/Government Organization and apply for the training
- ☐ Fill up the Industrial Training Form and submit it to the Departmental TPO.
- ☐ Take the permission letter from Departmental TPO.
- ☐ Complete the training program for specified duration.
- ☐ Follow the instructions, roles and responsibilities during training period.
- ☐ After completion of training prepare the training report and presentation
- ☐ Apply the training experience to enhance the opportunity for the placement.
- ☐ Search for the internship/Training opportunities

Role of Department

- Department shall provide list of some industries as well as government organizations who provide the training on different technologies.
- Apart from the provided industries/organizations if students want to do the training at other place then students should discuss with the departmental Training and placement officer.
- Departmental Training and placement officer shall provide the Industrial training permission letter as per the demand from student.
- Departmental TPO should collect Industrial Training application form of students
- Evaluate the students according to evaluation format
- Communicate with the companies about internship/training opportunities
- Try to maintain long term Relations with Companies

Role of the Industry/Government Organization :

- To give the opportunity to the student for training/ Internship.
- Train the students on latest technologies.
- Provide certificate/document to the students about completion of training.
- To give 1 page evaluation report to the Departmental Training and placement Officer.

Duration of Industrial Training

The industrial training has to be taken by TY students during summer vacation .Duration of the Industrial Training program depends on the requirements of the Industry. Ideally, it should be of minimum 1 week.

Disciplinary Procedures during Industrial Training

Students undergoing Industrial Training must adhere to the following regulations:

- **Discipline**

  Within the training period, the student is wholly responsible to the organization where he or she has been working. This means that the student must keep specified office hours, and must adhere to all rules and regulations of the organization, just like the other staff within the organization, during the entire training period.

- **Leave**

  Students are not allowed to take leave while undergoing training, except with the approval of the organization.

- **Other Regulations**

1. Students are prohibited from leaking secrets, or providing any information related to the business of the

organization or its clients or any other information acquired during or after the training period, to outside parties.

2. Students are prohibited from destroying or misusing any property belonging to the organization.

3. If a student is found to have violated these regulations, or to have neglected his or her duties, or to have violated discipline, appropriate action can be taken against him or her.

Evaluation

Evaluation within the Industrial Training context aims to evaluate the student's work quality and the development of their soft skills. Ideally, the student should be evaluated by faculty supervisors as well as the Industry supervisor. Among the evaluation methods used are:

- ☐ Evaluation report from faculty supervisor (Departmental Supervisor)
- ☐ Evaluation report from Industry supervisor (Person who delivered training to students)
- ☐ Industrial Training report (In Prescribed Format)
- ☐ Presentation by the students (During 7th semester)

The student must fulfill all aspects of evaluation.

B.TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VII

EC4571 EMPLOYABILITY ENHANCEMENT SKILL-I

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

Employability skill development -I course is introduced in the VII semester. The motive of the course is to make the students ready for the campus interview. The curriculum is designed by taking opinions of PARI and Hirshvogel Components India Pvt. Ltd.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Write programs for Siemens PLC.
2. Design Electrical drawing.
3. Design hardwiring for Siemens PLC

COURSE CONTENT : **24 Hrs**

UNIT-I

PLC PROGRAMMING : Siemens/Delta PLCprogramming,Simatic Manager/TIA portal programming.WINCC flexible HMI,Different ways of HMI communication and its configuration, SCADA designed programming, HMI troubleshooting.

UNIT-II

PLC DRIVES : Siemens/Deltanumeric/simotions drives.Siemens/Delta panel hardwiring and troubleshooting.

UNIT-III

DESIGN AND INTERFACING : Electrical drawing reading and understanding. CNC machine interfacing, CNC machine troubleshooting and modifications in programs.

REFERENCES :

1. "Programmable Logic Controllers Programming , Methods and Applications", John R. Hackworth and Frederick D. Hackworth Jr, Pearson Publication, 2011.
2. Handy manual FX-Series programmable controllers - Mitsubishi

MODE OF CONDUCT :

Contents will be delivered by the industry person and minimum five assignments will be given to the students. Evaluation of assignment will be done by the expert faculty from department on weekly basis. Assignment may be practical or project, which will be done by the individual student.

EVALUATION :

Evaluation will be done on following basis

1. Completion of assignments before deadline.
2. Lab Exam based on assignments.

B.TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VII

EC4591 PROJECT PHASE-I

L	T	P	Credits
0	0	4	4

COURSE DESCRIPTION :

The Final Year Project is a challenging capstone experience for Electronics & Telecommunication engineering students. Project is a course requirement, wherein under the guidance of an Instructor, a final year student is required to do some innovative/contributory/developmental work with application of knowledge earned while undergoing various theory and laboratory courses in his/her course of study. A student has to exhibit both analytical and practical skills through the project work.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Apply knowledge of mathematics, science, physics, engineering and management principles to solve complex engineering problems.
2. Identify, formulate and analyze engineering problem based on experimental, statistical and computational methods to meet desired needs.
3. Design a system, component or process to meet desired needs within realistic constraints.
4. Work as a leader or productive member of multi-disciplinary and multi-cultural team.
5. Design, simulate, analyze and implement desired systems (hardware and software) by using modern and appropriate tools and techniques.

PRE-REQUISITES : NIL

RULES AND REGULATIONS OF PROJECT :

1. Every student has to undertake project of professional nature and interest at various levels of study. The topic of project may be related to theoretical analysis, an experimental investigation, a prototype design, new concept, analysis of data, fabrication and setup of new equipment etc. The student shall be evaluated for his/her project through the quality of work carried out, the novelty in the concept, the report submitted and presentation(s) etc.
2. The project should be undertaken preferably by group of 5 students who will jointly work and implement the project in the two semesters.
3. A student has to carry out project under the guidance of a faculty from the same discipline unless specifically permitted by the Department Program Committees (DPCs)* of the concerned departments in case of

interdisciplinary projects or DPC* of the parent department in case of industry sponsored projects.

4. The project is divided into two stages. The first stage shall be carried out in Semester-VII while the second stage shall be carried out in Semester-VIII.

5. The quantum of work expected to be carried out by a student in each stage shall be in accordance with the division of credits given in Project Evaluation Scheme.

6. Students are expected to avoid plagiarism during the project work to secure full credits.

7. All claims should be supported by valid references in the report.

8. The decisions taken by the evaluators and examiners will be final.

9. The dissertation report (Synopsis, Project) is to be submitted in the prescribed format.

10. The Project report must be submitted by the prescribed date usually two weeks before the end of academic session of the semester.

ASSESSMENT OF PROJECT :

		Semester- VII	**Phase -I**		
Sr. No	**Details**	**Evaluation By**	**Evaluation Type**	**Schedule**	**Marks**
1.	Synopsis approval presentation	Instructor + DPC*	Approved/Not Approved	August 1st week	Y/N
2.	Demonstration of 15% project completion	Instructor for individual contribution + DPC*	ISE 1 by GA**	September 3rd week	25M (10+15)
3.	Demonstration of 35% project completion	Instructor for individual contribution + Instructors of other Group	ISE 2 by SE***	October 3rd week	25M (10+15)
4.	Presentation & Demonstration of 50% project completion	Panel of Examiners comprising of guide, external examiner & chairman	ESE	November 2nd week	50M

***DPC :** Department Program Committee - Committee constituted by Head of the department.

****GA :** Group Assessment- All faculties of the department who wants to contribute in the betterment of project will be present at the time of Assessment.

*****SE :** Shuffled Evaluation- In this type of Evaluation, three instructors of other project will evaluate the project group.

B.TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VIII

EC4021 MICROWAVE ENGINEERING

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

In this course, a curriculum model including recent developments and technologies in the Radio Frequency (RF) and Microwave Engineering field by using a blended approach is proposed. This study covers the description of the content of theoretical and hands on applications, the integration model. The main goal of the course is to prepare students for future professional careers in RF and Microwave Engineering by supporting them with new instructional technologies. The course is structured with a balance between theory and laboratory.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Describe microwave semiconductor devices, microwave tubes, microwave amplifiers.
2. Solve problems based on S parameters, microwave components and measurements.
3. Analyze basic microwave circuits and devices.
4. Evaluate performance of different types of microwave sources and microwave components based on construction, working and characteristics.
5. Choose the appropriate microwave tubes, semiconductor devices and amplifiers for the microwave applications.

PRE-REQUISITES :

There is no pre-requisite for this course; however knowledge of Electromagnetic theory is beneficial.

UNIT-I **06**

MICROWAVE WAVE GUIDES : Rectangular and circular wave guides: TE and TM modes in wave guides, power Transmission in wave guide, power losses in wave guide, mode excitation in wave guides, Characteristics of standard wave guides.

UNIT-II **06**

SCATTERING MATRIX AND MICROWAVE PASSIVE COMPONENTS : Scattering matrix of N port network, scattering matrix of terminated two port network. Properties of S matrix- S matrix formulation of two-port junction. Microwave junctions -Tee junctions -Magic Tee Corners - bends and twists - Directional couplers -two hole directional couplers, isolators, circulators,

UNIT-III **06**

MICROWAVE TUBES AND MEASUREMENT : Microwave tubes- High frequency limitations - Principle of operation of Multi-cavity Klystron, Reflex Klystron, and Magnetron. Microwave measurements: Measurement of power, wavelength, impedance, SWR,

UNIT-IV **07**

MICROWAVE SEMICONDUCTOR DEVICES : Microwave semiconductor devices- operation - characteristics and application of BJTs and FETs, tunnel diode, Varactor diode, Gunn diode.

UNIT-V **05**

MICROWAVE AMPLIFIERS : Two port power gains, Gain and stability, Single stage Transistor amplifier design: Design for Maximum Gain (Conjugate matching),

UNIT-VI **06**

MICROWAVE NETWORK ANALYZERS, MMIC, MICROWAVE HAZARDS AND APPLICATIONS : Introduction, Reference plane, Elements of a microwave network analyzer, Network analyzer block diagram .Microwave monolithic integrated circuit (MMIC), microwave hazards: Specific Absorption Rate, Microwave Oven. Linear accelerometer.

TEXT BOOKS :

1. Samuel Y Liao, "Microwave Devices & Circuits", Prentice Hall of India,3rd Edition, 2006.
2. Reinhold. Ludwig and Pavel Bretshko, "RF Circuit Design", Pearson Education, Inc., 2006.
3. D.M.Pozar, "Microwave Engineering", John Wiley & sons, Inc, 3rd Edition, 2006.

REFERENCE BOOKS :

1. Robert. E.Collin, "Foundation of Microwave Engg", Willey India. 2nd Edition
2. Annapurna Das and Sisir K Das, "Microwave Engineering", Tata Mc Graw3. Hill Inc., 1st Edition ,2004.
3. M.M.Radmanesh, "RF & Microwave Electronics Illustrated", Pearson Education, 2007.

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH. SEM-VIII
EC4041 VIDEO ENGINEERING

L	T	P	Credits
2	0	0	2

COURSE INTRODUCTION :

Television technology has now become a vital tool to the information revolution that is sweeping across the countries of the world. This course aims at a comprehensive coverage of analog television, Digital Television, HDTV and video recorders. This gives a comprehensive coverage of TV Systems with all the new developments in Television and Video Engineering. It includes the analysis and synthesis of TV Pictures, Composite Video Signals. This course deals with various Color Television receivers. It is focused on advanced topics in digital television and consumer applications.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Select television standards.
2. Compare various display technologies.
3. Recognize the principle of various advanced TV technologies.
4. Analyze the different case studies.

UNIT-I **08**

FUNDAMENTALS OF TELEVISION AND DISPLAY : Television basics: Factors of TV systems and standards, Interlaced Scanning, Composite video signal, Signal transmission and propagation, etc.., Color TV systems, colour fundamentals, mixing of colours, colour perception, chromaticity diagram, colour TV transmitter, colour TV receivers.

UNIT-II **08**

DIGITAL TV : Principle of Digital TV, Digital TV signals and parameters, Digital TV Transmitters, MAC signals, advanced MAC signal transmission, Digital TV receivers, Basic principles of Digital Video compression techniques, MPEG1, MPEG2, MPEG4, Video compression ITU-Standards(H.), Digital TV recording techniques.

UNIT-III **08**

HDTV : HDTV standards and systems, HDTV transmitter and receiver/encoder, Digital TV satellite Systems, CCTV, CATV, direct to home TV, 3D TV systems, Digital broadcasting, case study (e.g. Cricket match, Marathon, Foot ball match) , Mobile TV.

REFERENCE BOOKS :

1. R. R. Gulathi, "Modern Television Practice- Fourth Revised edition", New AGE Publication, 2012.
2. S. P. Bali, "Color TV Theory and Practice", 2010.
3. R.G. Gupta, "Audio Video Systems", Technical Education, 2007.

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH. SEM-VIII
EC4061 POWER ELECTRONICS

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

This course provides the basics of power semiconductors devices, firing and commutation circuits of the thyristor and provides in depth knowledge of power converters. It also deals with typical applications of power electronics.

COURSE OUTCOMES :

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

1. Discuss the characteristics of power devices and their ratings.
2. Explain operation of power electronics systems.
3. Analyze performance parameters of the converters and inverters.
4. Compare control techniques of different converters and inverters with respect to their performance.
5. Design converter circuits for the given specifications.

PREREQUISITE :

There is no prerequisite for this course; however the knowledge of basic electronics and network theory will be beneficial.

UNIT-I **06**

SEMICONDUCTOR POWER DEVICES : Characteristics of SCR, TRIAC, DIAC , GTO, power diodes, power transistors, power MOSFET and IGBT. Rating of power devices, series and parallel connections of SCRs, SCR protections- dv/dt, di/dt, over voltage and over current protection.

UNIT-II **06**

PHASE CONTROLLED CONVERTERS : Single phase half wave full wave controlled rectifiers with R and RL loads, operation with freewheeling diode, performance factors of the converters, dual converter, three phase half wave, half controlled and fully controlled rectifiers with resistive load. Utility interface and harmonics generation, harmonic standards and recommended practices.

UNIT-III **06**

DC - DC CCONVERTERS : Principle of operation of chopper, classification on the basis of operating quadrants, step-down converter, step-up converter, examples, multiphase choppers, examples. Design of dc-dc converters.

UNIT-IV **06**

PWM INVERTERS : Basic inverter operation, Single phase bridge inverters using MOSFETs/IGBTs, classification of inverters, performance parameters, three phase inverters using MOSFETs/IGBTs, harmonic elimination methods, examples.

UNIT-V **06**

DC AND AC DRIVES : Series and separately excited DC motors using converters and choppers, torque-speed characteristics, speed control techniques of AC motor: rotor resistance, stator-voltage and v/f control, basic equations, characteristics. Brushless motor drives.

UNIT-VI **06**

POWER ELECTRONICS APPLICATIONS : Uninterrupted Power Supply (UPS), Switched Mode Power Supply (SMPS), HVDC transmission, Battery charger, Circuit breakers, Induction heating and Dielectric heating, Integral cycle triggering.

TEXT BOOKS :

1. M. H. Rashid, "Power Electronics circuits devices and applications", PHI New Delhi, IIIrd edition, 2004.
2. MD Singh and K.B Khanchandani, "Power Electronics", Tata McGraw Hill, IInd edition, 2010.

REFERENCE BOOKS :

1. P. C. Sen, "Modern Power Electronics", S. Chand and Co, New Delhi, Vth edition, 2012.
2. Ned Mohan, T. Undeland & W. Robbins, "Power Electronics Converters applications and design", John Willey & sons, Singapore, IIIrd edition, 2003.
3. Dr. P.S. Bhimbhra, "Power Electronics", Khanna Publication, Vth Edition ,2012.
4. Bimal K. Bose, "Modern Power Electronics and AC Drives", Pearson Education, 2005.
5. Soumitra Kumar Mandal, "Power Electronics", McGraw Hill, 2014.

B. TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VIII
PROGRAM ELECTIVE-II
EC4081 AUTOMATION WITH SCADA

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

The course provides comprehensive coverage of SCADA System, its architecture, protocols, distributed control system, batch control system automation. It will provide knowledge about SCADA systems to identify few real-life industrial applications.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Explain the importance of SCADA in critical infrastructure.
2. Develop architecture of SCADA
3. Construct block diagram representation on industrial applications using SCADA.
4. Explain terminology & characteristics of batch control system.
5. Develop control schemes for different batch process.

PREREQUISITE :

Knowledge of PLC will be helpful.

UNIT-I **06**

SCADA SYSTEMS : Introduction, definitions and history of Supervisory Control and Data Acquisition, typical SCADA system Architecture, Communication requirements, Desirable Properties of SCADA system, features, advantages, disadvantages and applications of SCADA. SCADA Architectures (First generation - Monolithic, Second generation - Distributed, Third generation - Networked Architecture), SCADA systems in operation and control of interconnected power system, Power System Automation (Automatic substation control and power distribution), Petroleum Refining Process, Water Purification System, Chemical Plant.

UNIT-II **06**

SCADA PROTOCOLS : Open systems interconnection (OSI) Model, TCP/IP protocol, DNP3 protocol, IEC61850 layered architecture, Control and Information Protocol (CIP), Device Net, Control Net, Ether Net/IP, Flexible Function Block process (FFB), Process Field bus (Profibus). Interfacing of SCADA with PLC.

UNIT-III **06**

DISTRIBUTED CONTROL SYSTEMS COMPONENTS : Concepts of hierarchical control. Workstation & Workstation Hosts: issues, Design concepts & classification. Operator Interface evolution & HMI design. Networks in process automation, Fault-tolerant programming & real-time operating systems.

UNIT-IV **06**

BATCH CONTROL SYSTEM AUTOMATION : Introduction to Batch processing, batch control types & components. Batch control system terminology & characteristics of batch processing. The hierarchical batch model & control structure.

UNIT-V **06**

BATCH CONTROL SYSTEMS ENGINEERING & MANAGEMENT : General control requirements, safety interlocking, sequential control of batch processes, batch & recipe management. Case studies of use in Pharma & Dairy processing.

UNIT-VI **06**

STATE OF THE ART IN BATCH CONTROL SYSTEMS : Batch control standards, recipes, computer aided formulations, electronic batch recorder & signatures, batch control optimization, batch control system selection criteria.

REFERENCE BOOKS :

1. Thomas G Fisher, "Batch Control Systems", ISA Press.
2. Popovic & Bhatkar, Dekker. "Distributed computer control for Industrial Automation".

3. Ronald L. Krutz, "Securing SCADA System", Wiley Publications.
4. Stuart A Boyer, "SCADA supervisory control and data acquisition", ISA, 4th Revised edition
5. smuel Herb, "Understanding Distributed processor systems for control", ISA.
6. Bela Liptak, "Process software and Digital Networks", CRC Press

B. TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VIII

PROGRAM ELECTIVE-II

EC4101 EMBEDDED LINUX

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

This course is all about designing an embedded system with Embedded Linux OS. The course introduces the participant to Linux Embedded OS. The course focuses on the OS structure. The course deals with many facets of the Linux operating system, including: Linux kernel structure, I/O, Signals, Processes, Threads, and IPC. The course will be co-taught by an industry expert as well, through which learners will get enough practical/industrial exposure. Learners will learn the entire Linux kernel architecture, writing device drivers and applications for Embedded Linux and Real-time OS with lots of hands-on experiments.

PRE-REQUISITE :

A fundamental understanding of operating systems & a working knowledge in C and/or C++.

COURSE OUTCOMES :

After studying this course students should be able to:

1. Explain the basics of embedded linux & Embedded Linux environment.
2. Select and configure OS, file system towards optimizing performance.
3. Design simple editor, pseudo assembler etc.
4. Write a device driver for Embedded Linux.
5. Design an embedded system with Embedded Linux OS.

UNIT-I **06**

FUNDAMENTALS OF LINUX : Basic Linux System Concepts: Working with Files and Directories- Introduction to Linux File system - Working with Partitions and File systems - Understanding Linux Permissions; Using Command Line Tools: Executing Commands from the Command Line -Getting to a Shell-Popular Command-Line Commands-Working with the Bash Shell

UNIT-II **06**

VARIOUS DISTRIBUTIONS AND CROSS PLATFORM TOOL CHAIN : Introduction - History of Embedded Linux- Embedded Linux versus Desktop Linux -Commercial Embedded Linux Distribution- Choosing a distribution-Embedded Linux Distributions - Architecture of Embedded Linux - Linux Kernel Architecture-Porting Roadmap - GNU Cross Platform Tool chain

UNIT-III **06**

HOST- TARGET SETUP AND OVERALL ARCHITECTURE : Real Life Embedded Linux Systems-Design and Implementation Methodology Types of Host/Target Development Setups-Types of Host/Target Debug Setups Generic Architecture of an Embedded Linux System-System Startup -Types of Boot Configurations -System Memory Layout-Processor Architectures-Buses and Interfaces -I/O-Storage

UNIT-IV **06**

KERNEL CONFIGURATION : A Practical Project Workspace - GNU Cross- Platform Development Tool chain- C Library Alternatives - Other Programming Languages- Eclipse: An Integrated Development Environment - Terminal Emulators - Selecting a Kernel - Configuring the Kernel - Compiling the Kernel - Installing the Kernel-Basic Root File system Structure -Libraries-Kernel Modules and Kernel Images -Device Files-Main System Applications - System Initialization

UNIT-V **06**

LINUX DRIVERS : Introduction in to basics on Linux drivers, introduction to GNU cross platform Tool chain-Case study on programming one serial driver for developing application using Linux Driver

UNIT-VI **06**

CASE STUDIES : Configuring the Linux Environment, Compilation & Porting of Embedded Linux. Process Management Configuring and Managing Services -Starting and Stopping Services. Inter Process Communications IPC: Benefits of IPC- Basic concepts-system calls-creating pipes-creating Linux Driver Development: Devices in Linux- User Space Driver APIs- Compiling, Loading and Exporting- Character Devices- Tracing and Debugging-Blocking and Wait Queues- Accessing Hardware- Handling Interrupts- Accessing PCI hardware- USB Drivers-Managing Time- Block Device Drivers- Network Drivers- Adding a Driver to the Kernel Tree.

REFERENCE BOOKS :

1. Richard Petersen. , "Linux: The complete reference", sixth edition (Part I & II covers Unit I)
2. P. Raghavan, Amol Lad, Sriram Neelakandan, "Embedded Linux System Design & Development", Auerbach Publications, 2012. (Chapter 2 covers Unit II)
3. Karim Yaghmour, Jon Masters, Gilad Ben- Yossef, and Philippe Gerum, "Building Embedded Linux Systems", O'Reilly Publications, 2nd Edition 2008. (Chapter 1, 2, &3 covers Unit III & chapter 4, 5, &6 covers Unit IV)
4. Jonathan Corbet, Alessandro Rubini & Greg Kroah "Linux Device Drivers", - Hartman, 3rd Edition', O'Reilly, 2011. (Covers Unit V & VI)

B.TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VIII

PROGRAM ELECTIVE-II

EC4121 BIOMEDICAL IMAGE PROCESSING

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

Biomedical image processing is the emerging field of Biomedical Engineering. This field seeks to close the gap between engineering and medicine. It combines the design and problem solving skills of engineering with medical and biological sciences to advance healthcare treatment, including diagnosis, monitoring, and therapy with imaging technics.

Much of the topics consists of acquisition of bio signals, processing of bio signals,images. Prominent biomedical image processing applications include the MRI,CT Scanners, Ultrasound, automation as well as the use of web based and smart phone applications .

COURSE OUTCOMES :

1. Discuss about imaging applications in medicine.
2. Explain algorithms that are widely used in image processing.
3. Solve Engineering Problems related to medical imaging field.
4. Explain current technologies and issues that are specific to medical image processing systems.
5. Develop hands-on experience by using computers to process images with Matlab.

PREREQUISITE :

Students expecting to apply to the biomedical Instrumentation and Healthcare major should have opted Biomedical signal processing course in last Semester. Also students have studied fundamentals of electronics, science of chemistry, and physics. Students should be familiar with design of amplifiers and transducers. Students without this preparation may be required to take additional efforts to prepare themselves for the course.

UNIT-I **06**

INTRODUCTION : Basics of image processing, Image representation, Simple Image formation model, Sampling and Quantization, Basic relationships between pixels, Distance measures, Basic operations, Imaging Geometry, Image File formats like BMP,JPEG,DICOM etc, MATLAB programming

UNIT-II **06**

SOURCES OF MEDICAL IMAGES : Physics of X-ray, CT, PET, MRI, and ultrasound; Properties of the resulting images, Advantages and disadvantages of each imaging modality

UNIT-III **06**

IMAGE ENHANCEMENT : Contrast adjustment, denoising (convolution, FFT), deblurring, edge detection, anisotropic diffusion, Interpolation methods, including nearest-neighbour, linear, cubic and higher order and super-resolution

UNIT-IV **06**

REGISTRATION (ALIGNMENT) : Intensity-based methods, Cost functions (correlation, least squares, mutual information, robust estimators), and optimization techniques (fixed-point iteration, gradient descent, Nelder-Mead simplex method, etc.). Implement registration for rigid and non-rigid transformations, Transform based registration, Image Fusion methods: Spatial domain and frequency domain.

UNIT-V **06**

SEGMENTATION & RECONSTRUCTION : Simple methods such as thresholding, dynamic thresholding, region growing and watershed. Texture based tissue classification methods. More depth on the method of snakes (adaptive mesh), level set method (numerical solution of partial differential equations), and clustering (classifiers).

Reconstruction Methods: Reconstruction techniques for CT (filtered back projection) and MRI (using the FFT).The Radon transform, the Fourier transform, and how they relate to each other.

UNIT-VI

RECENT TRENDS IN MEDICAL INFORMATICS : Medical Expert Systems, Virtual reality applications in medicine, Virtual Environment - Surgical simulation - Radiation therapy and planning - Telemedicine -

virtual Hospitals - Smart Medical Homes - Personalized e-health services - Biometrics - GRID and Cloud Computing in Medicine.

REFERENCE BOOKS :

1. C.L. Epstein, "Introduction to the Mathematics of Medical Imaging", Prentice Hall, 2003.
2. K.R. Castleman, "Digital Image Processing", Prentice Hall, 1996.
3. R.C. Gonzalez and R.E. Woods, "Digital Image Processing", Prentice Hall, 2002.
4. R.C. Gonzalez, R.E. Woods and S.L. Eddins, "Digital Image Processing using Matlab", Prentice Hall, 2004.
5. R. Kimmel, "Numerical Geometry of Images", Springer, 2004.
6. G. Sapiro, "Geometric Partial Differential Equations and Image Analysis", Cambridge Univ. Press, 2001.

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH. SEM-VIII
PROGRAM ELECTIVE-II
EC4141 BROADBAND ACCESS NETWORK

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

Broadband Access Network is offered as program elective course at the eighth semester of Electronics & Telecommunication Engineering undergraduate program. This course covers fundamental concepts of data and computer communications. The tremendous growth of Internet traffic has accentuated the aggravating lag of access network capacity. The most widely deployed broadband solutions today are digital subscriber line (DSL) and cable modem (CM) & Passive optical networks. The course will introduce basics of various broadband access technologies, including: protocol, network architecture. Topics covered in this course include: Evolution of access networks, fundamentals of optical networks, Digital subscriber lines, cable modem, passive optical network technologies. Optical transport networks such as ATM, SONET, SDH.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Describe features of optical networks & various broadband access technologies.

2. Illustrate architectures & protocols of broadband access networks.
3. Calculate technical parameters used in broadband access & transport networks design.
4. Evaluate performance of access & transport networks.
5. Summarize evolution of passive optical networks & hierarchies of optical transport networks.

PREREQUISITE : Nil

UNIT-I **06**

INTRODUCTION : History of access technology- dial-up, ISDN, Overview of broadband access technologies, Optical Networks, Optical Layer, Transparency and All Optical Networks, Optical Packet Switching, Transmission Basics.

UNIT-II **06**

DIGITAL SUBSCRIBER LINE : DSL standards (ADSL, HDSL, RADSL, VDSL, G.lite) - Access network architecture (DSLAM, ATM), Modulation technologies (DMT).

UNIT-III **06**

CABLE MODEM SERVICE : Headend and regional network architecture, Cable Modem Termination System - CMTS, Hybrid Fiber Coax networks - HFC, CableLabs initiatives - DOCSIS, PacketCable, CableHome.

UNIT-IV **06**

PASSIVE OPTICAL NETWORKS- ARCHITECTURES AND PROTOCOLS : PON Architectures, FTTx , Broadband PON- architecture & protocol, Gigabit - Capable PON, Ethernet PON Architecture, 10GEPON PMD Architecture.

UNIT-V **06**

OPTICAL ACCESS AND HYBRID OPTICAL -WIRELESS ACCESS NETWORKS : TDM-PON Evolution, WDM-PON Components and Network Architectures, Hybrid TDM/WDM-PON, WDM-PON Protocols and Scheduling Algorithms, Hybrid Optical-Wireless Access Network Architecture, Radio Over fiber architectures.

UNIT-VI **06**

OPTICAL TRANSPORT NETWORKS (OTNS) : SONET and SDH: Frame structure, Functional Component, problem detection, concatenation. Architecture of Optical Transport Networks (OTNs)- Digital wrapper, in-band and out-of-band control signalling, Importance of Multiplexing and multiplexing hierarchies, SONET multiplexing hierarchies, SDH multiplexing hierarchies.

TEXT BOOKS :

1. N.Ransom & A.A. Azzam, "Broadband Access Technologies", McGraw Hill, 1st Edition,1999.
2. Ramaswami & K.N. Sivarajan, Morgan Kaufmann, "Optical Networks: A practical Perspective", 3rd Edition, 2010.

REFERENCES BOOKS :

1. W. Vermillion, "End-to-End DSL Architecture", Cisco Press, 1st Edition, 2003.
2. K.M. Sivalingam & S.Subramanian, Kluwer, "Optical WDM Network Principles and Practice", Academic Publishers, 2nd Edition 2002.

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VIII
PROGRAM ELECTIVE II
EC4161 MACHINE VISION

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

Machine Vision is offered as the program elective course at the eighth semester of Electronics & Telecommunication Engineering undergraduate program. Machine Vision represents an exciting and dynamic part of cognitive and computer science.

Machine Vision provides an intensive introduction to the process of generating a symbolic description of an environment from an image. Lectures describe the physics of image formation, motion vision, and recovering shapes from shading. Binary image processing and filtering are presented as preprocessing steps. The other topics covered are morphological processing, imaging & range image processing, some case studies.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Define and select components of a machine vision system.
2. Apply basic techniques used in the development of machine vision system.
3. Analyze various techniques used in segmentation by applying different types of the mask on the image using appropriate tool.

4. Compare a variety of pattern classification, structural pattern recognition, and pattern classifier combination techniques.
5. Implement the machine vision algorithms for real world applications.

PREREQUISITE : Nil

UNIT-I **05**

INTRODUCTION : Human Vision : Low Level and high Processing, Image Formation & Sensing, Projections, Brightness, Lenses, Image Sensing, Physics of Colour, and Standards and color Models, cameras- calibration and selection.

UNIT-II **06**

BASIC MACHINE VISION TECHNIQUES : Representations of Images, basic Image Processing operations, Image filtering operations.

UNIT-III **07**

MORPHOLOGICAL IMAGE PROCESSING : Image & structuring element, Dilation & erosion, opening and closing operation, Hit- or -miss transformation, edge effects, extended functions, Applying Morphology to Practical Tasks, recursion and speed of operation, gray scale morphology, Texture analysis.

UNIT-IV **06**

IMAGE SEGMENTATION : Edge detection: Differential Operators, Discrete Approximations, Roberts, Prewit & Sobel Laplacian of Gaussian (LoG) Detector,Canny Edge Detector, Template matching.

Histogram-based Segmentation, Thresholding, K-means Clustering Spatial Coherence, Merging and Splitting, Region Growing, Graph Theoretic Segmentation Mean-shift Segmentation, Watersheds, Active Contours. Texture Analysis.

UNIT-V **07**

PATTERN RECOGNITION : Introduction, Statistical Methods, Non-parametric Approaches to Pattern Recognition, Knowledge representation, statistical pattern recognition, classification principles, classifier setting, classifier learning, Baye's classification, nearest neighbor classification, cluster analysis.

ALGORITHMS, APPROXIMATIONS AND HEURISTICS : Introduction, Changing Image Representation, Redefining Algorithms, Approximate and Heuristic Methods.

UNIT-VI **05**

3D VISION : 3D vision tasks, A single perspective camera, scene construction from multiple views, two cameras,

three cameras and trifocal tensor, 3D information from radiometric measurements, 3D model based vision, Machine Vision Application Using 3-D Imaging, Industry Application Example Using 3-D Imaging.

TEXT BOOKS :

1) Milan sonka , Vaclav Hlavac, Roger Boyle, "Image processing analysis and Machine vision", Thomson Publication, IInd edition.

2) Bruce G. Batchelor (ed.), "Machine Vision Handbook", DOI 10.1007/978-1-84996-169-1_1, # Springer-Verlag London Limited 2012

3) E.R.Davies, "Machine Vision: Theory, Algorithms, Practicalities", Elsevier, IIIrd edition, 2006

4) Rafael C Gonzalez , Richard E. Woods , "Digital image processing", Pearson Publication, IInd edition, 2002.

5) Earl Gose etal, "Pattern recognition and image analysis", PHI publication

REFERENCE BOOKS :

1) Pratt W.K, "Digital Image Processing", Third Edition, John Wiley & Sons, 2001

2) B. Chanda, D. Datta, majnudar, "Digital image processing and Analysis",PHI, 2004.

Reference: http://www.deu.edu.tr/ders-katalog/2016-2017/eng/en_132_9448_3015.html

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH SEM-VIII
PROGRAM ELECTIVE II
EC4181 FUZZY LOGIC

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

This course commences the exciting field of fuzzy systems. It deals with reasoning that is approximate rather than fixed and exact. Fuzzy logic is problem solving control system methodology. It introduces the fuzzy systems. It provides the skills to produce a fuzzy control system for a continuous process application.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Identify fuzzy sets and classical sets.

2. Relate fuzzy relations.
3. Interpret membership functions.
4. Plan knowledge base and rule base system.
5. Analyze fuzzy control applications

PREREQUISITE: Nil

UNIT-I **06**

CLASSICAL SETS & FUZZY SETS : The utility & limitations of Fuzzy systems, The Allusion: statistics & random processes, uncertainty & information, fuzzy sets & membership, classical sets: operations, properties, mapping of classical sets to functions, Fuzzy sets: operations, properties.

UNIT-II **06**

CLASSICAL RELATIONS & FUZZY RELATIONS : Cartesian product, crisp relations: cardinality, operations, properties, Fuzzy relations: cardinality, operations, properties,fuzzy Cartesian product & composition, tolerance & equivalence relations, fuzzy tolerance & equivalence relations, value assignments: cosine amplitude, max-min method, other similarity methods.

UNIT-III **06**

PROPERTIES & DEVELOPMENT OF MEMBERSHIP FUNCTIONS, FUZZIFICATION & DEFUZZIFICATION : Features of membership function, membership value assignments, various forms, fuzzification, defuzzification of crisp sets, ?-cuts for fuzzy relations, defuzzification to scalars.

UNIT-IV **06**

LOGIC & FUZZY SYSTEMS AND FUZZY ARITHMETIC & EXTENSION PRINCIPLE : Logic: classical logic, fuzzy logic, Fuzzy systems: natural language, linguistic hedges, fuzzy (rule-based) systems, graphical techniques of inference, extension principle, fuzzy arithmetic, interval analysis in arithmetic, approximate methods of extension: vertex, DSW algorithm, restricted DSW algorithm.

UNIT-V **06**

FKBC DESIGN PARAMETERS : The structure of FKBC, rule base, data base, inference engine, choice of fuzzification procedure, choice of defuzzification procedure, Nonlinear fuzzy control: control problem, FKBC as a nonlinear transfer element, types of FKBC.

UNIT-VI **06**

FUZZY CONTROL SYSTEMS : Control system design problem, aircraft landing control problem, fuzzy engineering

process control, fuzzy statistical process control, industrial applications, Adaptive fuzzy control: design & performance evaluation, the main approach to design, Fuzzy controller.

TEXT BOOKS :

1. Timothy J. Ross, "Fuzzy Logic with engineering applications", Willey publication, 3rd edition, 2010.
2. D Driankov H Hellendoorn M Reinfrank, "An introduction to Fuzzy Control", Narosa publications, 2001.

B.TECH. ELECTRONICS & TELECOMMUNICATION
B.TECH. SEM-VIII
PROGRAM ELECTIVE II
EC4201 SYSTEM VERILOG

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

In the semiconductor and electronic design industry, System Verilog is a combined hardware description language and hardware verification language based on extensions to Verilog. System Verilog started with the donation of the Superlog language to Accellera in 2002. The bulk of the verification functionality is based on the OpenVera language donated by Synopsys. In 2005, SystemVerilog was adopted as IEEE Standard 1800-2005. In 2009, the standard was merged with the base Verilog (IEEE 1364-2005) standard, creating IEEE Standard 1800-2009. The current version is IEEE standard 1800-2012.

The feature-set of SystemVerilog can be divided into two distinct roles:

1. SystemVerilog for RTL design is an extension of Verilog-2005; all features of that language are available in SystemVerilog.
2. SystemVerilog for verification uses extensive object-oriented programming techniques and is more closely related to Java than Verilog.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Explain importance of hardware verification languages and methodologies.
2. Apply the Object Oriented Principles in the system Verilog.
3. Analyze the differences between Verilog and system verilog.
4. Write code and simulate any digital function in Verilog HDL.
5. Choose good coding techniques per current industrial practices.

PREREQUISITE :

Students need understanding of Boolean algebra, combinational and sequential digital circuits and number systems (binary, hexadecimal).

UNIT-I **06**

BASICS OF VERIFICATION : Difference between ASIC verification and ASIC testing, Verification basics, Testbenches, Layered Organization of Testbenches. Importance of hardware verification languages and methodologies.

System Verilog data types and typedefs : System Verilog data types, enhanced literal numbers syntax, 4-state and 2-state types, typedefs, enum, struct data type, Type parameters, $unit and $root. Packages, strings, static and dynamic type casting, Random number generation.

UNIT-II **06**

SYSTEM VERILOG OPERATORS, LOOPS, JUMPS, FUNCTIONS : loops and jumps in system verilog, introduction to different always blocks, systemverilog enhancements to tasks and functions, systemverilog priority and unique modifiers for case and if statements, 'time scale, system verilog time unit and time precision

Structs, Unions, Packed and Unpacked Arrays, Semaphores and Mailboxes: Structs and its assignments, packed and unpacked arrays, array indexing, structs and packed structs, Unions and packed unions, dynamic arrays and methods, foreach loop, associative arrays and methods, queues and concatenation operations, queue methods, semaphores and methods, mailboxes and methods, bounded and unbounded mailboxes.

UNIT-III **06**

CLASS AND RANDOMIZATION : Systemverilog class basics, class declaration, class members and methods, class handles, class object construction, super and this keywords, object handles, user defined constructors, class extension and inheritance, chaining new() constructors, overriding class methods, extending class methods, local and protected keywords, constrained random variables, directed vs random testing, rand and randc class data types, randomize-randomizing class variables, random case, built-in-randomization methods, random sequence and examples.

UNIT-IV **06**

INTERFACES : Interface overview, generic interfaces, interfaces vs records, how interfaces work, requirements of good interface, interface constructs, interface mode ports.

Program block: Fundamental testbench construction, program blocks, program block interaction with modules, final blocks, Testbench stimulus/Verification vector timing strategies.

Clocking: Clocking blocks, clocking skews, clocking block scheduling, fork-join processes.

UNIT-V **06**

CONSTRAINED RANDOM VARIABLES, COVERAGE, METHODS AND INTERFACES : Randomization constraints, simple and multi-statement constraints, constraint distribution and set membership, constraint distribution operators, external constraints, covergroups, coverpoints, coverpoint bins and labels, cross coverage, covergroup options, coverage capabilities. Virtual class, why to use virtual class, virtual class methods and restrictions, polymorphism using virtual methods, pure virtual methods, pure constraints, passing type parameters, virtual interfaces.

UNIT-VI **06**

SYSTEM VERILOG ASSERTIONS : Assertion definition, assertion benefits, system Verilog assertion types, immediate assertions, concurrent assertions, assert and cover properties and labels, overlapping and non-overlapping implications, edge testing functions, sequences, Vacuous success, property styles, System Verilog assertion system functions, Assertion severity tasks, assertion and coverage example of an FSM design.

TEXT BOOKS :

1. Christian B Spear, "System Verilog for Verification: A guide to learning the Testbench language features", Springer publications, 3 rd edition, 2012.
2. Vijaya Raghavan, "System Verilog Assertions", Springer publications, 2005
3. Sutherland, "System Verilog for Design", Springer publications, 2nd Edition, 2006

B. TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VIII

EC4521 ADVANCED COMMUNICATION LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

This LAB deals with existing developments in television and video Engineering. The Lab deals with both the fundamental workings of analog and digital Televisions.

In this course, a curriculum model including recent developments and technologies in the Radio Frequency (RF) and Microwave Engineering field by using a blended approach is proposed. This study covers the description of the content of theoretical and hands on applications, the integration model. The main goal of the course is to prepare students for future professional careers in RF and Microwave Engineering by supporting them with new instructional technologies. The course is structured with a balance between theory and laboratory.

COURSE OUTCOMES :

After successful completion of this course, students should be able to

1. Illustrate operation of microwave sources, description of components and guide lines to operate microwave instruments.
2. Measure various microwave parameters.
3. Design microwave circuit using microwave components.
4. Arrange experiments in team and write necessary reports effectively.
5. Examine & interpret the color Television Receiver and digital Television Receiver.
6. Compare different audio- video interfaces used in advanced television receivers.

Video engineering experiments :

1. Study of CRT colour television circuit & voltage analysis of power supply section.
2. Composite colour video signal analysis & fault detection of CRT colour television.
3. Configuration & verification of working principle of DTH system.
4. Video & audio quality analysis of various interfaces supported by digital television systems.
5. Voltage & waveform analysis of audio-video recording & playback using DVD & VCD player.

Microwave experiments:

1. Simulation of rectangular and circular waveguide using simulation tool.
2. Study of Reflex Klystron and its characteristics.
3. Determine the frequency and wavelength in rectangular waveguide working on TE10 mode.
4. Measure the unknown impedance using slotted section and smith chart.
5. Simulation of E-Plane Tee/H-Plane Tee/Magic Tee using simulation tool.
6. Study of Gun oscillator and its characteristics.

B.TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VIII

EC4541 POWER ELECTRONICS LAB

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

This course focuses on the measurement of the performance parameters of the converters by performing the experiments like single phase half controlled and full controlled rectifiers, dc-dc converters and inverters. Also it includes analysis of the parameters of the converters that helps enhancing analytical abilities of the students.

PRE-REQUISITES :

There is no prerequisite for this course; however the knowledge of basic electronics and network theory will be beneficial.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Sketch the circuit diagram/block diagram as per the requirement.
2. Demonstrate response of the converters/inverters for various conditions.
3. Determine performance parameters of the converters.
4. Analyze the results and conclude.
5. Produce the report of the experiment.

EXPERIMENT LIST :

1. V-I characteristic of SCR.
2. Triggering circuit for SCR using UJT.
3. SCR commutation circuit.
4. AC phase control using TRIAC.
5. Single phase full converter with R and RL load.
6. Three phase semi converter with R load.
7. Step-down dc-dc converter.
8. Step-up dc-dc converter.
9. Single phase full bridge inverter.
10. DC motor control.

B.TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VIII

EC4561 EMPLOYABILITY ENHANCEMENT SKILL-II

L	T	P	Credits
0	0	2	1

COURSE DESCRIPTION :

Employability Enhancement Skill -II course is introduced in the VIII semester. The motive of the course is to make the students ready for the campus interview technically. The curriculum is designed by taking the opinion of different Industry experts. The different industry persons who have given their valuable inputs are Patani Computers, CoreelTechnologies,IBM, ESC India etc.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Interface on-chip and off-chip peripherals to the PIC controller.
2. Design application using CAN and SPI protocols.
3. Develop a minimum system using Wi-Fi, blue tooth and PIC controller.

COURSE CONTENT : **24 Hrs**

UNIT-I

COMMUNICATION PROTOCOLS : CAN protocol for automotive domain (e.g. engine parameter monitoring and control) using PIC, I2C protocol programming using PIC.

UNIT-II

MEMORY INTERFACING : Memory interface using SPI protocol - SD/micro SD card using PIC, Serial memory interface using I2C protocol.

UNIT-III

PERIPHERAL INTERFACING : Interfacing Wi-Fi, Blue Tooth, RF and GSM using PIC microcontroller.Application study -MPEG3,MPEG4.

REFERENCES :

1. Instructor reference material.
2. "Programming PIC microcontrollers with PIC basic", chuck helebuyck

3. "PIC microcontrollers-programming in basic", Milan verle.

4. "The C programming Language", Brian W.kernighan and Dennis M.Ritchie

5. "Let Us C", YashvantP .kanetkar

MODE OF CONDUCT :

Contents will be delivered by the industry person and minimum five assignments will be given to the students. Evaluation of assignment will be done by the expert faculty from department on weekly basis. Assignment may be practical or project based which will be done by the individual student/

EVALUATION :

Evaluation will be done on following basis

1. Completion of assignments before deadline.

2. Lab exam based on assignments.

B.TECH. ELECTRONICS & TELECOMMUNICATION

B.TECH SEM-VIII

EC4581 PROJECT PHASE-II

L	T	P	Credits
0	0	8	8

COURSE DESCRIPTION :

The Final Year Project is a challenging capstone experience for Electronics & Telecommunication engineering students as they complete their four year honors degree. The course builds upon the knowledge and skills that students have gained from previous coursework in their professional engineering degree. Professional working practice is learnt in the context of a realistic engineering problem where integrative aspects are emphasized. The aim is to provide a bridge from academic work to professional practice.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Analyze result of implemented system to reach proper conclusions.

2. Inculcate professional, ethical and moral responsibilities.

3. Communicate effectively through reports, presentations and discussions within both the technical domain and the community at large.

4. Apply the principles of project management both as a member and a team leader for project development.
5. Learn independently and be ready for a lifelong learning to face increasing challenges and responsibilities.

PRE-REQUISITES : NIL

The group will submit the completed project work to the department at the end of semester VIII as mentioned below.

Semester- VIII Phase -II					
Sr. No	**Details**	**Evaluation By**	**Evaluation Type**	**Schedule**	**Marks**
1.	Demonstration of 75% project completion	Instructor for individual contribution + DPC*	ISE1 by GA**	February 1st week	25M (10+15)
2.	Demonstration of 100% project completion & Report submission	Instructor for individual contribution + Instructors of other group	ISE2 by SE***	April 2nd week	25M (10+15)
3.	Final viva & presentations	Panel of Examiners comprising of guide, external examiner & chairman	ESE	April 4th week	50M

*DPC: Department Program Committee - Committee constituted by Head of the department.

**GA: Group Assessment- All faculties of the department who wants to contribute in the betterment of project will be present at the time of Assessment.

***SE: Shuffled Evaluation- In this type of Evaluation, three instructors of other project will evaluate the project group

BTech
Open Elective Course Code
Semester VII (2016-17)

No.	Department	List of Open Electives-l	Course Code
1	Auto	Reliability Engineering	OE401
2	Civil	Project Management	OE411
3	Civil	Environmental Impact Assessment	OE413
4	CSE	Network Administration	OE421
5	CSE	Software Project Management	OE423
6	CSE	Quality Management	OE425
7	Elect	Linear and Nonlinear Optimization	OE431
8	ETC	Image Processing	OE441
9	IT	Software Project Management	OE451
10	Mech	Aircraft Systems	OE461
11	Mech	Supply Chain Management	OE463
12	Mech	Creativity and Innovation	OE465
13	MBA	Marketing for Engineers	OE471
14	MBA	Engineering Economics	OE473

BTech
Open Electives Course Code
Semester VIII (2016-17)

No.	Department	List of Open Electives-ll	Course Code
1	Auto	Renewable Energy Sources	OE402
2	Civil	Materials Management	OE412
3	Civil	Industrial Health and Safety Engineering	OE414
4	CSE	Information Technology Foundation Program	OE422
5	CSE	Database Administration	OE424
6	Elect	Wind Energy Engineering	OE432
7	ETC	Robotics	OE442
8	IT	IT for Engineers	OE452
9	Mech	Entrepreneurship Development	OE462
10	Mech	Engineering Application of Operation Research	OE464
11	MBA	Finance for Engineers	OE472
12	MBA	Costing and Cost Control	OE474

B.Tech. Semester - VII
Open Elective - I
OE 401 RELIABILITY ENGINEERING

L	T	P	Credits
3	0	0	3

RATIONALE :

Reliability engineering consists of the systematic application of time-honored engineering principles and techniques throughout a product lifecycle. The goal of reliability engineering is to increase the ability of the components and the devices to sustain under a number of extreme environmental and operating conditions, such that they operate for longer periods of time without failure. Reliability Engineering is used in modern industries in case of electronic systems, automotive components, electrical and mechanical systems, process industry and also in software industry.

COURSE LEARNING OUTCOMES :

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

1. Explain fundamental concepts and measures of reliability.
2. Apply methods for estimating the reliability of designs and for analyzing reliability data.
3. Create reliability block diagram for a given system to predict and enhance the reliability of a particular system
4. Apply engineering knowledge and specialist techniques to prevent or to reduce the failures or frequency of failures.
5. Apply the appropriate methodologies to determine time and strength based reliabilities.
6. Explain terms involved in software reliability.

PRE-REQUISITES : Basic Mathematics, Probability fundamentals etc.

CURRICULUM

Unit 1 : Introduction to Reliability Engineering **7 hrs**

Reliability definitions, failure, failure density, failure rate, hazard rate, Mean Time To Failure (MTTF), Mean Time Between Failure (MTBF), safety and reliability, quality, cost and system effectiveness, life characteristic phases, modes of failure, areas of reliability, quality and reliability assurance rules, product liability, importance of reliability, reliability function, hazard function, the expected (or mean) residual life

Unit 2 : System reliability and Reliability Allocation **7 hrs**

Series models, Parallel systems, Complex system analysis and optimal arrangement of components, Tie and Cut-Set Methods for Complex System reliability, Computations, Reliability considerations in design. Reliability allocation or

apportionment, reliability apportionment techniques, equal apportionment, AGREE, ARINC, feasibility of objectives apportionment, reliability block diagrams and models, reliability predictions from predicted unreliability, minimum effort method.

Unit 3 : Time and failure-dependent reliability **5 hrs**

Series chain model, parallel system model, Standby systems, Mixed Parallel and Standby systems, Repairable system, Markov models, availability and maintainability, Non-repairable standby systems.

Unit 4 : Failure Mode, Effects and Criticality Analysis **6 hrs**

Failure mode effects analysis, severity/criticality analysis, Ishikawa diagram for failure representation, fault tree construction, basic symbols, development of functional reliability block diagram, fault tree analysis, fault tree evaluation techniques, minimal cut set method, minimal tie set method for fault tree estimation.

Unit 5 : Strength based Reliability **6 hrs**

Safety factor, safety margin, stress strength interaction, design of mechanical components and systems, material strengths and loads, reliability testing and reliability growth testing, mechanical and human reliability, accelerated life testing, Highly Accelerated Life Testing (HALT) and highly accelerated stress screening.

Unit 6 : Software Reliability **5 hrs**

Need and Concepts of Software Reliability, Failure and Faults - Prevention, Removal, Tolerance, Forecast, Dependability Concept - Failure Behaviour, Characteristics, Maintenance Policy, Reliability and Availability, Modeling, Reliability Evaluation

TEXT BOOKS

1. L. S. Srinath, Reliability Engineering, East-West Press, 4th Edition.
2. Elsayed A. Elsayed, Reliability Engineering, Addison Wesley, 1996.
3. Kailash C. Kapur, Reliability Engineering, 2012

REFERENCE BOOKS

1. Ebeling C.E., Introduction to Reliability and Maintainability Engineering", Overseas Press. Pvt Ltd.
2. B.S.Dhillon, Maintainability, Maintenance and Reliability for Engineers, CRC Press.
3. L.S,Srinath, Reliability Engineering, EWP, 3rd Edition 1998
4. Roy Billinton and Ronald N Allan , Reliability Evaluation of Engineering Systems, Springer, 2007
5. Roger D Leitch, Reliability Analysis for Engineers : An Introduction, Oxford University Press, 1995

6. S S. Rao, Reliability Based Design, Me Graw Hill Inc. 1992

7. E.E.Lewis, Introduction to Reliability Engineering, John Wiley and Sons.

8. Basu S.K, Bhaduri, Terotechnology and Reliability Engineering, Asian Books Publication.

9. Dr, A. K. Gupta, Reliability, Maintenance and Safety Engineering.

10. John D. Musa, Software Reliability Engineering, Tata McGraw Hill.

B.Tech. Semester - VII

Open Elective - I

OE 411 : PROJECT MANAGEMENT

L	T	P	Credits
3	0	0	3

Course Description :

This course is designed for budding engineers who want to build their carrier in MNCs as a Project Manager or become entrepreneur. The course will provide information about project management, identification of sustainable project, feasibility analysis of project, planning scheduling and control of project, Project .appraisal techniques and. International project management.

Numerous example and activities have been included in this course to illustrate the principles and techniques of project management and appraisal. This course discusses strategic, qualitative and organizational considerations which will help for capital budgeting decisions. It also describes business practices in various areas.

Students from CSE, ETC, IT and Electrical department can adopt this course.

Course Learning Outcomes:

At the end of this course students will be able to

1. Describe concept of project management & identify promising investment opportunities.
2. Analysis the feasibility of project on basis of commerce, finance, economics social & environmental aspects.
3. Prepare and use networks for project planning and control.

Unit 1: Introduction **4 hrs**

Concept Of project and project management organizations and project management, Generation and screening of project ideas.

Unit 2: Project feasibility Analysis-I **6 hrs**

Market & demand analysis - Situational analysis and specification of objective, Collection of secondary information, Conduct of market survey, Characterization of the market, Demand forecasting, Uncertainties in demand forecasting, marketing plan.

Technical analysis - Manufacturing process/technology, Technical arrangements, Material input and utilities, Product mix, Plan capacity, Location and site, Machineries and equipments, Structures and Civil works. Environmental Aspects. Project Charts and layouts, Schedule and project implementation, Need for considering alternatives.

Unit 3: Project feasibility Analysis-II **8 hrs**

Financial estimates and projection - Cost of project. Means of finance, Estimate of sales and production. Cost of production, Working capital requirement and its financing, profitability projection(or Estimates of working results), Projected cash flow Statement, Projected balance sheet, Multi-year projection, Financial modeling using spreadsheet

Social and economic cost benefit analysis

Environmental impact assessment.

Unit 4: Project planning, Scheduling and Control **10 hrs**

Bar chart & Network Scheduling, CPM network analysis (Time estimates), CPM cost model and Cost optimization, Updating of network resource Allocation introduction.

Unit 5: Project appraisal technique **6 hrs**

Net present value, Benefit cost ratio, Internal rate of return, urgency payback period, Accounting rate of return

Unit 6: International Project Management **4 Hrs**

Definition, types & Key success factors in International Project Management

References

1. Projects planning, Analysis, Selection, Financing, Implementation and Review -Prasanna Chandra - Me Grow Hill publication - 7th edition.
2. Cost Benefit Analysis - E. .1. Mishan.
3. Project Appraisal & Impact Analysis. SOAS University of London. Module introduction & overview.
4. A Guide to a project management body of knowledge - published by Project management institute - 5th edition.

B.Tech. Semester - VII

Open Elective - I

OE 413 : ENVIRONMENTAL IMPACT ASSESSMENT

L	T	P	Credits
3	0	0	3

Course Description :

Environmental impact assessment (EIA) is offered as open Elective for Undergraduate course (B. Tech) semester VIII, It deals with definitions and concepts, rationale and historical development of EIA, EIA in Engineering, Initial environmental examination, environmental impact statement, environmental appraisal, environmental impact factors and areas of consideration, measurement of environmental impact, organization, scope and methodologies of EIA, status of EIA in India.

Course Learning Outcomes :

Student should able to

1. To study and apply EIA methods.
2. To analyse the all projects by using Environmental Impact assessment tool.
3. To provide solution for decision making in Industrial development Problem.
4. To prepare EIA report for submission to concerned authority.

UNIT 1 **06**

Evolution of EIA : Environmental Impact Assessment: Introduction, Stages Of EIA, Origin of EIA, Establishments of Procedure: Legislative Option, Project Screening for EIA, Methods, Projects thresholds, Sensitive area criteria Matrices .Scope studies for Environmental Impact Studies (EIS). Preparation for EIS Planning, Public Participation and Review of EIS.

UNIT 2 **06**

Methods for impact assessment: Background information, interaction matrix methodologies, network methodologies, mathematical modelling, environmental setting, environmental impact assessment methodology, documentation and selection process, environmental indices and indicators for describing affected environment, Life cycle assessment

UNIT 3 **06**

Prediction and assessment of impact for air and noise environment: Basic information of air quality, identification of type and quantity of air pollutant, existing air quality and air quality standards, impact prediction and assessment, mitigation. Basic information of noise, existing noise levels and standards, prediction of noise levels and assessment of impact, mitigations

UNIT 4 **06**

Prediction and assessment of impact for water and soil environment: Basic information of water quality (Surface water and ground water), water quality standards, identification of impact, prediction of impact and assessment, mitigations. Background information of soil environment, soil and ground water standards, prediction and assessment of impact for ground water and soil, mitigations.

UNIT 5 **06**

Prediction and assessment of impact on cultural and socioeconomic environment:

Basic information on cultural resources, rules and regulations for cultural resources like archaeological, historical structures, Cultural system, prediction and assessment of impact, mitigations. Basic information of socioeconomic environment, description of existing socioeconomic environment, prediction and assessment of impact, mitigation, resettlement and rehabilitation.

UNIT 6 **06**

Decision Methods for Evaluation of Alternative:

Categorization of Industries for seeking environmental clearance from concerned authorities, procedure for environmental clearance, procedure for conducting environmental impact assessment report, Rapid and Comprehensive E1A, genera) structure of EIA document, Environmental management plan, post environmental monitoring.

REFERENCE BOOKS:

1. Canter R.L., Environmental Impact Assessment, McGraw Hill International Edition, 1997.
2. John G. Rau and David C. Wooten (Ed), Environmental Impact Analysis Handbook, McGraw Hill Book Company.
3. Environmental Impact Assesment By R.RBarthwal (New Age Intenational Publishers)
4. Environmental Impact Assesment By Abbasi

Examination Scheme

Sr.No.	Exam	Mode of Exam	Max. Marks	Min. Passing
1	ISE	ELA report preparation and its presentation	20	
2	MSE	Theory - 50% questions application oriented	30	
3	ESE	20 marks - MCQ 80 marks - Theory 70% questions application oriented	100	40

B.Tech. Semester - VII
Open Elective - I

OE421: NETWORK ADMINISTRATION

L	T	P	Credits
3	0	0	3

Course Description :

The main objective of this course is lo study the various concepts of Networking. It contains medium, devices, routing and designing of network.

Course Learning Outcomes :

On completion of this course the student wilJ be able to:

1. Identify the correct cable type required to connect two networks.
2. Express working of Internetworking models and need of OS1 model
3. Differentiate between collision and broadcast domain
4. Identify Ipv4 address and classify it
5. Express working of networking services like FTP, T'einet, DHCP and DNS
6. Design a network for given requirements

SYLLABUS

Unit 1 : Internetworking **(4)**

Introduction to Computer Network, Internetworking basics, internetworking model

Unit 2 : OSI Reference model **(7)**

OSJ reference model. Application layer, presentation layer, session layer, transport layer, network layer, data link layer, physical layer

Unit 3 : Ethernet networking and Data Encapsulation **(7)**

Collision domain, broadcast domain, CSMA/CD. Half and Full Duplex Ethernet, Ethernet at the Data Link Layer, Ethernet at the physical layer, Ethernet cabling, Straight-though cable. Crossover cable, rolled cable, fiber optic

Unit 4 : IP addressing **(6)**

IP addressing. IP terminology, The hierarchical IP addressing scheme, Private IP addresses. Ipv4 address types, Layer 2 broadcasts, Layer 3 broadcasts. Unicast Address. Multicast Address

Unit 5 : Introduction to networking services **(7)**

Introduction to File Transfer Protocol, Telnel, Dynamic Host Configuration Protocol, Domain Name- Service

Unit 6 : Network Design **(5)**

Action Plan, Needs of network. Example of network design

Text Books :

1. Unit 1, 2, 3 and 4 from chapter 1, 2 and 3, "CCNA Routing and Switching". Todd Lammle, Sybex A Wiley Brand publication.
2. Unit 6 from chapter 12, "HeadFirst Networking", AJ Anderson, & Ryan Benedetti, O'reilly publication.

Reference Books :

1. Unit 5 from TCP/IP protocol suite - Behrouz A. Forouzen (Tata Mag. Hii!)
2. Computer Networks - Fifth Edition, Andrew S. Tanenbaum. Pearson Publication.

B.Tech. Semester - VII
Open Elective - I

OE423 : SOFTWARE PROJECT MANAGEMENT

L	T	P	Credits
3	0	0	3

Course Description :

This course provides an introduction about software project management. This course's purpose is aware students about the different factors needed for software project management. It also includes learning of activity planning, risk management, resource allocation.

Course Learning Outcomes :

Upon successful completion of the course students should be able to:

1. Discuss importance of project management.
2. Prepare project plan, evaluate and estimate efforts.
3. Perform activity planning and risk management.
4. Identify resources for selected project and perform allocation.

SYLLABUS

Unit 1 : Introduction lo Software Project Management **(4)**

Introduction, Why is software project management important? What is a project? Software projects versus other types of project, Contract management and technical project management . Activities covered by software project management. Plans, methods and methodologies. Some ways of categorizing software projects, Stakeholders, Setting objectives, The business case. Project success and failure, What is management? Management control

Unit 2 : Project Evaluation and Programme Management **(7)**

Introduction, A business case. Project portfolio management, Evaluation of individual projects. Cost-benefit evaluation techniques. Risk evaluation,.Programme management. Managing the allocation of resources within programmes. Strategic programme management. Creating a programme. Aids to programme management. Some reservations about programme management, Benefits management

Unit 3 : Project Planning **(7)**

Introduction to Step Wise project planning, Select project Identify project scope and objectives. Identify project infrastructure, Analyse project characteristics. Identify project products and activities. Estimate effort for each activity, identify activity risks, Allocate resources. Review/publicize plan, Execute plan/lower levels of planning

Unit 4 : Software Effort Estimation **(5)**

Introduction. Where are estimates done?. Problems with over- and underestimates, The basis for software estimating. Software effort estimation techniques. Bottom-up estimating. The top-down approach and parametric models, Expert judgment, Estimating by analogy, Albrecht function point analysis. Function points Mark II . COSMIC full function points, COCOMO 13: a parametric productivity model

Unit 5 : Activity Planning and Risk Management **(8)**

The objectives of activity planning. When to plan. Project schedules, Projects and activities, Sequencing and scheduling activities. Network planning models, Formulating a network model, Adding the lime dimension. The forward pass, The backward pass, Identifying the critical path. Activity float. Shortening the project duration, identifying critical activities, Activity-on-arrow networks. Risk, Categories of risk, A framework for dealing with risk, Risk identification, Risk assessment Risk planning, Risk management, Evaluating risks to the schedule, Applying the PERT technique, Monte Carlo simulation. Critical chain concepts

Unit 6 : Resource Allocation **(5)**

The nature of resources. Identifying resource requirements, Scheduling resources, Creating critical paths. Counting the cost, Being specific. Publishing the resource schedule, Cost schedules. The scheduling sequence

Text Book:

1. Software Project Management. 5 Ed. Bob Hughes and Mike Cottereil. McGraw-Hill Education New Delhi, 2012.

References :

1. Robert K. Wysocki "Effective Software Project Management", WlJey Publication, 2011.
2. Walker Royce: ''Software Project Management", Addison Wesley, 1998.
3. Gopaiaswamy Ramesh, "Managing Global Software Projects'' - McGraw Hill Education (India), 14th Reprint 2013.

B.Tech. Semester - VII
Open Elective - I

OE425: QUALITY MANAGEMENT

L	T	P	Credits
3	0	0	3

Course Description :

This course presents guidelines and principles to develop and implement total quality management system. Quality management is very essential to face challenges in real world's business. This course demonstrates leadership and innovation approaches to survive the business community.

Course Learning Outcomes :

After successful completion of this course student should able to:

1. Explain meaning of quality concept and its influence,
2. Use quality management methods and tools for analyzing and solving problems of organization.
3. Identify elements in quality .measurement process and predict the errors.

SYLLABUS

Unit 1 : Quality Concepts : **(4)**

Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design. Review of design. Evolution of proto type.

Control on Purchased Product :

Procurement of various products, evaluation of supplies, capacity verification, Development of sources, procurement procedure,

Unit 2 : Manufacturing Quality : **(7)**

Methods and techniques for manufacture inspection and control of product, quality in sales-and services, guarantee, analysis of claims.

Quality Management:

Organization structure and design, quality function, decentralization, designing and fitting, organization for different type products and company, economics of quality value and contribution, quality cost, optimizing quality cost, seduction program.

Unil 3 : Human Factor in quality : **(7)**

Attitude of top management, cooperation of groups, operators attitude, responsibility, causes of apparatus error and corrective methods.

Unit 4 : Control Charts : **(5)**

Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts.

Attributes of Control Chart :

Defects, construction and analysis of charts, improvement by control chart, variable sample size, construction and analysis of C charts

Unit 5 : Defects diagnosis and prevention : **(8)**

defect study, identification and analysis of defects, correcting measure, factors affecting reliability, MTTF. calculation of reliability, building reliability in the product, evaluation of reliability, interpretation of test results, reliability control. maintainability, zero defects, quality circle.

Unit 6 : ISO-9000 and its concept of Quality Management **(5)**

ISO 9000 series. Tasuchi method. JIT in some details.

Text / Reference Books :

1. Lt. Gen. H. LaJ, “Total Quality Management”, Eastern Limited, 1990.
2. Greg Bounds, “Beyond Total Quality Management’’. McGraw Hill, 1994.
3. Menon, H.G, ‘TQM in New Product manufacturing1’, McGraw Hill 1992

B.Tech. Semester - VII
Open Elective - I

OE431 : LINEAR AND NONLINEAR OPTIMIZATION

L	T	P	Credits
3	0	0	3

Course Outcomes :

On successful completion of this course the learner will be able to:

1. Explain the need and basic terms of the optimization
2. Classify optimization problem
3. Apply mathematical tools to solve optimization problem
4. Compare the different solution techniques
5. Practice optimization toolbox for solving optimization problem.

Unit 1 : **06**

Introduction and Basic Concepts of optimization :

Historical Development; Engineering applications of Optimization; General model of Optimization problem: Objective function; Constraints and Constraint surface; Classification of optimization problems; Optimization techniques - classical and advanced techniques.

Unit 2 : **06**

Optimization using Calculus :

Stationary points; Functions of single and two variables; Optimization of function of one variable and multiple variables; Examples; Optimization of function of multiple variables subject to equality constraints; Lagrangian function; Optimization of function of multiple variables subject to equality constraints; Hessian matrix formulation; Eigen values; Kuhn-Tucker Conditions; Examples,

Unit 3 : **06**

Linear Programming :

Standard form of linear programming (LP) problem; Canonical form ofLP problem; Assumptions in LP Models; Elementary operations; Examples; Motivation of simplex method, Simplex algorithm and construction of simplex tableau; Simplex criterion; Revised simplex method

Unit 4 : **06**

Non-Linear Programming:

Standard form of non-linear programming (NLP) problem; Direct root method: Newton, quasi-Newton, Secant methods; Examples

Unit 5 : **06**

Introduction to Heuristic Techniques :

Introduction; Benchmark Test Function; Example; Comparison of Heuristic Techniques and Numerical Technique

Unit 6 : **06**

Metaheuristic Technique :

Introduction to Metaheuristic Technique, Example; Statistical analysis of Metaheuristic Technique.

Reference Books :

1. Linear Algebra and its Applications Third Edition - Gilbert Strang, Thomson Learning Inc., 2007
2. Engineering Optimization Theory and Practice Fourth Edition, Singiresu S. Rao, John Wiley& Sons, Inc., 2010
3. Particle Swarm Optimization, Maurice Clerc, ISTE Ltd., 2006
4. Electric Power System Applications Of Optimization, Second Edition, James A. Momoh, CRC Press Taylor & Francis, 2008
5. Optimization of Power System Operation, Jizhong Zhu, John Wiley & Sons, Inc., 2015

B.Tech. Semester - VII
Open Elective - I

OE441 : IMAGE PROCESSING

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

Digital image processing is a fascinating subject in several aspects. Human beings perceive most of the information about their environment through their visual sense. While for a long time images could only be captured by photography, we are now at a stage which allows image data to be captured, manipulated, and evaluated electronically with computers. With breathtaking pace, computers are becoming more powerful and at the same time less expensive, so

that widespread applications for digital image processing emerge in every field. Hence this course is offered as an open elective for all branches of engineering. - . The course tries to offer an integral view of image processing from image acquisition to the extraction of the data of interest. The topics covered include fundamentals of digital image, improving quality of an image, segmentation of area of interest from an image and representation of segmented part of an image.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Illustrate process of image formation and digitization,
2. Apply different image processing operations on an image
3. Utilize suitable image processing operation to perform given task.
4. Assess effect of different image processing operations on an image
5. Devise suitable scheme for solving given problem.

PREREQUISITE: Nil

UNIT 1 **6**

DIGITAL IMAGE FUNDAMENTALS : Components of image processing system, human and computer vision, hierarchy of image processing system, applications, image formation and digitization, binary, gray scale and color images.

UNIT 2 **6**

IMAGE ENHANCEMENT **IN SPATIAL DOMAIN :** Gray level transformation function: image negatives, Log transformation, power law transformation, Piecewise linear transformation functions, Histogram equalization, Enhancement using arithmetic / Logic operation.

UNIT 3 **6**

IMAGE FILTERING : Basics of spatial filtering, image smoothening spatial filters, image sharpening spatial filters, Detection of discontinuities: Point detection, line detection, edge detection, Sobel, Prewitt, Laplacian mask for edge detection,

UNIT 4 **6**

MORPHOLOGICAL IMAGE PROCESSING : Dilation & erosion, opening and closing operation, Hit- or - miss transformation. Basic morphological algorithms: Boundary extraction, region filling, thinning and thickening, skeletons.

UNIT 5 **6**

IMAGE SEGMENTATION: Thresholding, Role of illumination, global and adaptive thresholding, pixel based segmentation, region based segmentation and edge based segmentation

UNIT 6 **6**

IMAGE SHAPE AND CLASSIFICATION: shape representation, shape parameters, feature space, clusters, and classification techniques.

TEXT BOOKS :

1) "Digital image processing", Rafael C Gonzalez, Richard E. Woods: Pearson Publication, IInd edition, 2002.

2) "Digital image processing", S. Jayraman, S Esakkiarajan, Veerakumar:MGH, 2009.

REFERENCE BOOKS

1) "Image processing analysis and Machine vision", Milan sonka, Vaclav Hlavac, Roger Boyle, IInd edition, Thomson Publication, 1999.

2) "Digital Image Processing", Pratt W.K, Third Edition, John Wiley & Sons, 2001

3) "Digital image processing and Analysis", B. Chanda, D. Datta, Mujumdarf PHI, 2004.

B.Tech. Semester - VII
Open Elective - I

OE 451 : SOFTWARE PROJECT MANAGEMENT

L	T	P	Credits
3	0	0	3

Course Learning Outcomes :

On completion of this course the student will be able to:

1. Describe the key concepts of software project management and quality issues related to software.
2. Determine the feasibility of the software project prior to implementation.
3. Estimate the effort and cost needed to implement the software.
4. Prepare an activity plan for a project and to estimate the overall duration of the project by analyzing the risks involved in it.

UNIT 1 : **(5)**

Introduction to Software Project Management : Definition of the project, Principles of project management, Project management life cycle, Characteristics of software project, Importance of software project management.

UNIT 2 : **(7)**

An Overview of Software Project Planning : Introduction to stepwise project planning, Select project, Identify project scope & objectives, Identify project infrastructure, Analyze project characteristics, Identify project products & activities, Estimates efforts for each activity, Identify activity risks, Allocate recourses, Review/publicize plan, Execute plan/lower level of planning.

UNIT 3 : **(6)**

Software Effort Estimation : Introduction, Problems with over & under estimates, The basis for software estimating, Software effort estimating techniques, COCOMO model, Cost estimation, Staffing pattern, Capers Jones estimating rules of thumb, Effect of schedule compression.

UNIT 4 : **(6)**

Activity Planning : Introduction, Objectives of activity planning, When to plan, Project schedules, Projects and activities, Network planning models, Adding the time dimension, Identify the critical path, Forward pass and backward pass.

UNIT 5 : **(6)**

Risk Management : Risk and it's implication, Categories of risks, Framework for dealing with risk, Risk identification, Risk assessment, Evaluating risks to the schedule, PERT techniques, Advantages of PERT.

UNIT 6 : **(6)**

Software Quality : Attributes of successful project management, Responsibilities of the project manager, Problems with project goals, Project management issues with regard to new technologies, Software quality and measurement of software quality, Place of software quality in project planning, Importance of software quality. Defining software quality, ISO 9126.

Text Books :

1. Bob Huges and Mike Cottrell, "Software Project Management", 5th edition McGraw-Hill,2010.
2. Pankaj Jalote, "Software Project Management in Practice", Pearson Education Asia, 2004.

Reference Books:

1. Joseph Philips, "IT Project Management", Tata McGraw-Hill, 2009.
2. S. A. Kelkar, "Software Project Management- A concise study", 3rd edition, Eastern Economy Edition, PHI, 2013.
3. Robert T. Futrel, Donald F. Shafer, and Linda I. Shafer, "Quality Software Project Management", Pearson Education Asia, 2002.

B.Tech. Semester - VII
Open Elective - I

OE461 : AIRCRAFT SYSTEMS

L	T	P	Credits
3	0	0	3

Course Description :

This course gives information about different systems used in aircraft. Students will draw an analogy from the engineering knowledge they earned during their last 3 years of learning and existing aircraft systems they are learning. Students will come to know that with little efforts they can design the aircraft systems and thus it will become easy for them to select aviation sector as a career.

Course Learning Outcomes :

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

1. Get an exposure to the Aircraft and Aerospace Industry.
2. Understand Aircraft Control Systems and Engine Control System.
3. Know the need and functioning of Environmental Control System.
4. Explain and Design Fuel, Hydraulic and Pneumatic Systems of Aircraft.
5. Explain and Design functioning of Electrical System of Aircraft.
6. Evaluate and decide avionics and information system for aircraft.

Prerequisites :

No prerequisites are needed for enrolling into this Open Elective course.

Unit 1 : **06**

Introduction to Aircraft : Evolution and History of Flight, Types of Aerospace Industry, Key Players in Aerospace Industry, Basic Components of an Aircraft, Control surfaces and High lift Devices. Aircraft Axis System, Aircraft Motions, STOL and STOVL Aircraft, Stealth Aircraft. Aircraft Systems, Types of Aircraft Systems: Mechanical Systems, Electrical and Electronic Systems.

Unit 2 : **06**

Aircraft and Engine Control Systems :Aircraft Control Systems : Primary & Secondary Flight Control, Flight Control Linkage Systems, High Lift Control Systems, Trim and Feel, Flight Control Actuation.

Engine Control Systems: Engine/Airframe Interfaces, Engine Technology and Principles of Operation, Engine Control

Problem, Engine Starting, Reverse Thrust.

Unit 3 : **06**

Environmental Control Systems : Need for Controlled Environment, Environmental Control System Design, Cooling Systems, Humidity Control, Air Distribution Systems, Cabin Pressurization, Oxygen System, Anti-G System, Ice and Rain Protection Systems.

Unit 4 : **06**

Fuel, Hydraulic and Pneumatic Systems : Fuel systems: Characteristics of Fuel Systems, Fuel System Components, Fuel Systems Operating Modes, Fuel Tank Safety, Cold Fuel Management. Hydraulic systems: Hydraulic Circuit Design, Hydraulic Reservoir, Hydraulic Pumps, Hydraulic Actuation, Hydraulic Fluid Conditioning, Steering and Brakes Systems, Landing Gear Systems.

Pneumatic systems : Use of Bleed Air, Engine Bleed Air Control System, Bleed Air system Indications, Bleed Air System Users, Pitot Static Systems.

Unit 5 : **06**

Electrical Systems : Aircraft Electrical System, Power Generation, Primary Power Distribution, Power Conversion & Energy Storage, Secondary Power Distribution, Electrical Loads, Emergency Power Generation, Recent System Developments, Electric Flight Control Actuations, Auxiliary Power Unit, More Electric Aircraft.

Unit 6 : **06**

Avionics and Information Systems : Autopilot and Flight Management Systems, FADEC: Full Authority Digital Engine Control, FEW with Digital Flight Computer Control, Navigation Systems, Terrain Reference Navigation System, Communication Systems, Information systems, Digital/Glass Cockpit, Head-Up-Di splay, Instrument Landing System, Integrated Digital Avionics Suite, Stores Management System, Radar System, Multi Mode Radar, Weather Radar

Reference Books

1) Flight without Formulae by A.C Kermode, 10th Edition, Pearson Education.

2) Mechanics of Flight by A.C Kermode, 5th Edition 2004, Pearson Education.

3) Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration by lan Moir, Allan Seabridge, WILEY India Edition 2001.

4) Aircraft Conceptual Design Synthesis by Denis Howe, WILEY,2000.

5) Understanding Aircraft Structures by John Cutler, WILEY Blackwell,4th 2006.

B.Tech. Semester - VII
Open Elective - I

OE463 : SUPPLY CHAIN MANAGEMENT

L	T	P	Credits
3	0	0	3

Course Description :

Fierce competition in today's global markets, the introduction of products with shorter life cycle, and the heightened expectations of customers have forced business enterprises to invest in, and focus attention on, their supply chains. This, together with continuing advances in communications and transportation technologies (e.g., mobile communication, Internet, and overnight delivery), has motivated the continuous evolution of the supply chain and of the techniques to manage it effectively.

In a typical supply chain, raw materials are procured and items are produced at one or more factories, shipped to warehouses for intermediate storage, and then shipped to retailers or customers. Consequently, to reduce cost and improve service levels, effective supply chain strategies must take into account the interactions at the various levels in the supply chain. In this course, students will able to present and explain concepts, insights, practical tools, and decision support systems important for the effective management of the supply chain. This course will help the students to develop an understanding of the following key areas and their interrelationships:

- ☐ The strategic role of a supply chain
- ☐ The key strategic drivers of supply chain performance
- ☐ Supply chain network design and analytical methodologies for supply chain analysis

This course will help the students to learn the strategic importance of good supply chain design, planning, and operation for every firm. The students will be able to understand how good supply chain management can be a competitive advantage, whereas weaknesses in the supply chain can hurt the performance of a firm.

Course Learning Outcomes :

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

1. Develop understanding of role and identify key issues in the supply chain management.
2. Explore and suggest appropriate SC strategies under given situations.
3. Design the inventory system and level at various locations in supply chain.
4. Select the distribution and transportation options.
5. Develop appropriate strategic alliances for enhancing the performance of SC.
6. Use Information technology to improve SC performance.

Unit 1 : **06**

Understanding of Supply Chain : Objectives of a supply chains, decision phases, stages of supply chain, supply chain process view, cycle view of supply chain process, push/pull view of supply chain processes, key issues in SCM

Unit 2 : **06**

Supply chain drivers and obstacles : Four drivers of supply chain- inventory, transportation, facilities and information; A framework for structuring drivers in supply chain, supply chain strategies, strategic fit, Obstacles to achieve strategic fit, value of information, Bullwhip effect and reduction

Unit 3 : **06**

Inventory Management : Role of cycle inventory, Economics of scale to exploit fixed costs and discounts, cycle time related costs, levels of safety, single stage inventory model, risk pooling, centralized and decentralized systems of planning inventory in supply chain

Unit 4 : **06**

Network Planning and supply chain Integration : Network design, warehouse location, service level requirements, integrating inventory positioning and network design, supply chain integration. Push-pull and pull-push type systems, demand driven strategies, Impact of internet on supply chain strategies, Transportation in a supply chain, facilities affecting transportation decision, modes of transportation and their performance characteristics.

Unit 5 : **06**

Distribution strategies and strategic alliances : Introduction, Centralized vs. decentralized control, direct shipment, cross docking, push based vs. pull based supply chain, third party logistics (3PL), Retailer-Supplier relationship issues, requirements, success and failures, distributor integration types and issues

Unit 6 : **06**

Global logistics and Risk management : Agile supply chains, Introduction to global SCM, risk management, issues in international SCM, regional differences in logistics, design for logistics, supplier integration in to new product development, pricing issues and smart pricing. IT and Business processes in supply chain.

Reference Books

1) Supply Chain Management: Strategy, Planning, and Operation. Sunil Chopra and Peter Meindel. 4th Edition, Prentice Hall, 2010

2) Logistics and supply chain management, Christopher martin, Pearson Education Asia 2002

3) Marketing logistics: A supply chain Approach, Kapoor KK; Kansal Purva, Pearson Education Asia; 2003

4) Designing and managing supply chain concepts, strategies and case studies, David Simchi-Levi, Ravi Shankar; McGraw Hill Publication 3rd Edition.

B.Tech. Semester - VII

Open Elective - I

OE465 : CREATIVITY AND INNOVATION

L	T	P	Credits
3	0	0	3

Course Description :

Creativity and innovation are the key drivers of success for many of today's leading companies. Some of the most dramatic gains in shareholder value over the last few years (e.g., Google, Apple) are due to a culture of creative Innovation. Indeed, a culture of creativity and innovation is commonly recognized as the only sustainable competitive advantage. An important element of a creative culture is the use of breakthrough design thinking.

Ever since the wheel was invented, innovations have taken the world forward, right from sending humans to space to the ubiquitous handheld devices like Mobile phones. Innovations have broken the barriers to information, made communication faster and most importantly made our lives easier. While the rate of Innovation has increased dramatically, as a natural corollary, things are also getting obsolete faster, that means companies not only have the challenge of staying ahead of the innovation curve, but also staying relevant for a longer period of time. Companies that have managed to do both have been game-changers in their field, be it Google, Amazon, Apple or Facebook . Now the race is on to findthe next Google, Amazon, Apple and Facebook. Are you interested to be part of it ?

Course Objective :

The premises of this course are that (i) all people are naturally creative and (ii) everyone's creative abilities can be improved (just like all of your other abilities) through learning and practicing certain skills and techniques. The course is intended for students who want to enhance their innovation and design thinking skills in Technology, Business and other domains. More specifically, the course is designed to help students in achieving following course learning outcomes through case studies, group exercises, expert lectures etc.

Prerequisites :

There is no any specific prerequisite except openness to accept contradictions and willingness to experiment creatively.

Methods for Learning and Teaching :

This class will involve a blend of lecture, large-and small-group discussion, in-class collaborative creation, and design workshops. Students are expected to bring texts to class each session. Students will be expected to read in advance of class sessions and be prepared to discuss relevant ideas, themes, and writing practices.

It is expected that the course should be more challenging and expectations for the quality of student work to increase as the semester progresses. Moreover, it is expected that the students to put forth effort in each creative project and assignment, giving each the care and time it needs. The course design will help assist in this area through integrative collaboration, in-class discussions of projects and creative concepts,in-class workshops, copies of all creative projects will be collected, including outlines, rough drafts, and proof of invention process, from all students. Students should

keep detailed notes for each stage of invention process that show intentional strategies for creative thinking. The class will be divided into no.of rmiltidisciplinary groups with max, four students in each group.

Course Learning Outcomes :

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

1. Stimulate creativity in yourself and others.
2. Incorporate design thinking into analysis of situations.
3. Apply creative and design thinking to a real-world situation.
4. Learn how to build and lead an innovation team

Unit 1 : **06**

Introduction to Innovation and Creativity : Importance and influence on business , triggers of innovation, types of innovation, innovations in different areas - Product development Entertainment, Education, Entrepreneur ship, Marketing, Health care, security. Agriculture, transportation, banking etc.

Unit 2 : **06**

Innovation & Creativity - Tools & Techniques : Problem solving techniques, Brainstorming, SCAMPER methods, Creativity styles, Mind stimulation: games, brain-twisters and puzzles, Six thinking hats

Unit 3 : Characteristics of Innovators **06**

Unit 4 : **06**

Design Thinking for strategic Innovation : Thinking preferences , Lateral thinking, Systematic Inventive Thinking

Unit 5 : **06**

Innovation Management : 8D Approach to Ideation , creativity process/stages, Intellectual Property

Unit 6 : **06**

Fostering Innovation Culture : Building team of creative people

Assignments include :

1) Brain teasers (to be solved individually)
2) Cartoon captions (teams)
3) Book readings and discussions (teams)
4) Team presentations on innovation: (1) innovative individual, (2) innovative company, (3) innovative movie/ game, (4) sustainable innovation, (5) innovation in business, (6) innovation in art, (7) innovation in architecture, (8) innovative nation, (9) innovation in science, (10) innovation in engineering & Technology

B.Tech. Semester - VII
Open Elective - I

OE471 : MARKETING FOR ENGINEERS

L	T	P	Credits
3	0	0	3

Course Description :

Marketing is the core of operating any business. Marketing defines & guides companies for interfacing with customers, competitors, collaborators, and the environment. Marketing helps you plan and execute the creating a value proposition by determining pricing, promotion, and distribution of ideas, goods, and services. It begins with needs and wants determination, assessing the five forces existing in the competitive environment. Selecting the most appropriate customer targets and developing marketing strategy and implementation program for an offering that satisfies consumers' needs better than the competition with emphasis on Industrial Marketing, Marketing is the art and science of creating customer value in exchange it benefits the organization and its stakeholders.

Course Objectives :

The main objectives of this course is to improve the ability of engineers to:

1. Assess market opportunities by analyzing customers, competitors, collaborators, context, and the strengths and weaknesses of a company.
2. Develop effective marketing strategies to achieve organizational objectives.
3. Design a strategy implementation program to maximize its chance of success,
4. Communicate and defend your recommendations and critically examine and build upon the recommendations of your classmates both quantitatively and qualitatively.

This course is appropriate for engineers in all functional areas (Automobile, white goods & software marketing emphasis). Course will help develop and implement marketing strategy, in other functional areas (finance, management, accounting, and operations) besides help understand how marketing strategies impact the profitability of an organization. For an entrepreneurial ventures and start-ups to succeed an excellent marketing strategy is the prerequisite.

Syllabus

1. Introduction to Marketing Core concept of marketing, Marketing Process, Function of Marketing environment, Analyzing needs & trends in micro, macro business environment.
2. Market Segmentation, Targeting & Positioning

   Basis for market segmentation, targeting, positioning. Marketing Mix, Significance of competitive environment.

3. New Product Development Product and product line decisions. Product life cycle (PLC), Managing PLC, Test marketing and the new product, Branding and packaging decisions.
4. Pricing & Distribution Price determinants, policies, methods. Channel management, Channel conflict and resolutions
5. Promotion mix, Advertising, Media decisions, Sales Promotion, Personal selling, Managing sales force. Global marketing.
6. Strategy: A way to better profits Dealing with competition, Porter's five force model, Strategy, Strategy execution

Reference Book :

1. Philip Kotler, Kevin Lane Keller - "Marketing Management" Pearson Publications -15th Edition-2016

B.Tech. Semester - VII
Open Elective - I

OE473 : ENGINEERING ECONOMICS

L	T	P	Credits
3	0	0	3

Course Description :

Engineering integrates physical environment and economical environment.Physicai environment outlines produce goods and services, depending upon physical laws and economic environment assess worth of goods and services. So learning EE equips the budding engineers with the analytical tools of Economics and applies the same to rational decision-making. It further seeks to develop economic way of thinking in dealing with practical business problems and challenges.

Course Outcomes :

After successM completion of course, engineers will be able to :

1. Assess-microeconomic variables and its implication in business decision making.
2. Analyses and evaluate macroeconomic variables for selection of best alternatives to maximize profit and value of an organisation.
3. Identify the competitive and global market for making larger presence and leadership,
4. Apply in calculating present and future value of money for taking right decision in terms of investment and disinvestment.

5. Modify, supplement, and enrich economic theory by adding insights from behavioral psychology.
6. Understand the role and function of financial institutions and trade organisations for expanding and diversifying the business in national and international boundary.

Unit 1 : **6**

Applied Microeconomics : Role of microeconomic analysis in decision in view of complexity of the modern economy, Resources and Scarcity, Demand Analysis and demand management (domestic), Determinants, estimations and uses of elasticity of demand, Supply and Price, Elasticity of supply, Demand Forecasting, Indifference Curve, Production and output estimation in short run and long run, Cost theory and estimation, Production Possibility Curve and its importance in business decision making.

Unit 2 : **6**

Applied Macroeconomics : Gross Domestic Product(GDP) and Gross National Product(GNP),Consumer Price Index(CPI),Wholesale Price Index(WPI) and GDP Deflator,Capital accumulation and economic growth, level of Investment, Inflation, Theory of employment,interest and money by Keynes and contrasting with Say's theory, and Balance of Payment, Deficit financing , Globalisation and Division of labour, Business Cycle, Fiscal and Monetary Policy, Exchange Rate Policy (Comparison with a few leading economies),Ginni Coefficient and Purchasing Power Parity(PPP),Poor economics, Free Market Economics

Unit 3 : **6**

Firms and Markets : Motive of existence of firm,Profit Maximising output,Goals of non profit firm and public sector firms, Global Firms ,The competitive and Monopoly model, Monopolistics Competitions, Theory of competitive advantages, Alternate pricing practices-Pricing of multiple product and price discrimination, National Market, International Market,Sensex,Nifty.

Unit 4 : **6**

Time Value of Money : Concepts and application. Capital budgeting; Traditional andmpdern methods, Payback period method, IRR, ARR, NPV, PI (with the help of case stud

Unit 5 : **6**

Behavioral Economics : Behavioural Decision making, Choice under uncertainty and certainty, Probalistics Judgment, Departure from perfect rationality, Choice involving time, risk and strategy, System I and System II theory and its impact on business decision making, Nudge Theory and its success in today's world.

Unit 6 : **6**

Financial Institutions and Trade Organisations (National and International) : Reserve Bank of India(RBI),

Security and Exchange Board of India(SEBI),Banks-PubJic, Private, Foreign and International Apex Bank-World Bank, Asian Development Bank, New Development Bank BRICS etc. National Trade Organisations(CII, FICCI and ASSOCHAM),International Trade Blocks(NAFTA, SAFTA,EU etc.) and International Trade Organisation - WTO

Reference Books :

1. Dominick Salvatore and Ravikesh Srivastava, Managerial Economic, Principle and Worldwide Applications, Oxford Higher Education,2015
2. James L Riggs, David Bedworth and S V Randava, Engineering Economics,TMH,2014
3. Lipsey and Chrystal, Economics,Oxford Higher Education,2015
4. C R Thomas and S C Maurice,Managerial Economics,TMH,2015
5. Suma Damodaran, Managerial Economics,Oxford Higher Education,2015
6. Adam Smith ,The Wealth of Nations,amazon.com,2015
7. Abhijit V Banerjee and Esther Duflo,Poor Economics,Public Affairs,Newyork,2011
8. J M Keynes,The General Theory of employment, interest and money,Oxford University Press,0riginal Edition 1936,Reprint Edition 2015.
9. Joseph Stiglitz,FreefalI,WW Norton and Campany;NewYork,2014
10. Richard H Thaler and Cass R Sunstein,Nudge,Penguin Book,2008-09

B.Tech. Semester - VIII

Open Elective - II

OE 402 : RENEWABLE ENERGY SOURCES

L	T	P	Credits
3	0	0	3

RATIONALE :

This course provides a comprehensive overview of renewable energies including solar energy, wind power, hydropower, fuel cells, biomass, and other alternative renewable sources. This study provides the students with basic principles of various renewable energy sources and their applications. At the end of the course, the students are expected to identify the new methodologies / technologies for effective utilization of renewable energy sources.

COURSE LEARNING OUTCOMES :

After successful completion of the course students should be able to

1. Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the environment
2. Describe the primary renewable energy resources and technologies.
3. Apply the knowledge of thermodynamic and heat transfer principles to evaluate the performance of energy conversion systems for maximum efficiency.
4. Compare the various renewable energy technologies.

PREREQUISITES : Basic knowledge of non-renewable energy sources.

Unit 1 : Introduction to Energy Sources : **6 hrs**

World Energy Use - Reserves of Energy Resources - Environmental Aspects of Energy Utilisation - Renewable Energy Scenario in India and around the World - Potentials - Achievements / Applications - Economics of renewable energy systems.

Unit 2: Solar Energy **6 hrs**

Solar Radiation - Measurements of Solar Radiation - Flat Plate and Concentrating Collectors - Solar direct Thermal Applications - Solar thermal Power Generation - Fundamentals of Solar Photo Voltaic Conversion - Solar Cells - Solar PV Power Generation - Solar PV Applications.

Unit 3: Bio - Energy **6 hrs**

Biomass direct combustion - Biomass gasifiers - Biogas plants - Digesters - Ethanol production -Bio diesel - Cogeneration - Biomass Applications

Unit 4: Wind Energy **6 hrs**

Wind Data and Energy Estimation - Types of Wind Energy Systems - Performance - Site Selection - Details of Wind Turbine Generator - Safety and Environmental Aspects

Unit 6: Hydrogen Energy **6 hrs**

Introduction, Hydrogen Production methods, Hydrogen storage, hydrogen transportation, utilization of hydrogen gas, hydrogen as alternative fuel for vehicles. Design principle and operation of fuel cell, Types of fuel cells, conversion efficiency of fuel cell, and application of fuel cells.

Unit 6: Other Renewable Energy Sources **6 hrs**

Tidal energy, Wave Energy - Open and Closed OTEC Cycles , Small Hydro-Geothermal Energy , Stored hydro energy, Principles of hydro power technology

TEXT BOOKS

1. Rai, G.D., Non Conventional Energy Sources, Khanna Publishers, New Delhi, 2011.
2. Twidell, J.W. & Weir, A., Renewable Energy Sources, EFN Spon Ltd., UK, 2006.

REFERENCE BOOKS

1. Sukhatme. S.P., Solar Energy, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
2. Godfrey Boyle, Renewable Energy, Power for a Sustainable Future, Oxford University Press, U.K., 1996.
3. Freris, L.L., Wind Energy Conversion Systems, Prentice Hall, UK, 1990.
4. Johnson Gary, L., Wind Energy Systems, Prentice Hall, New York, 1985.
5. David M. Mousdale, Introduction to Biofiiels, CRC Press, Taylor & Francis Group, US A 2010.
6. B H Khan, Non-conventional Energy, Tata McGraw-Hill, New Delhi.
7. B.L. Singhal, Alternative Energy Sources, Tech Max Publication.
8. Maheswar Dayal, Energy Today & Tomorrow, I & B Horishr, India, 1982.

B.Tech. Semester - VIII

Open Elective - II

OE 412 : MATERIAL MANAGEMENT

L	T	P	Credits
3	0	0	3

Course Description :

Any engineering project can only be completed consuming resources. Project materials constitute major portion of project cost averagely to the tune of 65%, over and above this @ 10-15 % cost goes in management of these materials. Engineering refers to providing optimized solutions. Research shows that 1% saved through materials management is equal to 6-10 % increase in sells volume. This course floated as open elective at VIII semester of B. Tech. would be applicable to all branches, as materials and their management is required by all disciplines. This course will help students to find, procure, store, manage and utilize materials in an optimized manner. Students will also be familiar with international purchase, negotiation and decision making related to materials.

Course Learning Outcomes :

After successful completion of this subject Graduates should be able to:-

1. Plan and control materials for a project,

2. Use codification and standardization processes,
3. Perform material procurement and material storage.
4. Apply inventory control techniques for material management,
5. Apply MRP logic and systems for MM.

Pre-Requisites:

For proper completion of this course following are the Pre-Requisites:

1. Basic knowledge of the materials as a resource,
2. Use of basic mathematical operators,

Who can opt for this course ?

This course is applicable to all the programs and can be opted by any branch.

Unit 1: Introduction to Material Management **6 hrs**

Importance of materials management, Materials function, Need of Integrated Concept, Scope of material management, Organizing materials management, Types of materials, span of Control.

Unit 2: Purchasing and vendor development: 6 hrs

Functions, steps, purchasing cycle. Types of buying, Details of International buying, Procedure, Relevance of Good Supplier - Need for Vendor Evaluation- Goals of Vendor Rating-Advantages of Vendor Rating - Cost-ratio Method -Forced Decision Matrix, Negotiation.

Unit 3: Warehousing and stores management **6 hrs**

Layout of stores and warehouse, material handling in stores, physical control of stocks : obsolete, surplus and scrap management, accounting and record keeping of stores

Unit 4: Codification and standardization: **6 hrs**

Standardization and simplification, Aim, pro's and con's and scope of standardization, classification and levels of standards, Classification and codification, Nature of codification, Process and advantages of Codification,

Unit 5: Inventory Management and Control :

ABC analysis- advantages, mechanism, purpose, objectives Importance & Scope of Inventory Control, Types of Inventory, Costs Associated with Inventory, Inventory Control, Selective Inventory Control, Economic Order Quantity, Safety Stocks

Unit 6: Materials requirement Planning (MRP) **6 hrs**

Introduction, objectives, Terminology, Functions served by MRP, MRP Logic, systems and output, Management information form, Lot size consideration. Introduction to Manufacturing resource planning (MRP II)

Reference Books:

1. Introduction to Materials management- J. R. Tony Arnold, Stephan Chapman and Lloyd Clive-2008, Pearson publication, ISBN-13: 978-0-13-233761-8, ISBN-10: 0-13-233761
2. Material's and Financial Management- Dr. C. M. Sadiwala and R. C. Sadiwala, 2007, New Age International (P) Ltd., Publishers, ISBN (10): 81-224-2346-9, ISBN (13): 978-81-224-2346-4

Recommended Books:

1. Materials Management, Gopalkrishna & Sudarsan, TMH
2. Materials Management-Procedures, Texts & Cases, A.K. Dutta, Pearson
3. Hand Book of Materials Management - Gopal Krishnan - PHI
4. Inventory Control and Management - Waters - Wiley
5. Inventory Management - Principles and Practices -Narayan/Subramanian Exce]
6. Industrial engineering and production management- Martand Telsang-S. Chand publication

B.Tech. Semester - VIII
Open Elective - II

OE 414 : INDUSTRIAL HEALTH AND SAFETY ENGINEERING

L	T	P	Credits
3	0	0	3

Course Description :

Industrial Health and safety (IHS) is offered as open Elective for Undergraduate course (B. Tech) semester VII, It deals with definitions and concepts, rationale and historical development of IHS, need of safety , concept of hazard in industries, safety department and its role , risk assessment ,Safety Management Systems, OSHAS 18001 management system and Auditing and Occupational Health and Industrial Hygiene, It also deals with legal aspects in Industries.

Course Outcomes :

After successful completion of this course Graduates should be able to:-

1. Know the necessity and scope of Health and safety in Industries.
2. Analyze Industries by using OSHAS 18001 management system and Auditing
3. Become solution provider for decision making problem.
4. Understand concept of Health and safety in sustainable development.
5. Prepare Safety Audit Report for submission to concerned authority.

UNIT 1 : **06**

Safety - Concept and Need of Safety, Safety and Industries - definition, Various Hazards in Industries, Need of Industrial Safety, Safety Department and its Role

UNIT 2 : **06**

Introduction to Risk Assessment & Management, Safety Management Systems, OSHAS 18001 management system and Auditing,, Product Safety Job Safety Analysis, Safety Checklists, Safety Inspections, Confined Space Entry, Work Permit System, Lock Out- Tag

UNIT 3 : **06**

Accidents in Industries, Definition and Various Causes, Accident Theory, Cost of Accidents, Accident Prevention Techniques, Accident Investigation and Reporting, Accident Statistics

Safety in Industries-, Safe Design and Layout of Plants and Equipments, Machine Guarding, Safe Storage & Handling of Hazardous chemicals, MSDS, Good House Keeping

UNIT 4 : **06**

Occupational Health and Industrial Hygiene - Definition, Objectives, Need, Chronic and Acute Effects, Various Limits of Exposure-, LD 50,, LC50,TLV(TWA), STEL, OSHA Limits etc. Effects of Various Physical, Chemical and Biological Hazards Present in Industries on Human Health.

UNIT 5 : **06**

Various Occupational Diseases and Causative Agent, Occupational Diseases in Various Industries, Various Personal and Work Place Monitoring Systems Various Preventive Methods for Occupational Health Problems, Protection of Workers against Harmful Agents and Conditions, LEVs, PPEs, Ergonomics, Health Monitoring and Medicine

UNIT 6 : **06**

Legal aspects of Safety, Safety in Engineering industries, Chemical industries, Construction industries, On site &

Off site Emergency Management Plan

REFERENCE BOOKS :

No	Title of book	Author	Publication
1	Occupational Safety and health	by David L Goetsch	Prentice Hall, 2002-184
2	Safety manual	EDEL Engineering consultancy Pvt Ltd	
3	Hazardous Material and Hazardous Waste management	by Gayle Woodside, John Wiley & sons-Inc	John Wiley & sons 2nd Edition 1999
4	Environmental Health and Safety Auditing Handbook	Lee Harrison,	McGraw-Hill,1999
5	Heslth Hazards of the Human Environment	World Health Organization, Geneva, 1972	
6	Textbook of Preventive and Social Medicine	by K. Bhanot Publishers Park, Banarsidas	
7	Industrial and Occupational Safety, Health & Hygiene	by Dr. A.H. Hommadi	
8	Introduction to Industrial Safety	by K.T. Kulkarni	

B.Tech. Semester - VIII
Open Elective - II

OE422 : INFORMATION TECHNOLOGY FOUNDATION PROGRAM

L	T	P	Credits
3	0	0	3

Course Description :

The course represents the Intellectual Property and experience of software industry. Also give basic knowledge about Information Technology subject to entry-level engineers from heterogeneous backgrounds and disciplines to deliver world-class projects to giobai customers. The purpose of this course is to provide a unique set of teaching aids, consolidated training material lo entry level engineers to help them make "Industry ready",

Course Learning Outcomes :

On completion of this course student will be able,

1. Demonstrate the necessity of data structure in computational problems.
2. Apply concepts of Object Oriented approach and their application to solve problems.
3. Analyze and write succinct, clear and efficient algorithm for a given problem.
4. Design database using Relational Database Management System concepts.
5. Choose basic skills in project management.

SYLLABUS

Unit 1 : Introduction to C & Data Structure : **(3)**

Computer terms and concepts. Introduction to C, Introduction to Basic Data Structure, Searching and Sorting Algorithms.

Unit 2 : Problem Solving Techniques : **(3)**

Introduction to Logic, Introduction to Problem Solving, introduction To Algorithms, Implementation of Algorithms Using Flowchart.

Unil 3 : Programming and Testing : **(8)**

Introduction to programming paradigm , Basic Programming and selection Control Structure . Iteration Control Structure , Coding Standards and Best Practices , Demonstration of ID and 2D Array , String , Introduction to code optimization techniques. Modular Approach through usage of Functions , Testing and Debugging , Project Specification and Briefing.

Unit 4 : Object Oriented Concepts Using Java : (8)

Introduction to Object Oriented Programming, Abstraction & Encapsulation. Relationships, Polymorphism, Interfaces and Packages.

Unit 5 : Relational Database Management : (7)

Introduction , ER Modeling . Normalization . SQL

Unit 6 : Project Management : (7)

Project Management Concepts. Projec! Management Activities, Project Estimation Techniques, Project Planning and Scheduling. Project Risk Management, Project Execution & Monitoring, Project Communication Management. Project Management Tools. Project Monitoring and Control.

Text Books :

1. Data Structures and Algorithms, Addison-wesely -Alfred V.Aho. Ullman, Hopcroft
2. Lei Us C- YashwantKanitker
3. "Database system concepts". Second ecL MG.H international editions, Henry F Korth, Abraham Silbersc-hatz
4. The Complete Reference-Herbert Scheldt.
5. Engineering Project Management, Nigel ,1. Smith, 3rd Edition.

Reference Books :

1. Structured Computer Organization-Andrew S. Tanenbaum
2. Computer Architecture : A Quantitative Approach- John L, Hennessy. David Gold berg. David A. Patterson
3. Algorithms and Data Structures The Science- Baldwin, Douglas &Scragg, Greg W..
4. Unified Modeling Language- Robert Booch
5. "Fundamentals of Database Systems", Third ed, Addison Wesiey-Elmasri, Navathe

B.Tech. Semester - VIII

Open Elective - II

OE 424 : DATABASE ADMINISTRATION

L	T	P	Credits
3	0	0	3

Course Description :

This course will cover both traditional database systems and recent developments in database systems, emphasizing fundamental principles, computer structure and practical techniques. This course provides instruction in the operations of an Oracle database. Database administration skills covering installation, configuration and tuning a database, administering servers and server groups, managing and optimizing schemas, tables, indexes, and views, creating logins, configuring permissions, assigning roles and performing other essential security tasks, backup and recovery strategies, automation and maintenance.

Course Learning Outcomes :

On successful completion of course, the student should able to:

1. Properly install, configure and tune a database
2. Properly administer servers and server groups
3. Properly manage and optimize schemas, tables, indexes, and views
4. Properly create logins, configure permissions, assign roles, and perform other essential security tasks and properly monitor server activity and resolve performance issues
5. Implement replication and data merging
6. Manage data publications and subscriptions

Unit 1 : Overview of Oracle DBA Casks **(6)**

Oracle as a flexible, complex & robust RDBMS, The evolution of hardware and the relation to Oracle. Different DBA job roles (VP of DBA. developer DBA, production DBA, database babysitter). The changing job role of the Oracle DBA. Environment management (network, CPU, disk and RAM), instance management (managing SGA regions),Oracle table and index management.

Unit 2 : Oracle Database Management **(6)**

Overview of instance management, Initialization file .management, Oracle*Met configuration, Data buffer configuration & sizing, Verifying network connectivity with ping and tnsping. Testing database links.

Unit 3 : Oracle Object Management **(6)**

Oracle tables, views and materialized views, Oracle indexes, Oracle constraints. Schema, File & tablespace management, Database Maintenance, Oracle DBA Utilities.

Unit 4 : Monitoring Oracle **(6)**

Dictionary and v$ views, Table & index monitoring, workload & trend monitoring, Instance monitoring, Oracle environment monitoring, STATSPACK and AWR performance management.

Unit 5 : Performance Management **(6)**

Bottleneck performance analysis. Instance Tuning, SQL and CBO behavior, Tracing SQL Execution. SQL Execution Internals, and SQL Timing.

Unit 6 : Oracle High Availability tools **(6)**

Continuous availability and disaster recovery, Quantifying the cost of unplanned downtime, Oracle multi-master replication. DataGuard, Oracle Streams, Real Application Clusters, Backup & Recovery

Text Books :

1. Easy Oracle Jumpstart Oracle Database Management Concept and Administration *by Steve* Karam, Robert Freeman
2. C.J. Date, Database Systems, Addison Wesley, 2000
3. Chip Dawes. Biju Thomas, Introduction to Oracle 9i SQL, BPB, 2002
4. Bob Bryla, Biju Thomas, Oracle 9i DBA Fundamental], BPB, 2002
5. Doug Stums, Matthew Weshan, Oracle 9i DBA Fundamental I. BPB, 2002 Joseph C. Johnson, Oracle 9i Performance Tuning., BPB, 2002

Professional Associations

1. The Professional Association for SQL Server (PASS)
2. Data Management Association (DAMA)

Reference Books:

1. C.J. Date. Database Systems, Addison Wesley, 2000
2. Introduction to Database Administration, by O'reilly
3. ORACLE DBA handbooks

B.Tech. Semester - VIII
Open Elective - II

OE432 : WIND ENERGY ENGINEERING

L	T	P	Credits
3	0	0	3

Course Outcomes :

On successful completion of this course the learner will be able to:

1. Apply fundamental principles of thermodynamics, fluid mechanics and mechanical systems to wind turbine engineering.
2. Calculate various parameters related to wind turbine.
3. Design of wind turbine components.
4. Design in virtual environment.
5. Work on team-based projects.

Unit 1 : **06**

The Wind Resource :

The Nature of the Wind; Geographical Variation in the Wind Resource; Long-term Wind-speed Variations; Annual and Seasonal Variations; Synoptic and Diurnal Variations; Turbulence; Gust Wind Speeds; Extreme Wind Speeds, Turbulence in Wakes and Wind Farms, Turbulence in Complex Terrain.

Unit 2 : **06**

Aerodynamics of Horizontal-axis Wind Turbines :

Introduction, The Actuator Disc Concept, Rotor Disc Theory, Vortex Cylinder Model of the Actuator Disc, Rotor Blade Theory, Breakdown of the Momentum Theory, Blade Geometry, The Effects of a Discrete Number of Blades, Calculated Results for an Actual Turbine.

Unit 3 : **06**

Wind-turbine Performance :

The Performance Curves, Constant Rotational Speed Operation. Comparison of Measured with Theoretical Performance, Variable-speed Operation, Estimation of Energy Capture, Wind-turbine Performance Measurement, Aerodynamic Performance Assessment.

Unit 4 : **06**

Conceptual Design of Horizontal Axis Wind Turbines :

Introduction, Rotor Diameter, Machine Rating, Rotational Speed, Number of Blades, Power Control, Braking Systems, Fixed-space, Two-speed or Variable-speed Operation, Type of Generator.

Unit 5 : **06**

Component Design :

Blades, Pitch Bearings, Rotor Hub, Gearbox, Generator, Mechanical Brake, Yaw Drive, Tower, Foundations.

Unit 6 : **06**

Wind-turbine Installations and Wind Farms :

Project Development, Visual and Landscape Assessment, Noise. Electromagnetic Interference, Ecological Assessment, Finance.

Reference books :

1. Tony Burton, David Sharpe, Nick Jenkins, Ervin Bossanyi, 'Wind Energy Handbook' John Wiley and Sons, April 2001
2. Wind Energy Engineering, by Pramod Jain, The McGraw-Hill Companies, Inc., 2011
3. Wind Energy Explained: Theory, Design and Application, By James F. Manwell, Jon G. McGowan, Anthony L. Rogers, Wiley Publications, 2009
4. Wind turbine engineering design, David M. Eggleston , Forrest S. Stoddard, Van Nostrand Reinhold Company, 2008
5. Wind Power Generation And Wind Turbine Design, W. (editor) Tong, WIT PRESS, 2010

B.Tech. Semester - VIII
Open Elective - II

OE442 : ROBOTICS

L	T	P	Credits
3	0	0	3

COURSE DESCRIPTION :

This course is designed to facilitate students from different programs to understand the basics and advanced topics of ROBOTICS with respect to a single, dedicated, Indian company designed platform. We have selected our own Mumbai based company NEX Robotics platform, which has been accepted globally. NEX robotics has designed and developed the ROBOTIC Domain at par excellence with global players.

Firebird V is their new version BOT in the FIREBIRD Series. Fire Bird V will help you gain exposure to the world of robotics and embedded systems. With help of its innovative architecture and adoption of the 'Open Source Philosophy' in its software and hardware design, you will be able to create and contribute to complex applications that run on this platform, helping you acquire expertise as you spend more time with them.

COURSE OUTCOMES :

After completion of this course students will be able to:

1. Define Intelligence in ROBOTICS & Develop the different ways of adding Intelligent Quotient in ROBOT.
2. Explain in detail the architecture, components and technical spec of Fire Bird V ATMEGA2560 Robot.
3. Analyze PC Based Control Using Serial Communication.
4. Test programming on Fire Bird V ATMEGA2560 Robot with different I/O modules.
5. Execute the Interfacing between Fire Bird V ATMEGA2560 Robot with different wired and wireless communication modules.

PREREQUISITE :

No prerequisite. Knowledge of C and Basic electronics will be helpful.

UNIT 1 : 06

ROBOT INTELLIGENCE : What Is a Microcontroller? Why Use a Microcontroller? Kinematics, Dynamics, HAPTICS, Designer Computers—So Many Microcontrollers, The Compiler, PIC Programming Overview, Software and Hardware, PicBasic and PIC Basic Pro Compilers, EPIC Programmer, Firmware, Consumables, 16F84 PIC Microcontroller , Step 1: Writing Code (the Basic Program), Step 2: Using the Compiler ,Step 3: Installing the Firmware, or Programming the PIC Chip , Approaches to Building Intelligence, Where's the Intelligence?, Layered Behavioral Responses, Behavior Based Robotics

UNIT 2 : **06**

INTRODUCTION TO FIRE BIRD V ATMEGA2560 KIT: Safety precautions, Inappropriate Operation: Fire Bird V ATMBGA2560 technical specification Using Fire Bird V Robot, Pin Functionality, Upgrading Robot's Hardware.

UNIT 3 : **06**

PC BASED CONTROL USING SERIAL COMMUNICATION: Communication protocol for simple robot control, Robot control using RS232 serial port, Robot control using USB port, Robot control using XBee wireless communication module, Robot Control using 'GUI' for Fire Bird V ATMEGA2560, Errata

UNIT 4 : **06**

PROGRAMMING THE FIRE BIRD V ATMEGA2560 ROBOT: IDE Installation, Installing WIN AYR, Installing AYR Studio, Programming the Fire Bird V ATMEGA2560 Robot, Input / Output Operations on the Robot, Robot Position Control Using Interrupts

UNIT 5 : **06**

INTERFACING PROGRAMS ON FIRE BIRD V ATMEGA2560: Timer / Counter Operations on the Robot, LCD Interfacing, Analog to Digital Conversion, Serial Communication, SPI Communication.

UNIT 6 : **06**

ADVANCED PROGRAMMING CONCEPTS OF FIRE BIRD V ATMEGA2560:

(Learning by Doing - Learning mechanism)

USB Communication Wired RS232 (serial) communication, Wireless ZigBee Communication (2.4GHZ) (if XBee wireless module is installed), Wi-Fi communication (if Wi-Fi module is installed), Bluetooth communication (if Bluetooth wireless module is installed), Simplex infrared communication (From infrared remote to robot)

TEXT BOOK :

1. "PIC Robotics A Beginner's Guide to Robotics Projects Using the PIC Microcontroller", John lovine, First Edition, Mc-graw Hill Publisher
2. Fire Bird V ATMEGA2560 Hardware Manual V1.08 2012-10-12. Pdf
3. Fire Bird V ATMEGA2560 Software Manual Vl.OO 15-08-20122012-.pdf

REFERENCE BOOKS (DATASHEETS) :

1) ACS714 - Automotive Grade, Fully Integrated, Hall Effect-Based Linear Current Sensor 1C with 2.1 kVRMS Voltage Isolation and a Low-Resistance Current Conductor

2) ATMEGA 8 -8-bit with 8K Bytes In-System Programmable Flash

3) ATMEGA 2560 - 8-bit Microcontroller with 64K/128K/256K Bytes In-System Programmable Flash

4) CD40106BM/CD40106BC Hex Schmitt Trigger

5) FT232R USB UART 2005

6) GP2D12JOOOOF - Sharp Distance Measuring Sensor

7) GP2D120 - FT232R USB UART 2005

8) GP2YOA02YK - FT232R USB UART 2005

9) HD44780U (LCD-II) (Dot Matrix Liquid Crystal Display Controller/Driver)

10) L293D - Push-Pull Four Channel Driver

11) LM 324 - Low Power Quad Operational Amplifiers

12) LM1117 - 800mA Low-Dropout Linear Regulator

13) XBee™/XBee-PRO™ OEM RF Modules

14) MAX 232 - *+5V-Powered, Multichannel RS-232Drivers/Receivers*

15) TCRT 5000 - Reflective Optical Sensor with Transistor Output

16) TSOP1738 - Photo Modules for PCM Remote Control Systems

B.Tech. Semester - VIII

Open Elective - II

OE 452 : IT FOR ENGINEERS

L	T	P	Credits
3	0	0	3

Course Learning Outcomes :

On completion of this course the student will be able to:

1. Define the terminology and describe in writing the concepts of Operating Systems, Databases, Networking and Web Technology.
2. Identify and execute OS commands, Networking tools and SQL queries to perform operations.
3. Configure and manage Linux and network administration tasks for a given system.
4. Design and develop IT applications.
5. Use IT essentials to solve the given problem.

UNIT 1 : **(5)**

Operating System Concepts : Introduction to operating system, Types of operating system, Services of operating system, Operating system working, User and kernel mode, Process, File system, Operating system administration.

UNIT 2 : **(7)**

Linux Basic Administration : Component of Linux system, Basic features of Linux, Architecture of Linux, and general purpose commands and utilities, Files and directory related utilities, File-security features, Network configuration, User administration.

UNIT 3 : **(6)**

Networking Management : Fundamentals of computer networks & concepts, Types of computer networks, OSI and TCP/IP network models, Networking devices, Network protocols, Network connectivity test tools, Network/ Internet services, Basic network configuration.

UNIT 4 : **(6)**

Database Management : Database abstraction levels, Applications, Data models, Fundamental relational algebra operations, Structured Query Language (SQL).

UNIT 5 : **(6)**

Introduction Web Technology : Introduction of web, Client server architecture, Website, HTTP, Architecture of web browser and server, Introduction of Java scripts, HTML and CSS, Deployment and hosting.

UNIT 6 : **(6)**

Web Programming : Basics of Python, Object Oriented Programming, Dictionaries, Lists, File.

Text Books :

1. Silberschatz, Galvin, Gagne, "Operating System Concepts", 9th Edition,WILEY Publication.
2. F. Korth, Abraham Silberschatz, Sudarshan, "Data Base System Concept" (McGraw Hill Inc.) Fourth Edition.
3. B. Forouzan, "TCPJP Protocol Suite", 4th Edition,McGraw-Hill.
4. Martin Brown (Southhampton, UK), "The Complete Reference", McGraw Hill Education; ISBN-10: 007212718X,

Reference Books :

1. Sumitaba Das," Unix Concepts and Applications", The McGraw Hill Publication.
2. Julie C. Meloni," CSS and JavaScript All in One", Sams Publishing, 2nd Edition, ASIN: B000121XYK.

B.Tech. Semester - VIII
Open Elective - II

OE462 : ENTREPRENEURSHIP DEVELOPMENT

L	T	P	Credits
3	0	0	3

Course Description :

Now a day's all engineers run behind campus interviews and secured job. Very few of them think seriously above their career as entrepreneur. Instead becoming job seekers, they should become job creators. Nation also expects same thing from young technocrats. Therefore Start up India & Make In India mission are in progress. Technopreneurers should take advantage of these mission to start their career as Entrepreneur.

Up till now belief was Entrepreneurs are born and cannot be created. But research by David Mcleland & Entrepreneurship Development Institute of India, Ahmedabad , has proved that with proper guidance & training successful entrepreneurs can be created. With reference to guide lines provided by EDI Ahmedabad, NIESBUD, NIMSME, syllabus for course is designed.

Course Learning Outcomes :

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

1. Identify, analyze & select business opportunity to suit his personality based on SWOT analysis
2. Make market research & survey for selected business
3. Prepare and apprise detailed Project Report
4. Formulate plan for financial management of project.
5. Apply managerial inputs for starting & establishing his own business

Prerequisites :

Student from any branch of engineering with strong passion for Entrepreneurship.

Unit 1 : **04**

1.1. Entrepreneur : Definition, Concept, importance, nature, types, entrepreneurial culture, growth, entrepreneurial traits & motivations.

1.2. Entrepreneurship : Theory, Aspects, environment for entrepreneur ship, The process of _ entrepreneurial development training, Barrier to entrepreneurship, Entrepreneur competencies, Industrial Economics

Unit 2 : **05**

Project Identification : Concept of Project & classification, Searching for business idea, opportunity finding, Scanning Business Idea & development, Project formulation. Project design & net work analysis.

Unit 3 : **05**

Setting Up of Enterprize : Steps for starting small scale industry, whom to approach for what, incentives and subsidies, Role of state development, finance corporations, nodal agencies, Role of consultancy Organization, Lead Bank, various clearances & certificate required for a particular industry, Start Up India & Make hi India program.

Unit 4 : **06**

4.1.Industrial Finance : Long term loan, short term loan, over drafts, letter of credit, working capital management. Interviews with Industrialist.

4.2. Market Survey : Tools & techniques

Unit 5 : **10**

Project Report : Project Report preparation, Preliminary Project Report, feasibility report, marketing research, Project appraisal, statement of cash flow, accounting ratios, Break-even analysis

Unit No. 6. **06**

Costing and Accounting : Financial appraisal, Direct and Indirect costs, , Financial projections, Balance Sheet, Profit and loss account, Income tax, Sales Tax (VAT),Excise Tax, factory design and Layout

Text Books :

1) Dynamics of Entrepreneurial Development and Management -By Vasant Desai, Himalaya Publishing House,
2) Management of small scale Industries, -By Vasant Desai; Himalaya Publishing House,Delhi,1980
3) Small Scale Industries and Entrepreneurship, -By Vasant Desai, Himalaya Publishing House, Delhi, 2011

Reference Books :

1) Entrepreneurship Development and Management -By Neeta Bopodikar, Himalaya Publishing House, Delhi
2) Project Profiles for S.S.I. Mechanical Products;
3) E.D.P. Study Material by by Dr. Dinesh Awasthi, Mr. Raman Jossi V Padmananal E.D.I Ahamadabad
4) E.D.P. Study Material by MITCON Pune
5) E.A.P. Study Material by Mr. Raman Gujaral E.D.I. Ahmadnagar

B.Tech. Semester - VIII
Open Elective - II

OE464 : ENGINEERING APPLICATION OF OPERATION RESEARCH

L	T	P	Credits
3	0	0	3

Course Description :

Operations Research (OR) refers to science of decision making. Every business in the world needs to make complex decisions. Operations Research (OR) provides tools needed to make these decisions rigorously and effectively. The course extended the opportunity to develop skills to convert real life problem into the mathematical model and suggest the optimal solution to the problem. The focus of the course is on application of OR rather than rigorous mathematical treatment.

This is the first course in the program which familiarizes the students with formulation and solution of Linear Programming problems, dynamic and Linear Programming, assignment and Transportation models, Queering models, game theory and decision theory. It is an interdisciplinary course designed to consider application from several branches of engineering.

The course helps to build skills and competency to formulate and provide optimum solutions to the engineering problems. No prerequisites to opt this course.

Course Learning Outcomes :

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

1. Identify the breadth of quantitative decision situation that arise in engineering.
2. Develop skills needed for the mathematical modeling of real world decision situations.
3. choose appropriate techniques and methodology to solve the problems
4. Analyze the solution and carryout post optimality (sensitivity analysis) to implement the solution with practical consideration.
5. Ability to work in a team specifically to solve the larger problems.

Unit 1 : **06**

Operations Research and Decision Theory : Definition of Operations Research, Characteristics, Phases Operations Research models and Applications, Operations Research and Decision theory. Types of Decisions, decision environment, decision models. Expected monetary value (EMV), EVPI, EOL.Decision making^Hftdgr uncertainty, Decision making under conflict, Decision tree analysis, Decision making under utilities. Case problems on decision theory applications.

Unit 2 : **08**

Formulation and solution of linear programming problems : Formulation of Linear programming problems. Graphical solution. Simplex procedure for solving L.P.P. maximization and minimization Big 'M' method (chames penalty method), Degeneracy in L.P.P. special cases, duality in Linear programming, converting primal to dual, sensitivity analysis.

Unit 3 : **06**

Assignment and Transportation models : Mathematical formulation of assignment problem, Hungarian method for solving assignment problems, unbalanced and maximization problem. Variations in assignment problems, travelling salesman problem.

Mathematical statement of Transportation models, Matrix form of Transportation problem. Initial Basic Feasible Solution (IBFS) - Methods, optimum solution to Transportation models (modified distribution method, degeneracy and its resolution, transshipment problem)

Unit 4 : **06**

Integer and Dynamic Programming : Integer Programming problem, Gomory's cutting plane algorithm. Dynamic Programming - Bellman's principle of Optimality. Basic terminologies application of Dynamic programming applications: Project management, Cargo loading problem, Shortest route problem, Capital budgeting problems and Reliability problems

Unit 5 : **06**

Queering Models and Games Theory : Queering system, Transient and steady state system. Kendal's notation. Models of Queering model and problem on Queering models. Monto Carlo Simulation of Queering.

Games theory, Basic terminologies games with saddle point, pure and mixed strategies dominance properties. Solution methods and mixed strategies, Graphical Solution, solution of games using L.P.P. Business applications of Games theory.

Unit 6 : **05**

Replacement and Reliability models :

The replacement problem, failure mechanism, Replacement models, Replacement of items that deteriorate, Replacement of items that fail completely. System reliability, mathematical model of system reliability, Reliability estimation, Reliability testing and reliability improvement.

Reference Books -

1) Operation Research, Theory, methods and application, S. D. Sharma, Kedarnath ramnath Publisher (Reprint 2013).

2) Optimization in Engineering, Purna Chandra Biswal Scitech Publications, Chennai 2006.

3) Operation Research, Hamdy Taha, 9th edition 2014, McGraw Hill Publications

4) Introduction to Operation research concept and cases - Hiller and Liberman, T.M.H. New Delhi (2008)

5) Operation Research, Heera and Gupta, S, Chand and company, 5th edition, 2014, New Delhi

B.Tech. Semester - VIII

Open Elective - II

OE 472: FINANCE FOR ENGINEERS

L	T	P	Credits
3	0	0	3

Course Description :

In today's workplace, it is nearly impossible for an engineer to perform without considering the financial impact of every action on the organization's bottom line. Engineers need to be aware of issues such as cost reduction and capital investment and how their decisions can affect the financial statements. This course introduces basic financial management to engineers and technical personnel who need this knowledge to manage a profit center effectively. The course aims at providing students with an in-depth coverage of the various aspects of financial management.

It covers the assessing the financial health of the organization through ratio and cash flow analysis, sources of long term as well as short term finance. Decisions concern with financing, working capital and long term investment. Class will focus on both the academic theories underlying the management of funds and the practical aspects of financial management,

Course Objectives :

The course objective is to improve ability of the students to :

1. Develop confidence in the language of finance management in the engineering domain by analyzing financial reports to propose new financial and operating strategies.
2. Select the best decision-making criteria in making investment decisions (Short term & long term) and allocating capital.
3. Recommend long term financing source & determine the enterprise costs of raising capital through debt and equity offerings.

Unit 1 : Financial Statement & Finance Terminologies :

Key terms of Accounting and Finance, Accounting Principles underlying Preparation of Financial Statements.

Unit 2 : Analyzing Health of a Firm :

Techniques of Analyzing Health of a Firm, Classification of Ratios - Liquidity, Leverage, Activity, Profitability. Analysis of Cash Flows

Unit 3 : The Management of Working Capital :

Need of 'Working Capital, Operating Cycle of Working Capital, Determinants of Working Capital

Unit 4 : Investment Decision Rules :

Investment Decision Rules, Mutually Exclusive Projects. Evaluation Criteria for Investment Decision: Payback, ARE., NPV, PI & IRR, Benefit Cost Ratio, Decision Tree Analysis

Unit 5 : Long Term Financing :

Long Term Financing: Shares, Debentures, Loan capital, foreign capital, FDI, Euro issues & external borrowings, Venture capital financing.

Unit 6 : Financing Decisions and Cost of Capital :

Risk & Return, Cost of Capital, Cost of Equity, Cost of Debt, Weighted Average Cost of Capital, Making Financial Sense in Merger & Acquisition

Reference Books :

1. Finance for Engineers, F. K. Crundwell, Springer, 2008.
2. Corporate Finance, Stephen Ross, R. W. Westerfield, J. Jaffe & R.K. Kani, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 8th edition, 2009.
3. Accounting for Non-Specialists, Michael Jones, Wiley India Edition, 2007.
4. Corporate Finance, Aswath Damodaran, Wiley India Edition, 2nd edition, 2009.
5. Financial Management, M. Y. Khan & P. K. Jain, Tata McGraw-Hill Publishing Company Limited, New Delhi, 6th edition, 2011.
6. Financial Management, Dr. Prasanna Chandra, Tata McGraw-Hill Publishing Company Limited, 8th edition, 2011.

B.Tech. Semester - VIII
Open Elective - II

OE474 : COSTING & COST CONTROL

L	T	P	Credits
3	0	0	3

Unit 1 : **6**

Introduction to Cost Terms & Concepts : Cost Objects, Direct & Indirect Costs, Period & Product Costs, Cost Estimation & Cost Behavior, Relevant & Irrelevant Costs and revenues, Avoidable & Unavoidable Costs, Sunk Costs, Opportunity Costs, Incremental & Marginal Costs

Unit 2 : **6**

Cost Accumulation for Inventory Valuation and Profit Measurement : Cost assignment for direct and indirect costs, Job Costing & Process Costing System, Joint and By-Product Costing, Income effects of alternative cost accumulation systems.

Unit 3 : **6**

Cost Analysis for Decision-Making : Cost-Volume-Profit Analyses, Cost Estimation and Cost Behavior, Measuring relevant costs and revenues for decision-making, Activity Based Costing

Unit 4 : **6**

Cost Analysis for Planning, Control and Performance Measurement : Budgets & Budgetary Control System, Stages in Budgeting Process, Master Budget, Zero Base Budgeting, Standard Costing and Variance Analysis.

Unit 5 : **6**

Strategic Cost Decision Making : Relevant Cost Analysis Decisions : Relevant Cost, Irrelevant Costs, Committed Cost. Absorbed Cost, Situations where Fixed Costs become relevant for decision - making and its related implications, Target Costing, Life Cycle Costing, Kaizen Costing

Unit 6 : **6**

Project Cost Management Decisions : Resource Planning, Techniques of Resource Planning, Project Cost Estimating, Analogous estimating, Parametric modeling, Bottom-up estimating, Computerized tools, Project Cost Budgeting, Project Cost Control, Cost change control system, Performance measurement, Additional planning.

Reference Books :

1. Edward Blocher, Cost Management: A Strategic Emphasis, McGraw-Hill Higher Education 5th Revised edition 2010
2. Colin Drury, "Cost & Management Accounting", Cengage Learning Publication, 7th Edition 2012
3. Donal Towey ,"Cost Management of Construction Projects" Wiley-Blackwell; 3rd ed. Edition (9 August 2013)
4. Sam Kubba, "Green Construction Project Management and Cost Oversight" Butterworth-Heinemann Ltd; 1 edition
5. Shank Govindrajan, "Strategic Cost Management: The New Tool for Competitive Advantage" Simon & Schuster Publications