Acharya Nagarjuna University
Faculty of Engineering
Academic Regulations 2019 (R19) for B. Tech (Regular)

(Applicable for the students admitted during the
Academic Year 2019-2020 and onwards)

1. Eligibility for Admission:

Admission to the above program shall be made subject to the eligibility, qualification and specialization prescribed by the University for each program from time to time.

i. Admission shall be made either on the basis of merit/rank obtained by the qualifying candidates in EAMCET/ECET or otherwise specified, whichever is relevant.

The duration of B.Tech program is of four academic years divided into eight semesters comprising of two semesters in each academic year. A student is required to choose a branch of study at the time of admission. Students under lateral entry will be admitted straightaway into Third semester of B.Tech course in the respective branch. No change of branch shall be allowed after the admissions are closed.

2. Award of B.Tech. Degree:

A student will be declared eligible for the award of the B.Tech. degree if he/she fulfils the following academic regulations:

i. Regular entry students shall pursue a course of study for not less than four academic years and in not more than eight academic years.

ii. Student's who fail to fulfill all the academic requirements for the award of the degree within eight academic years (for Regular Entry) / six academic years (for Lateral Entry) from the year of their admission, shall forfeit their seat in B.Tech course and their admission is cancelled.

Completing the course of study shall mean not only satisfying the attendance requirements but also passing of all the subjects within the respective stipulated period

3. Branches of study:

The following Branches of study are offered at present for B. Tech. degree

S.No.	Branch
1.	Civil Engineering
2.	Electrical and Electronics Engineering.
3.	Mechanical Engineering.
4.	Electronics and Communication Engineering
5.	Computer Science and Engineering.
6.	Chemical Engineering

and any other branch as approved by the authorities of the University from time to time.

Each Branch will have a curriculum with a syllabi that shall consist of the following:

i. General Core Courses
   1. Basic Sciences
   2. Engineering Sciences
   3. Humanities and social sciences

ii. Program core courses in Engineering / Technology

iii. Elective courses of Engineering / Technology / Management Entrepreneurship / Business Communication and allied fields.

iv. Open Electives/CBCS

v. Mandatory learning courses

vi. Project work

4. Credits:

i. *Academic Year:* Two consecutive (one odd + one even) semesters constitute one academic year.

ii. *Choice Based Credit System (CBCS):* The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).

iii. *Credit:* A unit by which the course work is measured.

5. Distribution and Weightage of Marks (Internal & External):

i. The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition internship & project work shall be evaluated for 100 and 200 marks respectively.

ii. For both theory and lab subjects the distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation.

iii. There shall be five units in each of the theory subjects.

iv. For theory subjects, there shall be <u>two</u> midterm examinations during the semester. Each midterm examination shall consist of assignment for 15 marks and sessional test for 20 marks with duration of 150 minutes respectively.

First midterm examination shall be conducted for 50% coverage of syllabus and second midterm examination shall be conducted for remaining 50% of syllabus. Both the midterm exams are compulsory. Final midterm examination marks for a total of 35 marks shall be arrived at, by considering the 80% weightage (28 marks) to that midterm examination in which the student scores more marks and the remaining 20% (7 marks) for other midterm exam.

*****Note 1: The assignment test paper shall contain 6 questions of equal weightage and student is asked to answer any 3 questions randomly and shall be condensed for 15 marks, any fraction rounded off to the next higher mark.

*****Note 2: The sessional examination shall contain 3 questions out of which first question is objective(6marks) and compulsory and remaining two questions(7 marks each) having internal choice and shall be considered for 20 marks, any fraction rounded off to the next higher mark.

***Note 3: Remaining** 5 marks allotted for attendance as indicated in CLAUSE(_6)

V. For theory subjects, there will be 5 questions with following pattern in the End-Examination.

a. All Questions have to be answered compulsorily.
b. All five questions, EITHER/OR type shall be followed with 12 marks for each.
c. In each question as mentioned in (c), one, two or more bits can be set.

vii. Further, whenever any theory subject with two parts is offered (combined subject), for ex: Electrical & Mechanical Technology, then there shall be only two parts Part A, Part B in the question paper. First question objective can be equally divided into two parts.
Part – A: shall contain two questions, EITHER/OR type shall be followed with 12 marks for each.
Part – B: shall also contain two questions, EITHER/OR type shall be followed with 12 marks for each.

viii. Model Question paper for each theory course shall be prepared by the teacher within 15 days from the commencement of the semester and the same shall be forwarded to the Controller of Examinations through the Chairman, BOS concerned.

ix. For practical subjects there shall be a continuous evaluation during the semester for 40 internal marks and 60 end examination marks. Day-to-day work in the laboratory shall be evaluated for 25 marks by the concerned laboratory teacher based on the report of experiments/jobs(10 marks for the record submitted and 15 marks for day to day work). The end examination for 15 marks (10 marks for experiment and 5 marks for viva-voce) shall be conducted by the laboratory teacher and another examiner from the same department.

*Note: Day to day performance shall be recorded in student record(each experiment carries 15 marks, at least ten experiments should be done and average marks must be taken at the end of semester).

x. For the subject having design and / or drawing, such as Engineering Drawing, Machine Drawing and Estimation, the distribution shall be 40 marks for internal evaluation and 60 marks for end examination. The Internal evaluation will be 20 marks for day-to-day work in the class that shall be evaluated by the concerned subject teacher based on the reports/submissions prepared in the class. Further, there shall be two midterm exams in a Semester for a duration of 2 hrs each, evenly distributed over the syllabi for 20 marks and the average marks of both the mid examinations shall be considered as internal test marks. The sum of day to day evaluation and the internal test marks will be the final internal marks for the subject.

xiv. Out of a total of 200 marks for the project work, 80 marks shall be for Internal Evaluation and 120 marks for the End Semester Examination (Viva-voce). The viva-voce shall be conducted by a committee consisting of Head of the Department, Project Supervisor and an External Examiner nominated by the Principal from the panel of 3 members proposed by Head of the Department. The project work shall start in IV year I semester and shall continue in the semester break. The evaluation of project work shall be conducted at the end of the IV year II semester. The Internal Evaluation shall be made on the basis of weekly progress (a minimum of 12 weeks and 3 marks for each week progress) and at least two seminars (one at the beginning of IV B.Tech II semester (20 marks) and the other before submission of project work(24 marks) given by each student on the topic of his project.

xv. The laboratory records and internal test papers shall be preserved for minimum of 2 years in the respective departments and shall be produced to the Committees of the college as and when the same are asked for.

6. Attendance Requirements:

i. A student shall be eligible to appear for end examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.

ii. **Shortage of Attendance below 65% in aggregate shall in <u>NO</u> case be condoned**.

iii. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

iv. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.

v. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester, as applicable. They may seek readmission for that semester when offered next.

vi. A stipulated fee shall be payable towards condonation of shortage of attendance to the college.

vii. A weightage in sessional marks upto a maximum of 5 marks out of 40 marks in each theory subject shall be given for those students who put in a minimum of 75% attendance in the respective subject in a graded manner as indicated below.

Attendance of 90% and above		5marks
Attendance of 85% and above	and less than 90%	3marks
Attendance of 80% and above	and less than 85%	2marks
Attendance of 75% and above	and less than 80%	1mark

7. Minimum Academic Requirements (For Regular Entry Students):

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

i. A student who could not secure a minimum of 50% aggregate from midterm examination marks is not eligible to appear for the semester end examination and shall have to repeat that semester.

ii. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, design, drawing subject or project if he secures not less than 40% of marks in the end examination and a minimum of 50% of marks in the sum total of the internal evaluation and end examination taken together. In the internship & project he/she should secure 40%. For practical examination if he secures not less than 50% of marks in the semester end examination.

iii. A student shall be promoted from I to II year only if he/she fulfils the academic requirements of attendance and internal marks as stipulated in clause 6 and 7 irrespective of back log subjects in I/IV B.Tech.

iv. A student shall be promoted from II to III year only if he/she fulfils the academic requirements of attendance and internal marks as stipulated in clause 6 and 7 and also must secure 70% of the credits of the subjects that have been studied up to I year II semester from

irrespective of whether the candidate takes the end examination or not as per the normal course of study. At the time of commencement of calss work, he must attain the re quired credits

v. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of of attendance and internal marks as stipulated in clause 6 and 7 and also must secure 70% of the credits of the subjects that have been studied upto II year II semester. At the time of commencement of class work, he must attain the required credits

And in case of getting detained for want of credits by sections ii and iii above, the student may make up the credits through supplementary exams of the above exams before the date of class work commencement of Third or Fourth year I semester respectively.

8. Minimum Academic Requirements (For Lateral Entry Students):

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

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 40% of marks in the end examination and a minimum of 50% of marks in the sum total of the internal evaluation and end examination taken together. In the Seminar & Comprehensive viva-voce he/she should secure 40%.

ii. A student who could not secure a minimum of 50% aggregate from midterm examination marks is not eligible to appear for the semester end examination and shall have to repeat that semester.

iii. A student shall be promoted from II to III year only if he/she fulfils the academic requirements of attendance and internal marks as stipulated in clause 6 and 7 irrespective of back log subjects in II/IV B.Tech

iv. A student shall be promoted from III to IV year only if he/she fulfils the academic requirement of of attendance and internal marks as stipulated in clause 6 and 7 and also must secure **70%** of the subjects that have been studied up to III year I semester from

9. Grading:

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Table – Conversion into Grades and Grade Points assigned

Range in which the marks in the subject fall	Grade	Grade points assigned
≥ 90	O (Outstanding)	10
80-89	A+ (Excellent)	9
70-79	A (Very Good)	8
60-69	B+ (Good)	7
50-59	B (Above Average)	6
45-49	C (Average)	5
40-44	D (Pass)	4
< 40	F (Fail)	0
Absent	Ab (Absent)	0

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

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

9.1. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

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

$$SGPA = \Sigma (Ci \times Gi) / \Sigma C_i$$

Where, Ci is the number of credits of the i^{th} subject and Gi is the grade point scored by the student in the i^{th} course.

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

$$CGPA = \Sigma (Ci \times Si) / \Sigma C_i$$

Where 'Si' is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester.

iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iv. While computing the GPA/CGPA the subjects in which the student is awarded Zero grade points will also be included.

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

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

10. Gap - Year:

Gap Year – concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I year/II year/III year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for having the Gap Year.

11. Transitory Regulations:(old regulations changed)

1. Candidates who admitted into the four year B.Tech degree course under R-15 regulations but who got detained in any year for want of attendance/minimum aggregate sessional marks may join the appropriate year /semester in the semester system applicable for that batch and be governed by the regulations of that batch from then onwards unless otherwise specified.
2. A student admitted under credit based regulations(CR) detained due to lack of sessional marks/attendance at the end of the first semester of II/IV B.Tech shall join II/IV first semester fo R-15 batch . Such students will study all the courses prescribed for that R-15 in which the student joins. However the student has to clear all the first year backlog subjects by appearing the supplementary examination. Such candidates will be governed by the regulations applicable to lateral entry candidates of R-15 batch for the award of the degree.
3. A student admitted under CR, detained due to lack of sessional marks/attendance at the end of the second semester of II/IV B.Tech /at the end of subsequent semesters shall follow the credit based regulations only (CR).

12. With–holding of results:

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

13. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes:

Class Awarded	CGPA Secured
First Class with Distinction	≥ 8.0
First Class	≥ 6.5 < 8.0
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 4.0 < 5.5

14. Minimum Instruction Days:

The minimum instruction period for a semester is 16 weeks. The minimum instruction days including exams for each semester shall be for 90 days.

15. There shall be no branch transfers after the completion of admission process.

16. General:

i. The academic regulations should be read as a whole for purpose of any interpretation.
ii. Malpractice rules - nature and punishments is appended
iii. Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the BOS is final.
v. The University may from time to time, revise, amend or change the Regulations, Schemes of Examinations, and/or Syllabi.

17. Conduct and discipline

Students shall conduct themselves within and outside the premises of the institute in a manner befitting the students of our institution.
(b) As per the order of Honourable Supreme Court of India, ragging in any form is considered as a criminal offence and is banned. Any form of ragging will be severely dealt with.
(c) The following acts of omission and / or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures with regard to ragging.
(i) Lack of courtesy and decorum, indecent behavior anywhere within or outside the campus.
(ii) Willful damage of college / individual property
(iii) Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.
(iv) Mutilation or unauthorized possession of library books.
(v) Noisy and unseemly behavior, disturbing studies of fellow students.
(vi) Hacking of computer systems (such as entering into other person's areas without prior permission, manipulation and / or damage of computer hardware and software or any other cyber-crime etc.)
(vii) Usage of camera / cell phone in the campus (viii) Plagiarism of any nature
(ix) Any other acts of gross indiscipline as decided by the academic council from time to time.
(d) Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute / hostel, debar from examination, disallowing the use of certain facilities of the institute, rustication for a specified period or even outright

expulsion from the institute or even handing over the case to appropriate law enforcement or the judiciary, as required by the circumstances.
(e) For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the chief warden, the head of the department and the principal respectively, shall have the authority to reprimand or impose fine.
(f) Cases of adoption of unfair means and / or any malpractice in an examination shall be reported to the principal for taking appropriate action.
(g) All cases of serious offence, possibly requiring punishment other than reprimand, shall be reported to the academic council.
(h) The institute level standing disciplinary action committee constituted by the academic council shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.
(i) The principal shall deal with any academic problem, which is not covered under these rules and regulations, in consultation with the programmes committee in an appropriate manner, and subsequently such actions shall be placed before the academic council for ratification. Any emergency modification of regulation, approved by the appropriate authority, shall be reported to the academic council for ratification.

(j) "Grievance and Redressal Committee" (General) constituted by the Principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters

18. Punishments for Malpractice Cases - Guidelines

The examinations committee may take the following guidelines into consideration while dealing with the suspected cases of malpractice reported by the invigilators/squad members etc; during end examinations. The punishment may be more severe or less severe depending on the merits of the individual cases.

S. No	Nature of Malpractices/Improper conduct	Punishment
1.	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
2.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
3.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.

4.	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any other student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
5.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects including practical examinations and project work of that semester/year.
6.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects including practical examinations and project work of that semester/year.
7.	Smuggles in the Answer book or takes out or arranges to send out the question paper during the examination or answer book during or after the examination	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects including practical examinations and project work of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
8.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

9.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects including practical examinations and project work of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
10.	Posseses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects including practical examinations and project work of that semester/year. The student is also debarred and forfeits the seat.
11.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 7 to 9.	For Student of the college: Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects including practical examinations and project work of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
12.	Impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is debarred from writing the remaining exams, and rusticated from the college fur one academic year during which period the student will not be permitted to write any exam. If the imposter is an outsider, he will be handed over to the police and a case is registered against him. The performance of the original student who has been impersonated, shall be cancelled in all the subjects of the examination including practicals and project work of that semsester/year. The student is rusticated from the college for two consecutive years during which period the student will not be permitted to write any exam. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat

13.	If any malpractice is detected which is not covered in the above clauses 1 to 12 it shall be reported to the college academic council for further action to award suitable punishment.
14.	Malpractice cases identified during sessional examinations will be reported to the examination committee nominated by Academic council to award suitable punishment.

I/IV B.Tech ECE-Semester – 1(Theory - 5, Lab -4)

S.No	Course No	Course Name	Category	L-T-P-C
1	ECE 111	Mathematics I (Calculus & Linear Algebra)	BS	3-0-0-3
2	ECE 112	Engineering Physics	BS	3-0-0-3
3	ECE 113	Problem Solving & Programming(using C)	ES	3-1-0-4
4	ECE 114	Communicative English I	HS	2-0-0-2
5	ECE 115	Environmental Science	MC	3-0-0-0
6	ECE 151	Physics lab	BS	0-0-3-1.5
7	ECE 152	Problem solving & Programming using C	ES	0-0-3-1.5
8	ECE153	English lab	HS	0-0-3-1.5
9	ECE 154	Workshop I (Basic Engineering Workshop)	LC	0-0-3-1.5
			Total ==>	**18**

I/IV B.Tech ECE-Semester - 2 (Theory - 6, Lab - 5)

S.No	Course No	Course Name	Category	L-T-P-C
1	ECE 121	Mathematics II (ODE and Multivariable Calculus)	BS	3-0-0-3
2	ECE 122	Engineering Chemistry	BS	3-0-0-3
3	ECE 123	Engineering Graphics & Design	ES	1-0-3-2.5
4	ECE 124	Essential Electrical & Electronic Engineering	ES	3-1-0-4
5	ECE 125	Python Programming	ES	2-1-0-3
6	ECE 126	Constitution of India	MC	3-0-0-0
7	ECE 161	Chemsitry Lab	BS	0-0-3-1.5
8	ECE 162	Electrical & Electronics Lab	ES	0-0-3-1.5
9	ECE 163	Python Lab	ES	0-0-3-1.5
10	ECE 164	Workshop (Electronics and Communication Engineering)	LC	0-0-3-1.5
			Total ==>	**21.5**

Engineering Physics
(ECE, CSE, EEE)

L	T	P	C
3	0	3	4.5

Course Objectives:

- To impart knowledge in basic concepts of wave optics, properties of dielectric and magnetic materials, electromagnetic theory, fiber optics, semiconductors, superconductivity
- To familiarize the applications of nanomaterials relevant to engineering branches

Course Outcomes:

The students will be able to

- **interpret** the interaction of energy with the matter (L2)
- **explain** the principles of physics in materials science, nanoscience, medical physics and communication industry (L2)
- **apply** electromagnetic wave propagation in different guided media (L3)
- **calculate** conductivity of semiconductors (L3)
- **interpret** the difference between normal conductor and super conductor (L2)
- **demonstrate** the application of nanomaterials (L2)

Unit-I : Wave Optics (8hrs)

Principle of Superposition-Interference of light-Theory of Interference fringes-Conditions for sustained Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength.

Diffraction-Fraunhofer Diffraction-Single slit Diffraction -Diffraction Grating – Grating Spectrum -Determination of Wavelength.

Polarization-Polarization by reflection, refraction and double refraction-Nicol's Prism--Half wave and Quarter wave plate- Engineering applications of Interference, Diffraction and Polarization.

Learning Outcomes:

The students will be able to

- **explain** various types of coherent sources (L2)
- **outline** the conditions for sustained interference (L2)
- **identify** applications of interference including homodyne and heterodyne detection (L3)
- **analyze** the differences between interference and diffraction (L4)
- **illustrate** the concept of polarization of light and its applications (L2)
- **classify** the production and detection of different polarized light (L4)
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Unit-II: Dielectrics and Magnetics (10hrs)

Introduction to Dielectrics--Electric polarization-Dielectric polarizability, Susceptability and Dielectric constant-Types of polarizations Lorentz(internal) field-Claussius -Mosotti equation-Applications of Dielectrics .

Introduction to Magnetics-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability-Origin of permanent magnetic moment -Classification of Magnetic materials - Hysteresis-soft and hard magnetic materials-Ferrites and applications.

Learning Outcomes:

The students will be able to

- **explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **summarize** Gauss's law in the presence of dielectrics (L2)
- **interpret** dielectric loss, Lorentz field and Claussius- Mosotti relation (L2)
- **classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **explain** the applications of dielectric and magnetic materials (L2)

Unit – III: Electromagnetic Waves and Fiber Optics (10hrs)

Divergence and Curl of Electric and Magnetic Fields-Maxwell's Equations- Electromagnetic wave Equation and velocity.

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile, modes - Propagation of electromagnetic wave through optical fiber - -Block Diagram of Fiber optic Communication.

Learning Outcomes:

The students will be able to

- **apply** the Gauss' Theorem for divergence and Stokes' Theorem for curl (L3)
- **evaluate** Maxwell's displacement current and correction in Ampere's law (L3)
- **assess** the electromagnetic wave propagation in different media and its power (L3)
- **explain** the working principle of optical fibers and its classification based on refractive index profile and mode of propagation (L2)
- **identify** the applications of optical fibers in medical , communication and other fields (L2)

Unit – IV: Semiconductors (8 hrs)

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semi conductors - Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type Dependence of Fermi energy on carrier concentration and temperature (Qualitative)- Direct and Indirect band gap semiconductors-Hall effect-Hall coefficient - Applications of Hall effect - Applications of Semiconductors.

Learning Outcomes:

The students will be able to

- **classify** the energy bands of semiconductors (L2)
- **outline** the properties of n-type and p-type semiconductors (L2)
- **interpret** the direct and indirect band gap in semiconductors (L2)
- **identify** the type of semiconductor using Hall effect (L2)
- **list** the applications of semiconductors in electronic manufacturing (L2)
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Unit – V: Superconductors and Nano materials (8 hrs)

Superconductors-Properties-Critical parameters of Superconductors- Meissner effect-BCS Theory-Josephson effect(AC & DC)-Types of Superconductors-High T_C Superconductors- Applications.

Basics of Nano materials - Preparation and characterization – CNTs - Applications of Nano materials.

Learning Outcomes:

The students will be able to

- **explain** electrical resistivity of solids with temperature (L2)
- **classify** superconductors based on Meissner effect (L2)
- **explain** BCS theory , Josephson effect and high T_c materials (L2)
- **analyze** the size dependent properties of nanomaterials (L4)
- **choose** the methods for the preparation and characterization of CNTs (L3)

Text books:

1. M.N. Avadhanulu, P.G.Kshirsagar "A Text book of Engineering Physics"-S.Chand Publications,2017
2. H.K.Malik & A.K.Singh "Engineering Physics",- McGraw Hill Publishing Company Ltd, 2018

Reference Books:

1. David J.Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education,2014
2. Gerd Keiser "Optical Fiber Communications"- 4/e, Tata Mc GrawHill ,2008
3. Charles Kittel "Introduction to Solid State Physics",Wiley Publications,2011
4. S.M.Sze "Semiconductor devices-Physics and Technology"-Wiley,2008
5. T Pradeep "A Text book of Nano Science and Nano Technology"- Tata Mc GrawHill 2013

CS 113 Problem Solving and Programming(Using C)

L-T-P-C : 3-1-3-5.5

Course Objectives:

1. To teach problem solving through Flow charting tool – Raptor
2. To solve numerical problems using Raptor
3. To analyze problems by modular approach using Raptor
4. To understand the basic concepts and tokens of C
5. To learn the concepts of control structures, functions, arrays and pointers of C
6. To understand the concepts of structures , unions and files in C

Unit – 1: Flowchart design through Raptor

Flow chart symbols, Input/Output, Assignment, operators, conditional if, repetition, function and sub charts. Example problems(section 1) – Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD of 2 numbers

Example problems(section 2) - Fibonacci generation, prime number generation. Minimum, Maximum and average of n numbers, Linear search, Binary Search.

Learning Outcomes: Student should be able to

1. Select flowchart symbols for solving problems.
2. Develop basic flowcharts for performing Input, Output and Computations
3. Solve numerical problems using Raptor
4. Analyse problems by modular approach using Raptor

Unit 2: C Basics

C-Basics: C-character set, Data types, Constants, Expressions, Structure of C program, Operators and their precedence & associatively, Simple programs in C using all the operators, Type casting ,type coercion.

Learning outcomes: Student should be able to

1. Exercise concepts of control structures in C
2. Develope user defined and predefined functions in C

Unit 3: Control Structures and Functions

Control Structures, Basic input and output statements, Preprocessor directives.

Functions: Concept of a function, passing the parameters, automatic variables, scope and extent of variables, storage classes, recursion, iteration vs recursion, types of recursion, Simple recursive and non recursive programs, Towers of Hanoi problem.

Learning Outcomes: Student should be able to

1. Illustrate the flowchart and design an algorithm for a given problem and to develop IC programs using operators
2. Develop conditional and iterative statements to write C programs
3. Exercise user defined functions to solve real time problems

Unit 4: Arrays and Pointers

Arrays: Single and multidimensional Arrays, Character array as a string, string functions, Programs using arrays and string manipulation.

Pointers: Pointers declarations, Pointer expressions, Pointer parameters to functions. Pointers, Pointers and array, Pointer arithmetic.

Learning Outcomes: Student should be able to

1. Inscribe C programs that use the concepts of structures , unions in C
2. Develop programs on files and command line arguments in C
3. Inscribe C programs that use Pointers to access arrays, strings and functions.
4. Inscribe C programs using pointers and to allocate memory using dynamic memory management functions.

Unit 5: Structures and Files

Structures: Declaring and using structures, operations on structures, structures and arrays, user defined data types, pointers to structures.Command line arguments.

Files: Introduction, file structure, file handling functions, file types, file error handling, Programs using file functions.

Learning Outcomes: Student should be able to

4. Exercise user defined data types including structures and unions to solve problems
5. Exercise files concept to show input and output of files in C

Text Books:

1. https://raptor.martincarlisle.com/
2. Programming with C-Gottfried-Schaums Outline Series-TMH
3. C Programming – AnithaGoel/Ajay Mittal/E.Sreenivasa Reddy-Pearson India

Referrences:

1. Problem Solving with C- Somasekharan-PHI.
2. C Programming- Behrouz A forouzan – CENGAGE Learning
3. Test your c skills-Yaswanthkanithker
4. Let us C- Yaswanthkanithker

Communicative English-I

B.T./CE/Ch.E./CSE/ECE/EEE/EI/IT/ME

L-T-P-C

2-1-3-3.5

Course Objectives:

The course aims to inculcate a sense of professionalism among the students while emphasizing on the basic aspects of the language learning such as grammar and vocabulary building. It also aspires to train the students to meet the global challenges.

- Adopt activity based teaching-learning methods to ensure that learners would be engaged in use of language in the classroom sessions.
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Syllabus:

UNIT-1: 6 Hrs.

1. Reading: Reading Comprehension (Skimming, Scanning & Inference)
2. Writing: Paragraph Writing
3. Grammar: Common Errors in Nouns- Pronoun Agreement
4. Vocabulary Building: Content and Functional word list -100

Learning Outcomes:

At the end of the module, the learners will be able to

- identify the context, topic, and pieces of specific information (L3)
- ask & answer general questions on familiar topics (L2)
- employ suitable strategies for skimming & scanning to get the general idea of a text and specific information (L3)
- recognize paragraph structure with beginnings/endings (L3)
- form sentences using proper grammatical structures and correct word forms (L3)

UNIT- II: 6 Hrs.

1. Reading: Jumbled Sentences
2. Writing: Proposal Writing
3. Grammar: Correction of Errors in Subject- Verb Agreement
4. Vocabulary Building: Sign Post, Transition signals

Learning Outcomes:

At the end of the module, the learners will be able to

- comprehend short paragraphs on general topics (L2)
- understand the use of cohesive devices for better reading comprehension (L2)
- write well-structured paragraphs on specific topics (L3)
- make necessary grammatical corrections in short texts (L3)

UNIT - III: 6 Hrs.

1. Reading: Article Review
2. Writing: Note Making, Note Taking
3. Grammar: Correction of errors in Tense Usage
4. Vocabulary Building: Synonyms and Antonyms

Learning Outcomes:

At the end of the module, the learners will be able to

- Review the content with clarity & precision from an article (L3)
- infer meanings of unfamiliar words using contextual clues (L3)
- write summaries based on global comprehension of reading texts (L3)
- produce a well-organized essay with adequate details (L3)
- use correct tense forms, appropriate structures in speaking and writing (L3)

UNIT - IV: 6 Hrs.

1. Reading: Story Reflection
2. Writing: Pictorial Description
3. Grammar: Correction of Errors in Adjectives, Articles, Prepositions
4. Vocabulary Building: Root Words (200)

Learning Outcomes:

At the end of the module, the learners will be able to

- Reflect the content of the story with clarity & creatively (L3)
- infer meanings of unfamiliar words using contextual clues in the story (L3)
- infer & predict about content of a discourse (L4)
- interpret graphic elements used in academic texts (L2)
- make formal written communication using effective strategies (L3)

UNIT - V: 6 Hrs.

1. Reading: Mind Mapping
2. Writing: Information Transfer
3. Grammar: Correction of Errors in Wh- questions, Question Tags
4. Vocabulary Building: One Word Substitutes

Learning Outcomes:

At the end of the module, the learners will be able to

- take notes in mind while reading a text to answer questions (L3)
- edit short texts by correcting common errors (L4)
- produce a coherent paragraph interpreting a figure/graph/chart/table (L4)
- use language appropriate for description and interpretation of graphical elements (L4)

Course Outcomes:

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

- identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English (L3)
- formulate sentences using proper grammatical structures and correct word forms (L3)
- speak clearly on a specific topic using suitable discourse markers in informal discussions (L3)
- write summaries based on global comprehension of reading texts (L3)
- produce a coherent paragraph interpreting a figure/graph/chart/table (L4)
- take notes while listening to a talk/lecture to answer questions (L3)

REFERENCE BOOKS:

1. Bailey, Stephen. *Academic writing: A handbook for International Students*. Routledge, 2014.

2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3. *Skillful Level 2 Reading & Writing Student's Book Pack (B10),* Macmillan Educational.
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
5. Michael Swan. *Practical English Usage*, OUP. 1995.
6. F.T. Wood. *Remedial English Grammar,* Macmillan.2007
7. William Zinsser. *On Writing Well.* Harper Resource Book. 2001
8. Liz Hamp-Lyons and Ben Heasly. *Study Writing,* Cambridge University Press. 2006.
9. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad.
10. Sharon J.Gerson, Steven M.Gerson, *Technical Writing,* New Delhi: Pearson education, 2007.
11. Sanjay Kumar and Pushp Lata, *Communication Skills,* Noida: Oxford University Press, 2012.
12. Dr. Shalini Verma, *Word Power Made Handy*, S.Chand & Co Ltd., 2009.

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Environmental Science

Common to all branches **L-T-P-C**
3-0-0-0

OBJECTIVE:
To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES
Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

LEARNING **OUTCOMES**
Students will be able to
1. articulate the basic structure, functions, and processes of key social systems affecting the environment.
2. explain how water resources should be used.
3. articulate basic understanding of effects of modern agriculture on environment.
4. explain how various paradigms or world views and their implicit and explicit assumptions and values shape the viewer's perception of environmental problems and solutions.

UNIT – II: Ecosystems, Biodiversity, and its Conservation

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:
a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION : Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

LEARNING OUTCOMES
Students will be able to
1. get a clear picture of structure and functions of ecosystems.
2. explain why renewable and non-renewable energy resources are important.
3. get awareness about land degradation, soil erosion & desertification.
4. gain a rigorous foundation in various scientific disciplines as they apply to environmental science, such as ecology, evolutionary biology, hydrology, and human behavior.

UNIT – III: Environmental Pollution and Solid Waste Management

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :
a. Air Pollution.
b. Water pollution
c. Soil pollution

d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

SOLID WASTE MANAGEMENT : Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

LEARNING OUTCOMES UNIT-3

Students will be able to

1. demonstrate knowledge and understanding of theories in the field of Biodiversity and Systematics in the broad sense.
2. conduct basic conservation biology research.
3. explain endangered and endemic species of India.
4. identify the threats to biodiversity.

UNIT – IV: Social Issues and the Environment

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

LEARNING OUTCOMES:

Students will be able to

1. understand Cause, effects and control measures of air pollution.
2. understand soil, noise & water pollution.
3. explain the enforcement of Environmental legislation
4. understand solid waste management.

UNIT – V: Human Population and the Environment

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

LEARNING OUTCOMES

Students will have

1. knowledge about watershed management and environmental ethics.
2. explain the reasons for global warming
3. explain principles and impact of disasters on environment.
4. explain disaster management cycle in India.

TEXT BOOKS :

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company

REFERENCES :

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of India Private limited.

5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.

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

CO1	Gain a higher level of personal involvement and interest in understanding and solving environmental problems.
CO2	Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities
CO3	Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century
CO4	Recognize the interconnectedness of human dependence on the earth's ecosystems
CO5	Influence their society in proper utilization of goods and services.
CO6	Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices.

ENGINEERING PHYSICS LABORATORY SYLLABUS

Learning Outcomes:

The students will be able to

- **handle** optical instruments like microscope and spectrometer
- **determine** thickness of a hair/paper with the concept of interference
- **estimate** the wavelength and resolving power of different colors using diffraction grating
- **demonstrate** the importance of dielectric material in storage of electric field energy in the capacitors
- **plot** the intensity of the magnetic field of circular coil carrying current with varying distance
- **evaluate** the acceptance angle of an optical fiber and numerical aperture
- **determine** magnetic susceptibility of the material and its losses by B-H curve
- **determine** the fill-factor of the given semiconductor using solar cell
- **identify** the type of semiconductor i.e., n-type or p-type using Hall effect
- **determine** the band gap of a given semiconductor

List of Physics Experiments

1. Determine the thickness of the fiber using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Dispersive power of a Prisam
5. Resolving power of a grating
6. Photo cell – I-V Characteristic curves and determination of stopping potential
7. Magnetic field along the axis of a circular coil carrying current.
8. To determine the self inductance of the coil (L) using Maxwells-wines bridge.
9. B-H Curve
10. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
11. Hall effect
12. Photo voltaic cell - Determination of fill-factor
13. To determine the energy gap of a semiconductor
14. Measurement of resistance with varying temperature
15. Determination of Acceleration due to gravity by using compound Pendulum

16. References:

1. S. Balasubramanian , M.N. Srinivasan " A Text book of Practical Physics"- S Chand Publishers, 2017

2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

Problem Solving & Programming Using C Lab (CSE152)

Cycle 1:

1. Construct flowcharts to
a. calculate the maximum, minimum and average of N numbers
b. develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
2. Construct flowcharts with separate procedures to
a. calculate simple and compound interest for various parameters specified by the user
b. calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user
3. Construct flowcharts with procedures to
a. generate first N numbers in the Fibonacci series
b. generate N Prime numbers
4. Design a flowchart to perform Linear search on list of N unsorted numbers(Iterative and recursive)
5. Design a flowchart to perform Binary search on list of N sorted numbers(Iterative and recursive)
6. Design a flowchart to determine the number of characters and lines in a text file specified by the user

Cycle 2:

1.Exercises on data types and operators?

a) Practice exercises 3.1 to 3.16 and 4.1 to 4.17 and 14.1 to 14.20 Test your C Skills - yaswanthkanitkar text book.

b) Write a program which determines the largest and the smallest number that can be stored in different data types of like short, int., long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?

c) Write a program to find greatest of three numbers using conditional operator?

d) Write a program to swap two numbers with and without temp variable?

e) Practice a program using multiple unary increment and decrement operators in arithmetic expressions?

2. Exercises on control structures?

a) Practice exercise 2.1 to 2.15 Test your C Skills - yaswanthkanitkar text book.

b)Write a program to find greatest of three numbers? Use nested if, if else if and switch statements?

c) Write a program to read marks of a student and print the sum and average?

d) Display the grade based on the sum of marks?

e) write a program to count the digits of a number? Use for loop

f) Write a program to check whether a number is perfect or not? Use do-while

g) Write a program to check whether a number is strong or not? Use while

h) Write a program to check whether a number is amstrong or not? Use for

i) Write a program to check whether a number is palindrome or not? Use for

j) Write a program to find the Fibonacci series upto the given number? Use while

k) Write a program to print the pascals triangle? Used do-while

l) Write a program to print the result of the series 1+x^2/2+x^3/3+….+x^n/n

3. Exercises on functions?

a) Practice exercise 5.1 to 5.14 Test your C skills -yaswanthkanitkar text book.

b) Write program to swap two variables using functions? Write a program to perform menu driven arithmetic operations using functions?

c) Write a program to find the factorial of a number using recursive and non- recursive functions?

d) Write a program to find the Fibonacci series using recursive functions?

e) Write a program to find the solution for towers of Hanoi using recursive function?

f) Write a program to pass parameters to a functions using call by value and call by reference?

4. Exercises on Arrays?

a) Practice exercise 9.1 to 9.17 Test your C skills - yaswanthkanitkar text book.

b) Write a program to read n numbers and sort them?

c) Write a program to find the minimum and maximum numbers of the array?

d) Write a program to read two matrices and find their sum, difference and product of them?

e)Find the transpose of a matrix?

f) Write a program to print upper and lower triangle of a given matrix?

5. Exercises on strings?

a) Practice exercise 10.1 to 10.15 yaswanthkanitkar text book.

b) Write a program to demonstrate the use of string manipulation functions?

c) Write a program to compare two strings?

d) Write a program to sort the names in Alphabetical order?

6. Exercises on pointers?

a) Practice exercise 7.1 to 8.26 yaswanthkanitkar text book.

b) Write a program to read dynamic array and sort the elements?

c) Write a program to read dynamic array and find the minimum and maximum of the elements?

d) Write a program to perform pointer arithmetic?

e) Write a program on pointers for strings?

f) Write a program to use array of pointers?

7. Exercises on structures?

a) Practice exercise 11.1 to 11.30 yaswanthkanitkar text book.

b) Write a program to create student structure and read marks of three subjects and find the sum and total of the student?

c) Write a program on arrays of structures for 60 students record using the above student structure?

d) Write a program for complex structure? Perform addition, subtraction and multiplication of two complex numbers?

e) Write a program for addition and multiplication of two polinomials?

8.Write a program on Files?

a) Practice exercise 12.1 to 12.20 yaswanthkanitkar text book.

b)write a program to append content of a file?

c)Write a program to display the content of a file?

d)Write a program to copy content of one file to other file?

e)Write a program to count the no of characters in a file?

f)Write a program to compare the contents of two files?

References:

1. Test your C Skills by – YaswanthKanithkar-BPB Publishers

2. C programming; Test your skills-A.N.Kamthane-Pearson India

Communicative English Lab -I

(Common to all branches)

Lectures: 3 Periods Sessional Marks: 40

University Exam: 3 hours University Examination Marks: 60

Learning Objectives

The C***ommunicative English Lab*** mainly focuses on to improve the Linguistic Listening, Communicative Competence and Presentation Skills of the learners. Activities in the English Communication Skills Lab will simulate actual discourses that students will engage in their interaction with their peers, teachers or strangers in their day-to-day situations.

Learning Outcomes

The students will be able to

- Identify the sounds of English and able to check the correct pronunciation of the words
- Able to listen carefully to communicate effectively in cross- cultural contexts
- Capable to make the students communicate in Daily life situations
- Capable to read for content/ main idea
- Able to communicate confidently in oral presentations
- Enhance vocabulary

List of Activities

1. Identifying phonic sounds, listening to the sounds, practice and record the sounds from the English learning software
2. Common mispronounced words
3. Listening to the short audios and complete the tasks based on the audios
4. Listening to motivational speeches and answering the questions
5. Comprehending Spoken material in British English & American English
6. Situational Dialogues
7. Role plays
8. Reading comprehension exercises for GRE, TOEFL, GATE etc
9. Reading articles from newspaper
10. Specific reading for enhancing vocabulary
11. Vocabulary building exercises
12. Extempore
13. JAM sessions
14. Small talks
15. Oral presentations

Rev on 09.02.19

Basic Engineering Workshop
(Common to all branches)

L	T	P	C
0	0	3	1.5

Course Objective:
To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

Wood Working:
Familiarity with different types of woods and tools used in wood working and make following joints

a. Half – Lap joint
b. Mortise and Tenon joint
c. Corner Dovetail joint or Bridle joint

Sheet Metal Working:
Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a. Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

Fitting:
Familiarity with different types of tools used in fitting and do the following fitting exercises

a. V-fit b) Dovetail fit c) Semi-circular fit
d) Bicycle tire puncture and change of two wheeler tyre

Electrical Wiring:
Familiarities with different types of basic electrical circuits and make the following connections

a. Parallel and series b) Two way switch c) Godown lighting d) Tube light
e) Three phase motor f) Soldering of wires

Course Outcomes:
After completion of this lab the student will be able to

1. apply wood working skills in real world applications. (L3)
2. build different parts with metal sheets in real world applications. (L3)
3. apply fitting operations in various applications. (L3)
4. apply different types of basic electric circuit connections. (L3)
5. demonstrate soldering and brazing. (L2)

Mathematics-II

(ODE, PDE and Multivariable Calculus)

(Common to all branches of Engineering except CSE)

L	T	P	C
3	0	0	3

Course Objectives:

1) To enlighten the learners in the concept of differential equations and multivariable calculus.
2) To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT I: Linear Differential Equations of Higher Order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

Learning Outcomes:

At the end of this unit, the student will be able to

- identify the essential characteristics of linear differential equations with constant coefficients (L3)
- solve the linear differential equations with constant coefficients by appropriate method (L3)

UNIT II: Equations Reducible to Linear Differential Equations and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- classify and interpret the solutions of linear differential equations (L3)
- formulate and solve the higher order differential equation by analyzing physical situations (L3)

UNIT III: Partial Differential Equations – First order **8 hrs**

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply a range of techniques to find solutions of standard PDEs (L3)
- outline the basic properties of standard PDEs (L2)

UNIT IV: Multivariable Calculus (Vector differentiation)

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply del to Scalar and vector point functions (L3)
- illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT V: Multivariable Calculus (Vector integration)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

Learning Outcomes:

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field (L4)
- evaluate the rates of fluid flow along and across curves (L4)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

References:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018

3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

Course Outcomes:

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

- solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- estimate the work done against a field, circulation and flux using vector calculus (L6)

ENGINEERING CHEMISTRY

Common to all branches

L	T	P	C
3	0	3	4.5

Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.
- **compare** the materials of construction for battery and electrochemical sensors (L2)
- **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

UNIT-I: WATER TECHNOLOGY

Various impurities of Water, WHO guidelines, Hardness unit sand determination by EDTA method, water treatment for drinking purpose-sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic embrittlement, boiler Corrosion, priming and foaming- causes and prevention, Internal conditioning -Phosphate, Calgon and Carbonate treatment, External conditioning-Lime Soda process (simple problems), softening by ion-Exchange process, Desalination of Brackish water by Electro dialysis and Reverse osmosis.

Learning outcomes:

The student will be able to

- **list** the differences between temporary and permanent hardness of water (L1)
- **explain** the principles of reverse osmosis and electrodialysis. (L2)
- **compare** quality of drinking water with BIS and WHO standards. (L2)
- **illustrate** problems associated with hard water - scale and sludge**.** (L2)
- **explain** the working principles of different Industrial water treatment processes (L2)

UNIT-II: POLYMER CHEMISTRY

Introduction to polymers, Functionality of monomers, chain growth and step growth polymerization, Co-polymerization (Stereo specific polymerization) with specific examples and mechanisms of polymer formation.

PLASTICS: Thermoplastics and Thermosetting, preparation, properties and applications of Bakelite, Elastomers, Preparation, properties and applications of BUNA-S and BUNA-N Rubbers.

Conducting Polymers- Introduction, examples, general applications and mechanism of Conduction on Polyacetylene.

Chemistry of Nano materials: Introduction to nano chemistry, preparation of nano materials - carbon nanotubes and fullerenes and their engineering applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** different types of polymers and their applications (L2)
- **demonstrate** the mechanism of conduction in conducting polymers (L2)
- **explain** the preparation, properties and applications of Bakelite, Nylon-66, and carbon fibres (L2)
- **describe** the mechanism of conduction in conducting polymers (L2)
- **discuss** Buna-S and Buna-N elastomers and their applications (L2)
- **discuss** types and preparation of Nano materials and Fullerenes(L3)

UNIT-III: ELECTRO CHEMISTRY AND APPLICATIONS

Electrodes-concepts, types of cells, electro chemical series, Nernst equation.

BATTERIES: Primary cell (Dry cell), Secondary cell (Lead-acid), Lithium batteries and their advantages, Fuel cell (H_2-O_2 cell).

Corrosion:

Types of corrosions- chemical corrosion, dry corrosion, electro chemical corrosion and wet corrosion, galvanic series, pitting and differential aeration of corrosion, factors affecting corrosion.

Corrosion control: Cathodic protection, Corrosion Inhibitors, Electro plating (Au) & (Ni).

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Nernst equation for calculating electrode and cell potentials (L3)
- **differentiate** between pH metry, potentiometric and conductometric titrations (L2)
- **explain** the theory of construction of battery and fuel cells (L2)
- **explain** the types of corrosion, factors affecting corrosion(L2)
- **explain** protection methods of corrosion and corrosion inhibitors(L2)

UNIT-IV: INSTRUMENTAL METHODS

Electromagnetic spectrum-Absorption of Radiation: Beer-Lambert's law-Principle and applications of Ultra-Violet, Infra-Red and Nuclear Magnetic Resonance Spectroscopy. Principle and applications of Gas Chromatography and HPLC Techniques.

Learning outcomes:

After completion of Module IV, students will be able to

- **explain** the different types of spectral series in electromagnetic spectrum (L2)
- **understand** the principles of different analytical instruments (L2)
- **explain** the different applications of analytical instruments (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

UNIT-V: (i) Cement and Concrete Chemistry

Introduction to Building Materials, Portland Cement, Constituents, Manufacturing Process, Setting and Hardening Cement.

(ii) Organic reactions and synthesis of a drug molecule:

Introduction to reactions involving substitution (SN_1 and SN_2), elimination reactions (E_1 and E_2), Synthesis of commonly used drug molecule – Aspirin and Paracetmol.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** the manufacturing of portland cement (L2)
- **demonstrate** the scheme of concrete formation (L2)
- **identify** the constituents of portland cement (L2)
- **enumerate** the reactions at different temperatures in the manufacture of cement (L2)
- **explain** substitution and elimination reactions(L2)
- **explain** the synthesis of aspirin and paracetmol drug molecules(L2)

Prescribed Text Books

1. Engineering Chemistry, P.C. Jain and M. Jain - Dhanapathi Rai & Sons, Delhi
2. A text book of Engineering Chemistry, S.S. Dara - S. Chand & Co. New Delhi
3. Engineering Chemistry, B.K. Sharma - Krishna Prakashan, Meerut
4. Shashi chawla,A text book of engineering chemistry,3rd Edition,Dhanpat rai & co new delhi,2007.

5. Gurudeep raj & chatwal anand , “Instrumental methods of analysis “, 7th edition,CBS publications,1986.
6. Quantitative analysis by day&underwood.
7. A Text book of Instrumental methods by Skoog and West.
8. H.W. Wilard and demerit, “Instrumental methods of analysis “, 7th edition,CBS publications,1986.
9. Text book of Nano Science and Nano technology, B.S. Murthy and P. Shankar, University press.

Course Outcomes:

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

- **demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
- **explain** the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers. (L2)
- **explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)
- **explain** the manufacturing of portland cement **and** concrete formation (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)

Essential Electrical & Electronic Engineering

Common to all branches **L-T-P-C**
3-1-3-5.5

Course Objectives:
1. To introduce basics of electric circuits.
2. To teach DC and AC electrical circuit analysis.
3. To explain working principles of transformers and electrical machines.
4. To impart knowledge on Basic Electronic Components.

UNIT – I: DC & AC Circuits
Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Nodal and loop analysis. Thevenin's and Superposition Theorems Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits. Series Resonance and band width.

Learning Outcomes:
The students will be able to

- **explain** properties and behaviour of Electric circuit elements (R, L and C) in DC and AC circuits.
- **analyze** various circuits using Kirchhoff laws, Nodal and loop analysis & Theorems.
- Make use of basic principles involved in electrical engineering concepts.
- Analysis of single phase ac circuits.

.**UNIT-II: Poly phase & Magnetic circuits**
Generation of 3-phase voltages - phase sequence - star & delta connections - voltage, current & power in star & delta connected systems - analysis of 3-phase balanced circuits - measurement of 3-phase power by 2 wattmeter method.
Faraday's Laws of Electromagnetic Induction .Dynamically induced EMF –Statically induced EMF – Self Inductance – Mutual Inductance - Coefficient of coupling –Inductances in Series – Inductances in parallel – Dot convention.

Learning Outcomes:
The students will be able to

- Analysis of Poly Phase AC Circuits, the representation of alternating quantities and determining the power in these circuits.
- Faraday's laws.

UNIT-III: DC Machines
Principle and operation of DC Generator - EMF equation - OCC characteristics of DC generator – Principle and operation of DC Motor – Performance Characteristics of DC Motors - Speed control of DC Motors.

Learning Outcomes:
The students will be able to

- Know the principles and basics of DC machines used in industries.
- Analyze the performance of DC Machines.
- Summarize the different applications of commonly used electric machinery.

UNIT-IV: AC Machines:
Principle and operation of Single Phase Transformer - EMF equations-losses in transformers, regulation and efficiency. OC and SC test on transformer – auto transformer.
Principle, operation and construction of Three phase Induction Motor –torque equation and torque slip characteristics-power losses and efficiency.

Learning Outcomes:
The students will be able to

- Know the principles and basics of AC machines used in industries.
- Analyze the performance of AC Machines.
- Summarize the different applications of commonly used electric machinery.

UNIT-V: Semiconductor Devices:
Characteristics of Semiconductor junction Diode, Zener diode, transistor, JFET, UJT, SCR and their applications. Half-wave, Full-wave rectifiers and Bridge rectifier, with (L and LC) and without filters.
Bipolar Junction Transistor: Transistor operation, Common base configuration, Common emitterconfiguration, Transistor amplifying action, Common collector configuration, Operating point

Learning Outcomes:
The students will be able to

- . To acquire the knowledge about the characteristics and working principles of semiconductor diodes, Bipolar Junction Transistor.
- To study the Characteristics of basic electronic devices like P-N junction diode, zener diode & transistor in various configurations.

Text Books:
1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

References:
1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

LABORATORY SYLLABUS

Learning Outcomes:

The students will be able to

1. Verify Kirchoff's Laws, Superposition theorem & Thevenin's Theorem for dc excitation
2. Analyze the performance of AC and DC Machines by testing.
3. Study Characteristics of P-N junction and zener diode, transistor
4. Perform speed control of dc shunt motor

List of experiments: -

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Verification of Kirchhoff laws.
3. Verification of Superposition Theorem.
4. Verification of Thevenin's Theorems
5. Open circuit characteristics of a DC Shunt Generator.
6. Speed control of DC Shunt Motor.
7. Brake test on DC Shunt Motor.

8. OC & SC test of 1 – Phase Transformer.
9. Brake test on 3 - Phase Induction Motor.
10. Characteristics of PN junction and zener diode
11. Characteristics of transistor in common emitter configuration
12. Verification of transistor self bias circuit

Python programming (CS125)

L	T	P	C
2	1	3	4.5

Course Objectives:

- To understand software development life cycle
- To learn the basics of Python Programming
- Apply a solution clearly and accurately in a program using Python.
- Apply the best features of mathematics, engineering and natural sciences to program real life problems.

Unit 1:

Context of software development: Software, Development tools, Learning programming with Python, Writing a python program.

Values and Variables: Variables and assignments, identifier, Control codes within Strings, User Input, The eval function, the print function.

Expressions and Arithmetic: Expressions, Operator precedence and Associativity, Comments, Errors, More arithmetic operators.

Learning Outcomes: The students will be able to

- Learn how to design and program Python applications.
- Learn how to write loops and decision statements in Python.
- Acquire programming skills in core Python.

Unit 2:

Conditional Execution: Boolean Expressions, Simple if and if else,nested conditionals, multiway decision statements, conditional expressions, errors in conditional statements.

Iteration: While statements, for statement, definite loops and indefinite loops, nested loops, abnormal loop termination, infinite loops, iteration examples: computing square root, drawing a tree, printing prime numbers.

Learning Outcomes: The students will be able to

- Develop write functions and pass arguments in Python.
- Exercise custom and standard functions of Python programming

Unit 3:

Functions: Introduction, standard mathematical functions, time functions, Random numbers, main function, parameter passing, Function examples: Better organized prime number,

Command Interpreter, Restricted Input, Better Die rolling simulator, Tree-Drawing Function, Floating –Point equality, Custom functions Vs Standard functions.

More on Functions: Global variables, Default Parameters, recursion, Making functions reusable, documenting functions and modules, functions as data.

Learning Outcomes: The students will be able to

- Exercise usage of Lists in Python programming
- To learn processing of Lists in Python programming

Unit 4:

Lists: Using Lists, List assignment and equivalence, list bounds, Slicing, Lists and functions, Prime generation with a list

Lists processing: Sorting, flexible sorting, search, list permutations, randomly permuting a list, reversing a list.

Learning Outcomes: The students will be able to

- Develop programs on Lists in Python programming
- Develop programs on processing Lists using Python

Unit 5:

Objects: Using Objects, String Objects, List Objects.

Custom types: geometric points, Methods, Custom type examples, Class inheritance.

Handling Exceptions: Motivation, Exception examples, Using Exceptions, Custom Exceptions.

Learning Outcomes: The students will be able to

- Understand String and List Objects
- Exercise on exception handling in Python applications

Text books:

1. LEARNING TO PROGRAM WITH PYTHON Richard L. Halterman
2. Core Python Programming by Dr. R.Nageswara Rao, dreamtech, second edition

Python Programming Lab (CSE163)

1. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
2. Design a Python script to determine if a given string is a Palindrome using recursion
3. Design a Python script to sort numbers specified in a text file using lists.
4. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.
5. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
6. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)
7. Design a Python Script to find the value of (Sine, Cosine, Log, PI, *e*) of a given number using infinite series of the function.
8. Design a Python Script to convert a given number to words
9. Design a Python Script to convert a given number to roman number.
10. Design a Python Script to generate the frequency count of words in a text file.
11. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
12. Design a Python Script to implement Gaussian Elimination method.
13. Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.
14. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.
15. Design a Python script to search an element in the given list.
16. Design a Python script on *str* methods and *list* methods.

Constitution of India

L-T-P-C
3-0-0-0

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission of india.
- To understand the central and state relation financial and administrative.

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

LEARNING OUTCOMES:

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

LEARNING OUTCOMES:- After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

LEARNING OUTCOMES:- After completion of this unit student will

- Understand the structure of state government

- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secrateriate

UNIT-IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

LEARNING OUTCOMES:- After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zilla panchayat block level organisation

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

LEARNING OUTCOMES:- After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissiononerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8

2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

Course Outcomes: At the end of the semester/course, the student will be able to have a clear knowledge on the following:

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government.
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and its administration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on roles and functioning of Election Commission

Electronics and Communications Engineering Workshop

` L-T-P-C
0-0-3-1.5

WORKSHOP – II (ECE)

Course Objectives:

- To introduce electronic components, measuring instruments and tools used in electronic workshop.
- To equip with the knowledge of understanding data sheets of electronic components
- To give practical experience on soldering the electronic components on a PCB
- To introduce EDA tools
- To know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide training on Productivity tools like word processors, spreadsheets, presentations
- To provide knowledge in understanding working of various communication systems

List of Exercises / Experiments

1. Familiarization of commonly used Electronic Workshop Tools : Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
    - Provide some exercises so that electronics hardware tools and instruments are learned to be used by the students

2. Familiarization of Electronic Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
    - Provide some exercises so that electronic measuring instruments are learned to be used by the students

3. Electronic Components: Familiarization/Identification of electronic components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, color coding, package, symbol, cost etc.

4. Testing of electronic components like Resistor, Capacitor, Diode, Transistor, ICs etc.
    - Compare values of components like resistors, inductors, capacitors etc with the measured values by using electronic instruments

5. Study of Cathode Ray Oscilloscope (CRO)
    - Find the Amplitude and Frequency of a signal
    - Measure the Unknown Frequency & Phase difference of signals using Lissajous figures

6. Interpret data sheets of discrete components and IC's.
    - Write important specifications/ratings of components & ICs and submit it in the form of a report

7. Introduction to EDA Tools: MULTISIM/PSPICE/TINA schematic capture tool, Learning of basic functions of creating a new project, getting and placing parts, connecting placed parts, simulating the schematic, plotting and analyzing the results.
    - Provide some exercises so that students are familiarized in using EDA tools

8. Assembling and Testing of simple electronic circuits on breadboards; identifying the components and its location on the PCB, soldering of the components, testing the assembled circuit for correct functionality.

9. Familiarization with Computer Hardware & Operating System:
   - Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.
   - Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.
   - Install Operating system on the computer. Students should record the entire installation process.

10. Familiarization with Office Tools
   - Word Processor: Able to create documents using the word processor tool. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied.
   - Spreadsheet: Able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells.
   - Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper-linking, running the slide show, setting the timing for slide show.

11. Familiarization of PA system with different microphones, loud speakers, mixer etc. Represent the same in the form of diagrams, write specifications and submit it in the form of a report.

12. Understand working of various Communication Systems like Television, Satellite Transmitter & Receiver, Radio Receiver, Mobile Phone. Prepare demo boards/charts of various communication systems.

Course Outcomes:

- Identify discrete components and ICs (L3)
- Assemble simple electronic circuits over a PCB (L3)
- Testing of various components (L4)
- Interpret specifications (ratings) of the component (L5)
- Demonstrate disassembling and assembling a Personal Computer and make the computer ready to use (L2)
- Make use of Office tools for preparing documents, spreadsheets and presentations (L3)
- Demonstrate working of various communication systems (L2)

Text Books:

1. Gerd Keiser, "Optical fiber Communication", McGraw-Hill International, Singapore, 3rd ed., 2000.

References:

1. J. M. Senior, "Optical Communication, Principles and Practice ", Prentice hall of India, 1994.
2. Joseph Palais, "Fiber Optic Communication", Pearson edition, 2008
3. M. N. Bandyopadhyay, "Optical Communication and Networks", PHI edition.

Course Outcomes:

- Compute number of possible modes that a fiber can support (L3)
- Analyze various losses and quantify (L4)
- Compare performance of optical LEDs and Semiconductor LASERs in terms of efficiency (L5)
- Assess noise performance of optical detectors (L5)
- Employ suitable optical fibers for specific applications (L3)

ACHARYA NAGARJUNA UNIVERSITY
SCHEME OF INSTRUCTION AND EXAMINATION, w.e.f. 2019-2022
ELECTRONICS & COMMUNICATION ENGINEERING BRANCH
II/IV B.TECH -SEMESTER I

II/IV B.TECH -SEMESTER I

S.No.	Course Details		Category	Scheme of Instruction			Scheme of Examination		
	Code	Subject Name		Hours in a Week			Marks		Credits
				L	T	P	Internal	External	
1	EC 211	Electronic Devices	PC	3	0	0	40	60	3
2	EC 212	Digital Logic Design	PC	3	0	0	40	60	3
3	EC 213	Signals & Systems	PC	3	0	0	40	60	3
4	EC 214	Network Theory	PC	3	0	0	40	60	3
5	EC 215	Mathematics-III	BS	3	0	0	40	60	3
6	EC 216	Essence of Indian Traditional Knowledge	MC	2	0	0	100	0	0
7	EC 251	Electronics Devices Lab	PC	0	0	3	40	60	1.5
8	EC 252	Digital Logic Design Lab	PC	0	0	3	40	60	1.5
9	EC 253	Signals & Systems Lab	PC	0	0	3	40	60	1.5
10	EC 254	MATLAB	Skill Oriented Course	0	0	3	40	60	2
Total Credits									21.5

EC211 **ELECTRONIC DEVICES** **L T P M C**

3 0 0 100 3

UNIT I

THE PN JUNCTION DIODE: Basic Structure of the PN Junction, Biasing of PN Junction Diode, V-I characteristics of PN junction diode, Diode Current Equation, Effect of temperature on PN junction diodes, Static and Dynamic Resistances, Break Down of PN Junction Diode, Diffusion Capacitance, Transition Capacitance of The Diode, Diode Switching times, Piecewise Linear Diode Model.

UNIT II

BIPOLAR JUNCTION TRANSISTOR (BJT): Transistor Construction, Operation, Specification Sheet, Transistor Testing, Transistor Casing and Terminal Identification, Transistor Biasing, Operation of NPN and PNP transistor, Transistor as an Amplifier, Transistor configurations and their characteristics, Ebers Moll Model.

UNIT III

TRANSISTOR BIASING AND STABILIZATION: Need for Biasing, Operating Point, Load lines and Quiescent Point, Fixed Bias Circuit, Self Bias Circuit, Voltage Divider Bias Circuit, Collector to Base Bias Circuit Emitter Stabilized Bias Circuit, Bias Compensation using Diodes and Transistors Stabilization Factors, Stabilization against variations in VBE and β, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability, .

UNIT IV

JFET BIASING: Biasing Circuits for FET: Fixed Bias Circuit, Voltage Divider Bias Circuit, Self Bias Circuit, Graphical Solution for Self Bias.

MOSFET: Depletion MOSFET, Enhancement MOSFET, Comparison of BJT, JFET and MOSFET, Comparison of DMOSFET and EMOSFET, Biasing of MOSFET.

UNIT V

SINGLE STAGE AMPLIFIERS: Small Signal Low Frequency Amplifier Circuits: CE, CB, CC Amplifier Circuits, Small Signal Analysis of Junction Transistor: Analysis of CE, CB, CC using Hybrid Model, Analysis of CE Amplifier with Collector to Base Bias, Millers Theorem, Analysis of CE Amplifier with Emitter Resistance: Exact and Approximate Analysis.

TEXT BOOKS:

1. Jacob Millman, Christos C. Halkias, and Satyabrata Jit "Electronic devices and Circuits", 2nd Edition TMH, 1998.
2. Donald A. Neamen, "Semiconductor Physics and Devices", 3rd edition, TMH,2003
3. Robert L.Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory, Tenth Edition, PEARSON Publications.

REFERENCE BOOKS:

4.S.Salivahanan, N.Suresh Kumar and A.Vallavaraju, "Electronic Devices and Circuits" 2nd Edition, 2008, TMH.
5. U.A.Bakshi and A.P.Godse "Electronic Devices and Circuits" 1st Edition, 2014, Technical Publications.

EC212	**DIGITAL LOGIC DESIGN**	**L**	**T**	**P**	**M**	**C**
		3	**0**	**0**	**100**	**3**

UNIT-I

NUMBER SYSTEMS AND CODES: Decimal, Binary, Hexadecimal Number Systems and their Conversions Arithmetic Additions Subtraction using the method of Complements, Multiplication and Division Codes: BCD, Excess-3, Gray and Alphanumeric Codes
BOOLEAN ALGEBRA: Boolean Expressions and Theorems, Logic Gates, Universal Gates, Canonical and Standard forms, Boolean functions, Simplification of Boolean functions using K maps, Minimal Functions and their properties, Tabulation Method NAND and NOR Implementations Two Level and Multi Level

UNIT-II

COMBINATIONAL LOGIC CIRCUITS: EX-OR EX-NOR Circuits, General procedure **for combinational logic circuits, design and application of binary** Adders and Subtractors, Comparators, Encoders, Decoders Multiplexers and Demultiplexers, Design of BCD to 7 Segment Decoder, Parity Generator and Checker, BCD Adder/Subtractor, Carry Look Ahead Adders

UNIT-III

SEQUENTIAL LOGIC CIRCUITS: **Latches, characteristic table, characteristic**

Equation, Excitation Table, State table and State Diagrams for SR, JK, Master Slave JK, D and T flip-flops, Conversion from one type of Flip-Flop to another, shift registers, Analysis and Synthesis of Sequential Circuits, Sequence Generator, Sequence detector, Parity Generator
COUNTERS USING FLIP-FLOPS: Design of Ripple Counters, **Synchronous** Counter Up/Down Counters using Flip-Flops.

UNIT-IV

SYNCHRONOUS SEQUENTIAL CIRCUITS: Basic Design Steps, Sate Assignment Problem, Mealy State Model, Serial Adder Example, State Minimization, Design of a Counter using the Sequential Circuit Approach, FSM as an Arbiter Circuit, Analysis of Synchronous Sequential Circuits, ASM Charts, Formal Model for Sequential Circuits.

UNIT V
IC LOGIC FAMILIES: RTL, DTL, TTL, ECL and IIL families and their comparison

TEXT BOOKS:
1. M Morris Mano and Micael D. Ciletti, Digital Design, Pearson Education, 2008
2. Digital Principles and Design, Donald D. Givone,TMH,20Cb

REFERENCE BOOKS
1. Thomas L. Floyd, Digital Fundamentals 7th Edition, Pearson
2. Charles H. Roth jr., Fundamentals of logic Design, Jaico publications, 1992
3. Taub and Schilling, Digital Integrated Electronics.

EC213	**Signals & Systems**	**L T P M C**
		3 0 0 100 3

UNIT -1
SIGNAL ANALYSIS: Introduction to signals and systems, classification of signals and systems (both discrete and continuous), approximation of a function by a set of mutually orthogonal functions, evaluation of mean square error, orthogonality in complex functions, trigonometric and exponential Fourier series.

UNIT - II

FOURIER TRANSFORM
Representation of an arbitrary function over the entire interval: Fourier transform,Fourier transform of some useful functions, Singularity functions, Fourier transform of periodic function, some properties of Fourier transform, Energy density spectrum.
SIGNAL TRANSMISSION THROUGH LINEAR NETWORKS: Linear time- invariant system, Time response, Convolution and it's graphical interpretation, Causality and stability,

Paley-Wiener criterion, Frequency response, Filter characteristics of linear systems, Conditions for distortionless transmission, Relation between bandwidth and rise time.

UNIT - III

SPECTRAL DENSITY AND CORRELATION: Energy and power spectral density, Properties, Auto-correlation and Cross-correlation functions, Properties of correlation function, Parseval's theorem.

SAMPLING THEOREM AND ITS IMPLICATIONS RECONSTRUCTION : ideal interpolator, Zero-order hold, First order hold, Aliasing and its effects.

UNIT-IV

LAPLACE TRANSFORM: The Laplace transform, Region of Convergence, the inverse Laplace transform, Properties of Laplace transform, problems.

UNIT -V

Z-transform : Z-transform, Region of Convergence, Properties of Z-transform, Inverse Z-transform

TEXT BOOKS:

1. B P Lathi, Signals, Systems and Communications, BSP, 2003
2. P.Z Peebles, Jr, Probability, random variables and random signal principles, TMH.
3. Simon Haykin, Signals and Systems, John Wiley, 2004

REFERENCE BOOKS:

1. A V Oppenheim, A S Wilsky and IT Young, Signals and Systems, PHI/ Pearson,2003
2. David K Cheng, Analysis of Linear Systems, Narosa Publishers, 1990.

EC214	**Network Theory**	**L**	**T**	**P**	**M**	**C**
		3	**0**	**0**	**100**	**3**

UNIT – I

Review of R,L,C and M(Mutual Inductance) and their V-I characteristics-dot rule-Energy Sources, Ideal, Practical and dependent sources and their V-I characteristics, Source transformation, Voltage and Current division; V-I characteristics of Passive elements and their series / parallel combination; Star Delta transformation

Graph Theory: Introduction to Graph Theory, Tree, Branch, Link, Cutset and loop matrices, relationship among various matrices and parameters, Mesh and Nodal Analysis for DC circuits. Formulation of mesh & nodal equations involving are R,L,C and M.

UNIT – II

Review of sinusoidal analysis: Phase relation in pure resistor, Inductor and capacitor; Impedance diagram, phasor diagram, series and parallel circuits, compound circuits. Computation of active, reactive and complex powers; power factor.
First order R-L, R-C circuits, Initial conditions in RLC elements- initial conditions for complicated network-time constant-second order circuits (RLC series and parallel circuits).

UNIT – III
Laplace Transforms:
Laplace Transforms of typical signals, periodic functions, Inverse transforms, Initial and final value theorems, Application of Laplace transforms in circuit analysis.
Transformed Network Analysis: Response of RL, RC, RLC circuits for impulse and pulse excitations using Laplace Transform method.
Definition of operational/ transformed impedances and admittances of L, C and transformer with initial conditions; development of transformed networks incorporating initial conditions as sources and solution of transformed networks.

UNIT – IV
Network Theorems: Superposition theorem, Thevenin's and Norton's theorems, Reciprocity, Compensation, Maximum power transfer theorems, Tellegan's and Millman's theorems, Application of theorems to DC circuits. Sinusoidal steady state Mesh and Node Analysis. Application of network theorems to AC circuits.

UNIT V
Resonance: Series resonance, Impedance and phase angle, voltages and currents, bandwidth and Q factor and its effect on bandwidth, magnification, parallel resonance, resonant frequency, variation of impedance with frequency , Q factor, magnification, reactance curves in parallel resonance. Frequency response of RL, RC circuits.

TEXT BOOKS:

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, 6th Edition,TMH, 2002.
2. M.E.Vanvalkenburg, Network Analysis, 3rd Edition, PHI, 2003.
3. A Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 4th Ed, TMH,2010

REFERENCE BOOKS:

1. Franklin F.Kuo, Network Analysis and Synthesis, 2nd Edition, John Wiley & Sons, 2003.
2. Mahmood Nahvi and Joseph Edminister, Electric Circuits, 4th Edition, Schaum's outline series, TMH, 2004.

		L	T	P	M	C
EC215	**Mathematics - III**	**3**	**0**	**0**	**100**	**3**

UNIT – I: Fourier Series: Introduction and Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Even and Odd functions, Half range series, Typical wave forms and Parseval's formulae, Complex form of the Fourier series.

UNIT – II Integral Transforms: Introduction- Definition – Fourier integrals – Fourier integral theorem (without proof)-Fourier sine and cosine integrals – complex form of Fourier integral - Fourier Transforms - Properties of Fourier Transforms - Finite Fourier sine and cosine transforms - Convolution theorem (without proof), Parseval's Identity for Fourier Transforms(without proof)

UNIT-III Numerical Solutions of Equations:Introduction - Solution of Algebraic and Transcendental Equations - Bisection method-Newton- Raphson Method - Solutions of linear Simultaneous Linear Equations: iterative Methods - Gauss-Seidel Method

UNIT-IV Finite Differences and Interpolation:Finite Differences – Differences of a polynomial – factorial notation – relations between operators – Newton's Interpolation formulae – central difference interpolation formulae - Gauss interpolation formulae – stirlings formula - interpolation with unequal intervals – Lagranges interpolation – inverse interpolation

UNIT-V Numerical Differentiation and Integration: Numerical Differentiation – Formulae for derivatives. Numerical Integration: Trapezoidal rule - Simpson's one-third rule - Simpson's three-eighth.Numerical Solution of Ordinary Differential Equations: Introduction – Picard's Method-Euler's Method - Runge- Kutta Method of fourth order.

Numerical Solution of Partial Differential Equations: Introduction - Classification of second order equations.

Unit

TEXT BOOK: 1. B.S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers,

REFERENCE BOOKS:

2. N.P. Bali, A textbook of Engineering Mathematics, Laxmi publications

3. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Edition, New Age International (P) Ltd

4. N.P. Bali, Satyanarayana Bhavanari and Indrani Kelker Engineering Mathematics– I BY Laxmi publications, New Delhi.

EC 216 Essence of Indian Traditional Knowledge L T P M C

2 0 0 100 0

Course Objectives:
The course will introduce the students to:
1. To get a knowledge in Indian Culture
2. To know Indian languages, literature and the fine arts in India.
3. To explore the science and scientists of Medieval and Modern India.

UNIT I:
Introduction to Culture: Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India.

UNIT II:
Indian Languages, culture and Literature: The role of Sanskrit, Significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of South India.

UNIT III:
Religion and Philosophy: Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious reform movements in Modern India(selected movements only).

UNIT IV:
Fine Arts in India: (Arts, Technology & Engineering): Indian painting, Indian handicrafts, music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (Ancient, Medieval and Modern), Science and Technology in India, development of science in ancient, medieval and modern India.

UNIT V:
Education system in India: Education in Ancient, Medieval and Modern India, aims of Education, subjects, languages, science and scientists of Ancient India, Medieval and Modern India.

Reference Books:
1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375, 2005
2. "Science and Samskrit", SamskritaBhartiPublisher, ISBN 13:978-8187276333, 2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre", ISBN: 81-7450 494- X, 200

Course Outcomes:
After successful completion of the course the students will be able to
1. Understand philosophy of Indian culture.
2. Distinguish the Indian languages and literature.
3. Learn the philosophy of ancient, medieval and modern India.
4. Acquire the information about the fine arts in India.
5. Know the contribution of scientists in different eras.

EC251 ELECTRONIC DEVICES AND CIRCUITS LAB

L	T	P	M	C
0	0	3	100	1.5

1. Study of C.R.O
2. Characteristics of Silicon and Germanium diodes
3. Characteristics of Zener diode and regulator
4. Characteristics of Common Base configuration
5. Characteristics of Common Emitter configuration
6. Characteristics of Emitter follower circuit
7. Drain and Transfer Characteristics of JFET
8. Drain and Transfer Characteristics of Depletion MOSFET
9. Drain and Transfer Characteristics of Enhancement MOSFET
10. Design and verification of Self bias circuit
11. Characteristics of LDR and Thermistor
12. Characteristics of source follower circuit
13. Characteristics of Photo transistor
14. Design and verification of collector to base bias circuit
15. Design and verification of Current Source Bias Circuit

EC252 DIGITAL LOGIC DESIGN LAB

L	T	P	M	C
0	0	3	100	1.5

1. Realization of Gates using Discrete Components.
2. Realization of Gates using Universal Building Block (NAND only).
3. Design of Combinational Logic Circuits like Half-adder, Full-adder, Half-

Subtractor and Full- Subtractor

4. Verification of 4-bit Magnitude Comparator.

5. Design of Decoders like BCD-Decimal decoder.

6. Applications of IC Parallel Adder (1's & 2's compliment addition).

7. Design of Code Converters (Binary to Gray).

8. Design of Multiplexers/De-Multiplexers.

9. Verification of Truth-Table of Flip-Flops using Gates.

10. Design of Shift registers (To Verify Serial to parallel, parallel to Serial, Serial to Serial and parallel to parallel Converters) using Flip-Flops.

11. Design of ring& Johnson counters using flip-flops.

12. Conversion of flip-flops (JK-T, JK-D).

13. Design of binary/decade counter

14. Design of Asynchronous counter, mod counter, up counter, down counter & up/down counter.

15. Design of synchronous counter, mod counter, up counter, down counter& up/down counter

EC-253 SIGNALS AND SYSTEMS LAB L T P M C

0 0 3 100 1.5

1. Write a program to generate the discrete sequences (i) unit step (ii) unit impulse (iii) ramp (iv) periodic sinusoidal sequences. Plot all the sequences.

2. . Find the Fourier transform of a square pulse .Plot its amplitude and phase spectrum.
3. Write a program to convolve two discrete time sequences. Plot all the sequences. Verify the result by analytical calculation.
4. Write a program to find the trigonometric Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings.
5. Write a program to find the trigonometric and exponential fourier series coefficients of a periodic rectangular signal. Plot the discrete spectrum of the signal.
6. Generate a discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
7. The signal x(t) is defined as below. The signal is sampled at a sampling rate of 1000 samples per second. Find the power content and power spectral density for this signal. $X(t) = \cos (2\pi * 47t)+ \cos(2\pi* 219t)$, $0 < t < 10$ $X(t) = 0$, otherwise
8. Write a program to find the magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
9. Write a program to find the response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
10. Write a program to find the autocorrelation and cross correlation of sequences.
11. Generate a uniformly distributed length 1000 random sequence in the range (0,1). Plot the histogram and the probability function for the sequence. Compute the mean and variance of the random signal.
12. Generate a Gaussian distributed length 1000 random sequence . Compute the mean and variance of the random signal by a suitable method.

13. Write a program to generate a random sinusoidal signal and plot four possible realizations of the random signal.
14. Generate a discrete time sequence of N=1000 i.i.d uniformly distributed random numbers in the interval (-0.5,-0.5) and compute the autocorrelation of the sequence.
15. Obtain and plot the power spectrum of the output process when a white random process is passed through a filter with specific impulse response .

Text Book: Contemporary Communication Systems using MATLAB by John G.Proakis, M.Salehi, Cengage Learning Publisher.

EC254	IT Workshop (MATLAB)

1. Write a MATLAB program to find greatest of three numbers? Use nested if, else if ladder
2. Write a MATLAB program to read marks of a student and print the sum, average and display the grade?
3. Write a MATLAB program to count the digits of a number? Use for loop
4. Write a MATLAB program to check whether a number is perfect or not? Use do-while
5. Write a MATLAB program to check whether a number is strong or not? Use while
6. Write a MATLAB program to check whether a number is armstrong or not? Use for
7. Write a MATLAB program to check whether a number is palindrome or not? Use for
8. Write a MATLAB program to find the Fibonacci series upto the given number? Use while
9. Write a MATLAB program to print the result of the series 1+x^2/2+x^3/3+….+x^n/n
10. Write a MATLAB program to perform menu driven arithmetic operations using functions?
11. Write a MATLAB program to find the factorial of a number using recursive and non- recursive functions?
12. Write a MATLAB program to find the Fibonacci series using recursive functions?
13. Write a MATLAB program to find the solution for towers of Hanoi using recursive function?
14. Write a MATLAB program to read an array and sort the elements in an array?
15. Write a MATLAB program to find the minimum and maximum numbers of the array?

16. Write a MATLAB program to read two matrices and find their sum, difference and product?

17. Write a MATLAB program to find the transpose of a matrix?

18. Write a MATLAB program to print upper and lower triangle of a given matrix?

19. Write a MATLAB program to read a file and write data into file?

20. Write a GUI MATLAB program to create student application form?

21. Write a MATLAB program on creating simple plots?

22. Write a MATLAB program to read an image, perform different operations on image and display the resulting images?

ACHARYA NAGARJUNA UNIVERSITY
SCHEME OF INSTRUCTION AND EXAMINATION, w.e.f. 2019-2022
ELECTRONICS & COMMUNICATION ENGINEERING BRANCH
II/IV B.TECH -SEMESTER II

II/IV B.TECH -SEMESTER II

S.No.	Course Details		Category	Scheme of Instruction			Scheme of Examination		
	Code	Subject Name		Hours in a Week			Marks		Credits
				L	T	P	Internal	External	
1	EC 221	Electromagnetic Field Theory	PC	3	0	0	40	60	3
2	EC 222	Analog Circuits	PC	3	0	0	40	60	3
3	EC 223	Probability theory and Stochastic Process	PC	3	0	0	40	60	3
4	EC 224	Microprocessor & Microcontrollers	PC	3	0	0	40	60	3
5	EC 225	Object Oriented Programming through JAVA	ES	3	0	0	40	60	3
6	EC261	Analog Circuits Lab	PC	0	0	3	40	60	1.5
7	EC262	Microprocessor & Microcontrollers Lab	PC	0	0	3	40	60	1.5
8	EC263	Communicative English Lab-II	PC	0	0	3	40	60	1.5
9	EC264	Java Programming	SKILL	0	0	3	40	60	2
Total Credits									21.5

EC 221 ELECTROMAGNETIC FIELD THEORY L T P M C
3 0 0 100 3

Course Objectives:
The objectives of this course:
1.To understand the use of electromagnetic fields in the wireless communication.
2.Toanalyze the characteristics of Maxwell's equation in Electric and Magnetic field.

Course Outcomes:
On successful completion of this course, the student will be able to
1. Analyse the relation between electric and magnetic fields using vector analysis.
2. Evaluate the Maxwell's Equation in Static Electric and Magnetic Field.
3. Apply Maxwell's equations in Electromagnetic fields.
4. Characterize Maxwell's equation in both static and Time varying fields.
5. Understand the propagation of electromagnetic waves in different media.

UNIT – I

Electrostatics-I: Coulomb's Law, Electric Field Intensity - Electric Fields due to Continuous Charge Distributions – Line Charge, Surface Charge, Volume Charge - Electric Flux Density - Gauss Law – Applications of Gauss Law – Point Charge, Infinite Line Charge, Infinite Sheet Charge - Electric Potential - Relations Between E and V.

UNIT – II

Electrostatics-II: The nature of dielectric materials, boundary conditions for perfect dielectric materials. Capacitance, Several capacitance examples: Parallel Plate Capacitor, Capacitance of a Coaxial Cable, Spherical Capacitor. Derivations of Poisson's and Laplace's equations. Current and current density, Energy density, continuity of current.

UNIT – III

The Steady Magnetic Field: Biot-Savart's Law, Ampere's Circuital Law, Magnetic Flux and Magnetic Flux Density, The scalar and vector magnetic potentials.
Magnetic Forces and Materials: Force on a moving charge, force on a differential current element, force between differential current elements, Magnetic Energy, the nature of magnetic materials, magnetization and permeability, magnetic boundary conditions.

UNIT – IV

Time Varying Fields and Maxwell's Equations: Faraday's Law - Transformer and Motional EMFs – Stationary Loop in Time Varying B Field, Moving Loop in Static B Field, Moving Loop in Time Varying Field - Displacement Current – Maxwell's Equations in Different Final Forms.

UNIT – V

Wave Equations: Waves equations for: a conducting medium, free space – Relation between E and H in a Uniform plane wave - Wave propagation: Lossless medium, Conducting medium, Good Dielectric, Good Conductor - Poynting Vector and Poynting theorm - Reflection of a Plane wave at Normal Incidence - Reflection of a Plane wave at Oblique.

TEXTBOOKS:

1. Matthew N.O. Sadiku, Elements of Electromagnetics, Oxford University Press, 3rd edition, 2008.
2. William H. Hayt Jr. and John A. Buck, Engineering Electromagnetics, Tata McGraw-Hill publications, 7th edition, 2006.
3. G S N Raju, Electromagnetic Field Theory and transmission lines, 1st Edition, Pearson Education India, 2005.

REFERENCES:

1. E.C. Jordan and K.G. Balmain, Electromagnetic Waves and Radiating Systems, PHI, 2nd Edition, 2000
2. John D. Krauss, Electromagnetics, Tata McGraw-Hill publications, 4th edition, 1991.
3. Schaum'sout line series, Electromagnetics, 2nd edition, Tata McGraw-Hill publications, 2006.

EC 222 **ANALOG CIRCUITS** **L T P M C**
3 0 0 100 3

Course Objectives:
The objective of this course is to
1. Analyze Wave shaping circuits using discrete components.
2. Design and analyze single stage and multi stage Amplifiers
3. Interpret the concept of feedback and classify various types of feedback amplifiers.
4. Understand the concept of power amplifier and identify different power amplifiers.

Course Outcomes:
Students will be able to
1. Design and analyze clippers and clampers using discrete components.
2. Understand the operation of MOSFET circuits and analyze different applications using MOSFET.

3. Design various amplifier circuits using MOSFET in different configurations.
4. Understand the concept of OP-AMP and characteristics of OP-AMP.
5. Analyse the importance of negative feedback in electronic circuits.
6. Analyze various types of feedback amplifiers like voltage series, current series, current shunt and Voltage shunt.
7. Understand types of power amplifiers based on position of Quiescent or operating point on load lines and also understand its parameters.
8. Design different types of power amplifiers for practical applications of desired specifications like efficiency, output power, distortion etc.

UNIT – I

Multi Stage Amplifiers: Need for cascading, Methods of Inter stage Coupling, Gain, Selection of Configuration in cascading Amplifiers, RC Coupled CE-CE Amplifier, CE-CB Cascode Amplifier, CE-CC Amplifier, Effect of cascading on Bandwidth and Gain

UNIT - II

FET Amplifiers: JFET Low Frequency small signal Model, Analysis of Common Source, Common Drain, Common Gate Amplifiers using small signal model.

Frequency Response: Amplifier Frequency Response, System Transfer Functions, Transistor Amplifiers with Circuit Capacitors, Bipolar Transistor Frequency Response, The FET Frequency Response, High Frequency Response of Transistor Circuits

UNIT-III

Power Amplifiers: Power Amplifiers, Power Transistors, Classification of Amplifiers: Class-A, Class B, Class C, Class AB Power Amplifiers.

UNIT - IV

Feedback Amplifiers: Introduction to Feedback, Basic Feedback Concepts, Ideal Feedback Topologies, Voltage Amplifiers, Current Amplifiers, Transconductance Amplifiers, Transresistance Amplifiers
Oscillators: Barkausen Criterion, The Phase Shift Oscillator, Resonant Circuit Oscillator and Crystal Oscillator.

UNIT - V

Operational Amplifiers: Operational amplifier and block diagram representation, op-amp with negative feedback. Block diagram representation of feedback configurations, voltage series feedback amplifier, voltage shunt feedback amplifier, differential amplifier with one op-amp

TEXT BOOKS:
1. Electronic devices and circuit theory", Robert L. Boylestad and Louis Nashelsky.
2. Microelectronics: Circuit Analysis and Desigm, DONALD A. NEAMEN, 4th Edition, McGraw-Hill, 2010.

REFERENCE BOOKS:
1. Microelectronic Circuits, 7th Edition, Sedra/Smith, Oxford University Press, 2010.
2. "Integrated electronics", Jacob Millman and Christos C Halkias.

EC 223 PROBABILITY THEORY AND STOCHASTIC PROCESS L T P M C

3 0 0 100 3

Course Objectives:

The primary objective of this course is:

1. To provide mathematical background and sufficient experience so that the student can read, write, and understand sentences in the language of probability theory, as well as solve probabilistic problems in signal processing and Communication Engineering.
2. To introduce students to the basic methodology of "probabilistic thinking" and to apply it to problems;
3. To understand basic concepts of probability theory and random variables, how to deal with multiple random variables, Conditional probability and conditional expectation, joint distribution and independence, mean square estimation.
4. To understand the difference between time averages and statistical averages
5. Analysis of random process and application to the signal processing in the communication system.
6. To teach students how to apply sums and integrals to compute probabilities, means, and expectations.

Course Outcomes:

Upon completion of the subject, students will be able to compute:

1. Simple probabilities using an appropriate sample space.
2. Simple probabilities and expectations from probability density functions (pdfs)
3. Likelihood ratio tests from pdfs for statistical engineering problems.
4. Least -square & maximum likelihood estimators for engineering problems.
5. Mean and covariance functions for simple random processes.

UNIT – I

Probability: Probability introduced through Sets and Relative Frequency, Experiments andSample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Baye's Theorem, Independent Events.

UNIT – II

Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous, and Mixed Random Variables, Distribution & Density Functions:Distribution and Density functions and their Properties – Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh and Conditional Distribution, Methods of defining Conditional Event, Conditional Density, and Properties.

UNIT - III

Operation on One Random Variable – Expectations: Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function.

Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

UNIT – IV

Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem.

UNIT – V

Random Processes: The Random Process Concept, Classification of Processes, Distribution and Density Functions, concept of Stationary and Statistical Independence, Mean and covariance functions,Ergodicity.Transmission of random process through LTI.Power spectral density. Time Averages, Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties.The Power Spectrum: Properties, Properties, Energy density spectrum.

TEXT BOOKS:

1. H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education
2. A.Papoulis and S. UnnikrishnanPillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill.
3. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International

REFERENCE BOOKS:

1. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers,
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Stochastic Processes, UBS Publishers
3. S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press.

EC 224 MICROPROCESSOR & MICROCONTROLLERS L T P M C
3 0 0 100 3

Course Objectives:
1. To understand the architecture of 8085 microprocessor.
2. To learn 8086 architecture Instruction set
3. To learn and understand 8051 Architecture assembly Language programming

Course Outcomes:
After completion of this subject the students will be able to:
1. Do programming with 8086 microprocessors Understand concepts of Intel x86 series of advanced processors
2. Able to understand the basic concepts of 8051 architecture Design and implement some specific real time applications Using 8051 Microcontroller

UNIT – I
MICROPROCESSOR: Introduction to microcomputers and microprocessors, introduction and architecture of 8086 family, addressing modes, instruction description and assembler directives of 8086 microprocessors.

UNIT - II
8086 PROGRAMMING AND SYSTEM CONNECTIONS: Program development steps, writing programs for use with an assembler, assembly language program development tools, writing and using procedures and assembler macros. 8086 interrupts and interrupt responses.

UNIT - III
Digital Interfacing: Programmable parallel ports, handshake IO, interface Microprocessor to keyboards.
Analog interfacing: DAC principle of operation, specifications and different types of DAC's and interfacing.
Programmable devices: Introduction to Programmable peripheral devices 8255, 8254, 8259, 8251, DMA data transfer, RS232 communication standard.

UNIT-IV

Micro controllers: Introductionto Micro controllers,comparing microprocessors and microcontrollers Architecture of 8051, Registers, Pin configuration of 8051, I/O Ports, Memory Organization, Addressing Modes.

UNIT - V

Programming & Interfacing 8051- Instruction set, Assembly language Programming,Counters& Timers, Serial data Communication– Interrupts,
Interfacing of 8051 – keyboard, Displays, ADC converters.

TEXT BOOKS:

1. Microprocessor architecture programming & applications with the 8085,S.Ramesh Gaonkar, PRI Publishers. 6th Edition
2. Advanced Microprocessors & Peripheral interfacing, Ray Bhurchandi, 3rd edition, MC graw hill Publications
3. The INTEL Microprocessors, Brey, 6th edition, PHI Publishers 4. The 8051 Microcontroller and architecture, Kenneth J. Ayala, PRI Publishers 2nd edition

REFERENCES:

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

EC 225	OBJECT ORIENTED PROGRAMMING THROUGH JAVA	L	T	P	M	C
		3	0	0	100	3

Course Objectives:

The course should enable the students to:

1. Understand the basic object-oriented programming concepts and apply them in problem solving.
2. Illustrate inheritance concepts for reusing the program.
3. Demonstrate on the multi-tasking by using multiple threads

Course Outcomes:

1. Use object-oriented programming concepts to solve real world problems.
2. Explain the concept of class and objects with access control to represent real world entities.
3. Demonstrate the behaviour of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
4. Use overloading methodology on methods and constructors to develop application programs.
5. Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords.
6. Describe the concept of interface and abstract classes to define generic classes.
7. Use dynamic and static polymorphism to process objects depending on their class.
8. Illustrate different techniques on creating and accessing packages (fully qualified name and import statements).
9. Understand the impact of exception handling to avoid abnormal termination of program using checked and unchecked exceptions.
10. Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
11. Use multithreading concepts to develop inter process communication

UNIT - I: OOPS CONCEPTS AND JAVA PROGRAMMING

OOP concepts: procedural and object oriented programming paradigm, Class and object, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism.

Java programming: History of java, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow statements, jump statements, simple java programs, arrays, console input and output, formatting output, constructors ,methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, exploring string class.

UNIT - II: INHERITANCE

Inheritance: Inheritance hierarchies, super and subclasses, member access rules, super keyword, preventing inheritance: final classes and methods, the object class and its methods;

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

UNIT – III: INTERFACES AND PACKAGES

Interface: Interfaces VS Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface.

Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

UNIT - IV: EXCEPTION HANDLING AND MULTITHREADING

Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Multithreading: Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.

UNIT – V: FILES

IO Programming: Introduction to Streams, Byte Streams, Character stream, Readers and Writers, File Class, File InputStream, File Output Stream, Input Stream Reader, Output Stream Writer, File Reader, File Writer, Buffered Reader, random access file operations.

TEXT BOOKS

1. Herbert Schildt and Dale Skrien “Java Fundamentals –A comprehensive Introduction”, McGraw Hill, 1st Edition, 2013.
2. Herbert Schildt, “Java the complete reference”, McGraw Hill, Osborne, 11th Edition, 2018.
3. T. Budd “Understanding Object-Oriented Programming with Java”, Pearson Education, Updated Edition (New Java 2 Coverage), 1999

REFERENCE BOOKS

1. P.J.Dietel and H.M.Dietel “Java How toprogram”, Prentice Hall, 6thEdition, 2005.
2. P.Radha Krishna “Object Oriented programming through Java”,CRC Press,1st Edition, 2007.
3. S.Malhotra and S. Choudhary “Programmingin Java”, Oxford University Press, 2nd Edition, 2014

EC 261 ANALOG CIRCUITS LAB L T P M C

0 0 3 100 1.5

Course Objectives:

The objectives of this course:

1. To understand the analysis and design of single stage and multi stage amplifiers.
2. To construct feedback amplifiers, oscillators, power amplifiers, Tuned Amplifiers and Multivibrators.
3. To simulate various analog electronic circuits and to determine their characteristics.

Course Outcomes:

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

1. Acquire knowledge in different electronic circuits using transistor amplifier.
2. Analyze and design of amplifiers, feedback amplifiers, oscillators, Tuned amplifiers and Multivibrators.
3. Measure and simulate important parameters of various amplifiers which are used to understand the behavior of analog electronic circuits.
4. Identify a suitable analog electronic circuit for various applications with a given specification.
5. Function effectively as an individual and as a member in a group in the area of analog electronic circuits.
6. Develop skills to communicate in verbal and written form in the area of analog electronic circuits.

List of Experiments:

1. Study of Full Wave Rectifier with and without Filters.
2. Frequency Response of Common Emitter Amplifier.
3. Frequency Response of Common Source Amplifier.
4. Measurement of Parameters of Emitter Follower; R_I, A_V, A_I& R_O.
5. Measurement of Parameters of Source Follower; R_I, A_V, A_I& R_O.
6. Two Stage RC-Coupled Amplifier.
7. Study of Cascode Amplifier.
8. Current series feedback topology
9. Class-A Power Amplifier
10. RC Phase Shift Oscillator
11. Hartley Oscillator
12. Colpitts Oscillator

EC262 MICROPROCESSOR & MICROCONTROLLERS LAB L T P M C

0 0 3 100 1.5

Course Objectives:

The course should enable the students to:

1: Introduce the programming and interfacing techniques of 8086 microprocessor.
2: Analyze the basic concepts and programming of 8051 microcontroller

Course Outcomes:

Students will be able to

1: Develop 8086 programming skills in assembly language.
2: Understand the instruction set of 8051 microcontroller, and have the ability to program 8051 using proper simulation tools.

List of Experiments:

Experiments Based on ALP (8086)

1. Programs on Data Transfer Instructions.
2. Programs on Arithmetic and Logical Instructions.

3. Programs on Branch Instructions.
4. Programs on Subroutines.
5. Sorting of an Array.
6. Programs on Interrupts (Software and Hardware).
7. 8086 Programs using DOS and BIOS Interrupts.

Experiments Based on Interfacing & Microcontroller (8051)
8. DAC Interface-Waveform generations.
9. Stepper Motor Control.
10. Keyboard Interface / LCD Interface.
11. Data Transfer between two PCs using RS.232 C Serial Port
12. Programs on Data Transfer Instructions using 8051 Microcontroller.
13. Programs on Arithmetic and Logical Instructions using 8051 Microcontroller.
14. Applications with Microcontroller 8051.

EC 263 COMMUNICATIVE ENGLISH LAB II L T P M C
0 0 3 100 1.5

Course Objectives:
The main course objective of ***Advanced English Communication Skills Lab*** is to develop the student's Non-Verbal Communication, Cognitive and Poignant Skills, Interview Skills, Employability and Interpersonal skills, which relate to situations in the work place. The skills imparted to the learners are body language, leadership, time management, team management, assertive skills, group discussions, interview techniques and positive work ethics ...etc.
The methodology includes Interactive sessions, Role Play, Team Work/Group Work/Pair Work and Peer Evaluation. The emphasis is on learning by doing to improve the learners' life skills.

Course Outcomes:

CO1	To realize the importance of communication skills in job arena To enhance the students ability to communicate
CO2	Able to learn vocabulary for GRE, TOEFL, IELTS,IES etc
CO3	Capable to participate in all recruitment procedures
CO4	Able to communicate effectively over a phone and proficient to demonstrate telephoning skills
CO5	Able to describe procedures and improves analytical thinking
CO6	Able to know the importance of personality development

Syllabus:
Module-l: Communication Skills:

I. Verbal

a) Types of Communication
b) Barriers to Communication
c) Strategies for effective communication

II. Nonverbal Skills -

a) Body Language – Voluntary and Involuntary
b) Kinesics
c) Facial Expressions
d) Proxemics
e) Oculesics
f) Haptics and Chronemics

Module-2: Advanced Vocabulary:

a) Word list (GRE & TOEFL related)
b) One Word Substitutes
c) Idioms

Module-3: Employability Skills (Ref: 6):

a) Interview Skills
b) Group Discussion
c) Resume Writing

Module-4: Telephonic Skills:

a) Formal &Informal interaction
b) Receiving Messages & Complaints
c) Tone modulation

Module-5: Descriptions:

a) Process Description
b) Pictures
c) Narration

Module-6: Behavioural Skills:

a) Emotional Intelligence
b) Positive Attitude
c) Team Work
d) Organization Skills

EC 264 **JAVA PROGRAMMING** **L T P M C**
0 0 3 100 2

Basic Programs:

1. Write java programs to find the following
   a) largest of given three numbers
   b) reverses the digits of a number
   c) given number is prime or not
   d) GCD of given two integers
2. Try debug step by step with small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
3. Write a java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.
4. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non-recursive functions.

Matrices, Overloading, Overriding:

5. Write a java program to multiply two given matrices.
6. Write a java program to implement method overloading and constructors overloading.
7. Write a java program to implement method overriding.

Palindrome, Abstract Class:

8. Write a java program to check whether a given string is palindrome.
9. Write a java program for sorting a given list of names in ascending order.

10. Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape

Interface:

11. Write a program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

Multithreading:

12. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
13. Write a java program that correct implements of producer consumer program
14. Write a program that creates three threads. First thread displays “Good Morning” every one second, the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.

Files:

15. Write a java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
16. Write a java program that displays the number of characters, lines and words in a text file.
17. Write a java program that reads a file and displays the file on the screen with line number before each line.

Web References:

1. http://java.sun.com
2. http://www.oracle.com/technetwork/java/index.html
3. http://java.sun.com/javase

ELECTRONICS AND COMMUNICATION ENGINEERING BRANCH

SCHEME OF INSTRUCTION AND EXAMINATION, w.e.f. 2019-2022

III/IV B. TECH - SEMESTER I

S.No.	Course Details		Category	Scheme of Instruction			Scheme of Examination		
	Code	Subject Name		Hours in a Week			Marks		Credits
				L	T	P	Internal	External	
1	EC 311	**Open Elective /Job Oriented Courses-I**	**OEC**	3	0	0	40	60	3
2	EC 312	Analog Communications	PC	3	0	0	40	60	3
3	EC 313	Computer Organization	PC	3	0	0	40	60	3
4	EC 314	Digital Signal Processing	PC	3	0	0	40	60	3
5	EC 315	**Program Elective Courses-I**	**PE**	3	0	0	40	60	3
6	EC 351	Analog Communications Lab	PC	0	0	3	40	60	1.5
7	EC 352	Digital Signal Processing Lab	PC	0	0	3	40	60	1.5
8	EC 353	VHDL Lab	PC	0	0	3	40	60	1.5
9	EC 354	Mobile App Development	Skill Oriented Course	0	0	3	100	0	2
Total Credits									21.5

PROGRAM ELECTIVE COURSES-I (PE)

EC 315/1 VLSI Design

EC 315/2 Mixed Signal Design

EC 315/3 High Speed Electronics

OPEN ELECTIVE (OEC)/JOB ORIENTED COURSES-I (JOEC)

EC 311/1 Linear Control Systems

EC 311/2 Power Electronics

EC 311/3 Nano Electronics

EC/EE 311/1 **LINEAR CONTROL SYSTEMS** **L T P M C**
3 0 0 100 3

UNIT – I

Introduction: Basic concept of simple control system – open loop – closed loop control systems. Effect of feedback on overall gain – stability sensitivity and external noise. Types of feedback control systems – Liner time invariant, time variant systems and nonlinear control systems.
Mathematical models and Transfer functions of Physical systems: Differential equations – impulse response and transfer functions – translational and rotational mechanical systems. Transfer functions and open loop and closed loop systems. Block diagram representation of control systems – block diagram algebra – signal flow graph – Mason's gain formula.
Components of control systems: DC servo motor – AC servo motor – synchro transmitter & receiver.

UNIT – II

Time domain analysis: Standard test signals – step, ramp, parabolic and impulse response function – characteristic polynomial and characteristic equations of feedback systems – transient response of first order and second order systems to standard test signals. Time domain specifications - steady state response – steady state error and error constants. Effect of adding poles and zeros on over shoot, rise time, band width – dominant poles of transfer functions.
Stability analysis in the complex plane: Absolute, relative, conditional, bounded input –bounded output, zero input stability, conditions for stability, Routh –Hurwitz criterion.

UNIT - III

Frequency domain analysis: Introduction – correlation between time and frequency responses – polar plots – Bode plots – Nyquist stability criterion – Nyquist plots. Assessment of relative stability using Nyquist criterion – closed loop frequency response.

UNIT – IV

Root locus Technique: Introduction – construction of root loci Introduction to Compensation Techniques- Lag Compensation, Lead Compensation, Lag Lead Compensation.

UNIT-V

State space analysis: Concepts of state, state variables and state models –diagonalization – solution of state equations – state models for LTI systems. Concepts of controllability and Observability.

TEXT BOOKS:

1. B.C. Kuo, Automatic control systems, 7th edition, PHI.
2. I.J.Nagrath& M Gopal, Control Systems Engineering, 3rd edition, New Age International.
3. K. Ogata, Modern Control Engineering, 3rd edition, PHI.

REFERENCE BOOKS:

1. Schaum Series, Feedback and Control Systems, TMH
2. M.Gopal, Control Systems Principles and Design, TMH
3. John Van de Vegta, Feedback Control Systems, 3rd edition, Prentice Hall,1993.

EC 311/2	POWER ELECTRONICS	L	T	P	M	C
		3	0	0	100	3

UNIT-I

Characteristics of Semiconductor Power Devices: Thyristor, power MOSFET and IGBT- Treatment should consist of structure, Characteristics, operation, ratings, protections and thermal considerations. Brief introduction to power devices viz. TRIAC, MOS controlled thyristor (MCT), Power Integrated Circuit (PIC) (Smart Power), Triggering/Driver, commutation and snubber circuits for thyristor, power MOSFETs and IGBTs (discrete and IC based).Concept of fast recovery and schottky diodes as freewheeling and feedback diode.

UNIT-II

Controlled Rectifiers: Single phase: Study of semi and full bridge converters for R, RL, RLE and level loads. Analysis of load voltage and input current- Derivations of load form factor and ripple factor, Effect of source impedance, Input current Fourier series analysis of input current to derive input supply power factor, displacement factor and harmonic factor.

UNIT-III

Choppers: Quadrant operations of Type A, Type B, Type C, Type D and type E choppers, Control techniques for choppers – TRC and CLC, Detailed analysis of Type A chopper. Step up chopper. Multiphase Chopper

UNIT-IV

Single-phase inverters: Principle of operation of full bridge square wave, quasi-square wave, PWM inverters and comparison of their performance. Driver circuits for above inverters and mathematical analysis of output (Fourier series) voltage and harmonic control at output of inverter (Fourier analysis of output voltage). Filters at the output of inverters, Single phase current source inverter

UNIT-V

Switching Power Supplies: Analysis of fly back, forward converters for SMPS, Resonant converters - need, concept of soft switching, switching trajectory and SOAR, Load resonant converter - series loaded half bridge DC-DC converter. Applications: Power line disturbances, EMI/EMC, power conditioners. Block diagram and configuration of UPS, salient features of UPS, selection of battery and charger ratings, sizing of UPS. Separately excited DC motor drive. P M Stepper motor Drive.

Text /Reference Books:

1. Muhammad H. Rashid, “Power electronics” Prentice Hall of India.

2. Ned Mohan, Robbins, “Power electronics”, edition III, John Wiley and sons.

3. P.C. Sen., “Modern Power Electronics”, edition II, Chand& Co.

4. V.R.Moorthi, “Power Electronics”, Oxford University Press.

5. Cyril W., Lander,” Power Electronics”, edition III, McGraw Hill.

EC 311/3	NANO ELECTRONICS	L	T	P	M	C
		3	0	0	100	3

UNIT-I

Introduction to nanotechnology, meso structures,Basics of Quantum Mechanics: Schrodinger equation, Density of States. Particle in a box Concepts, Degeneracy.

UNIT-II

Band Theory of Solids. KronigPenny Model. Brillouin Zones. Shrink-down approaches: Introduction, CMOS Scaling, The nanoscale MOSFET, Finfets, Vertical MOSFETs, limits to scaling, system integration limits (interconnect issues etc.),

UNIT-III

Resonant Tunneling Diode, Coulomb dots, Quantum blockade, Single electron transistors,

UNIT-IV

Carbon nanotube electronics, Bandstructure and transport, devices, applications,

UNIT-V

2D semiconductors and electronic devices, Graphene, atomistic simulation

Text/ Reference Books:

1. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson, 2009.

2. W. Ranier, Nanoelectronics and Information Technology (Advanced Electronic Materialand Novel Devices), Wiley-VCH, 2003.

3. K.E. Drexler, Nanosystems, Wiley, 1992.

4. J.H. Davies, The Physics of Low-Dimensional Semiconductors, Cambridge University Press, 1998.

5. C.P. Poole, F. J. Owens, Introduction to Nanotechnology, Wiley, 2003

EC 312 **ANALOG COMMUNICATIONS** **L T P M C**

3 0 0 100 3

UNIT – I

Amplitude Modulation: Time domain description, Frequency domain description, Single tone modulation, Generation of AM wave, Square law modulator, Switching Modulator, Detection of AM waves, Square law detector, Envelope detector, DSB-SC Modulation, Time-domain and frequency domain descriptions of DSB-SC, Generation of DSB-SC: Balanced modulator, Coherent detection of DSBSC modulated waves, Costas loop, Quadrature-Carrier multiplexing.

UNIT – II

SSB and VSB Modulations: Band-pass transmission, Complex low-pass representation of Narrow-band signals, Concepts of pre-envelope, Complex envelope and Natural envelope, Equivalent low-pass transmission model, Single side band modulation: Frequency domain description, Generation of SSB-SC wave, Frequency-discrimination method, Phase discrimination method, Demodulation of SSB-SC waves, Vestigial side-band modulation, Frequency domain description, Generation of VSB modulated wave, Envelope detection of VSB wave plus carrier, Comparison of AM techniques, Frequency Division Multiplexing (FDM).

UNIT – III

Angle Modulation: Introduction to Angle modulation, Relation between frequency Modulation and phase modulation, Single tone frequency modulation, Spectrum analysis of sinusoidal FM wave, Narrow Band FM and Wide Band FM, Transmission bandwidth of FM waves, Carson's Rule, Generation of FM waves, Indirect FM (Armstrong Method), Direct FM, Demodulation of FM waves, Balanced frequency discriminator – Zero-crossing detector, Linearized model of PLL, FM demodulation employing first order PLL, Practical Considerations, FM limiters, Applications.

UNIT – IV

Discrete Modulation: Generation and Demodulation of PAM, PWM and PPM; TDM, Comparison of Discrete Modulation Techniques.

Noise in Analog Modulation: AM Receiver model, Signal to noise ratios for coherent reception. DSB-SC receiver, SSC-SC receiver, Noise in AM receivers using envelope detection. AM threshold effect, FM receiver model, Noise in FM reception, Capture effect in FM, Threshold effect, FM threshold reduction, Pre-emphasis and De-emphasis in FM.

UNIT-V

Radio Transmitters: Frequency allocation for radio communication systems, Block diagrams and functions of radio transmitters for AM and FM systems.

Radio Recivers: TRF and super heterodyne receivers, RF, Mixer and IF stages, Choice of IF stages, Choice of IF, Image frequency, Alignment and tracking of radio receivers, AGC, Tone and volume controls, Receiver characteristics and their measurements, FM receivers, communication receivers, Fading and diversity reception

TEXT BOOKS:

1. Simon Haykin, Introduction to Analog and Digital Communication Systems, John Wiley and Sons, 3rd Edition, 2001
2. Leon W Couch II, Digital and Analog Communication Systems, Pearson Education, 2004
3. George Kennedy, Electronic Communication Systems, Mc Graw Hill, 4th Edition, 1999

REFERENCE BOOKS:

1. Taub and Schilling, Principles of Communication Systems, TMH, 2nd Edition, 1986
2. Sam Shanmugam, Analog and Digital Communication Systems, John Wiley, 1992.

EC 313	COMPUTER ORGANIZATION	L	T	P	M	C
		3	0	0	100	3

UNIT – I

Register Transfer and Micro-Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic micro-operations, Shift micro-Operations, Arithmetic Logic shift Unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers, computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instruction, Input-output and Interrupt, Design of basic Computer, design of Accumulator logic.

UNIT-II

Micro Programmed Control: Control Memory, Address Sequencing, MicroProgram example, Design of Control unit

Central Processing Unit: General Register organization, stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced instruction set (RISC).

UNIT -III

Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms Floating-point Arithmetic operations.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associative Memory Cache Memory, Virtual Memory, Memory Management hardware.

UNIT-IV

Input-Output Organization: Peripheral Devices, Input-output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor, Serial Communication.

UNIT-V

Multi Processors: Characteristics of multiprocessors, Interconnection structures, Inter-processor arbitration, serial arbitration procedure, parallel arbitration logic, Inter-processor communication, Inter-processor synchronization, mutual exclusion with a semaphore.

TEXT BOOKS:

1. M..Morris Mano, Computer System Architecture, 3rd Edition, PHI, 2003.

REFERENCE BOOKS:

1. John P Hayes, ‘Computer Architecture and Organization’, 2nd edition.
2. V.Carl Hamacher et.al, ‘Computer Organization’ 2nd edition.
3. Tanenbaum: Structured Computer Organization, Pearson Education
4. William Stallings: Computer Organization and Architecture, PHI

EC 314 **DIGITAL SIGNAL PROCESSING** **L T P M C**
3 0 0 100 3

UNIT – I

Discrete Signals and Systems: Introduction to digital signal processing, Advantages and applications, Discrete time signals, LTI system: Stability and causality, Frequency domain representation of discrete time signals and systems.
Review of **Z-transforms** and **Inverse Z-transforms**

UNIT – II

DFT and FFT: Discrete Fourier Series, Properties of DFS, Discrete Fourier Transform, Properties of DFT, Linear convolution using DFT, Computations for evaluating DFT, Decimation in time FFT algorithms, Decimation in frequency FFT algorithm, Computation of inverse DFT.

UNIT – III

IIR Filter Design Techniques: Introduction, Properties of IIR filters, Design of Digital Butterworth and Chebyshev filters using bilinear transformation, Impulse invariance transformation methods. Design of digital filters using frequency transformation method.

UNIT – IV

FIR Filter Design Techniques: Introduction to characteristics of linear phase FIR filters, Frequency response, Designing FIR filters using windowing methods: rectangular window, Hanning window, Hamming window, Generalised Hamming window, Bartlett triangular window,Kaiser window, Processing Comparison of IIR and FIR filters

UNIT – V

Realization of Digital Filters: Direct, Canonic, Cascade, Parallel and Ladder realizations Effect of finite register length in FIR filter design, Introduction to Multi rate Signal Processing-Decimation, Interpolation, sampling rate conversion

TEXT BOOKS:

1. Lonnie C Ludeman, Fundamentals of Digital Signal Processing, John Wiley & Sons, 2003.
2. S K Mitra, Digital Signal Processing: A Computer Based Approach, 2nd Edition, TMH, 2003
3. Alan V Oppenheim and Ronald W Schafer, Digital Signal Processing, Pearson Education/PHI, 2004. 4. P. Ramesh Babu, Digital Signal Processing, 2nd Edition, Scitech Publications, 2004.

REFERENCE BOOKS:

1. Johnny R. Johnson, Introduction to Digital Signal Processing, PHI, 2001.
2. Andreas Antoniou, Digital Signal Processing,TMH, 2006.
3. John G.Proakis, Dimitris G Manolakis, digital Signal Processing: Principles, Algorithms and Applications, Pearson Education / PHI, 2003

EC 315/1	VLSI DESIGN	L	T	P	M	C
		3	0	0	100	3

Course Objectives:

The objectives of the course are to:

1. Give exposure to different steps involved in the fabrication of ICs using MOS transistor, CMOS/BICMOS transistors.
2. Study the fundamentals of CMOS circuits and its characteristics.
3. Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads.
4. Give exposure to the design rules to be followed to draw the layout of any logic circuit.
5. Provide concept to design different types of logic gates using CMOS inverter.

Course Outcomes:

On successful completion of this course, the student should be able to:

1. Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
2. Choose an appropriate inverter depending on specifications required for a circuit.
3. Draw the layout of any logic circuit which helps to understand and estimate parasitics of any logic circuit.
4. Design different types of logic gates using CMOS inverter.
5. Provide design concepts to design building blocks of data path of any system using gates.
6. Understand basic programmable logic devices
7. Understand the modeling Styles in VHDL.

UNIT – I

An introduction to MOS technology: Introduction to IC technology, Basic MOS transistors, NMOS fabrication, CMOS fabrication and BiCMOS technology. Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds} versus V_{ds} relationships, threshold voltage V_t, Transconductance ($g_{m)}$, Figure of merit (ω), Pass transistor, NMOS inverter, Pull-up to pull- down ratio, CMOS inverter, BICMOS inverters, Latch-up in CMOS circuits.

UNIT – II

MOS and BICMOS circuit Design processes: MOS layers, Stick diagrams, Layout diagrams, Design rules and layout, Sheet resistance Rs, Standard unit of capacitance, The Delay unit, Inverter delays, Propagation delays, Wiring capacitances, Scaling models, Scaling factors for device parameters.

UNIT – III

Subsystem design and layout: Architectural issues, Switch logic, Gate Logic, examples of Structured Design (combinational logic). Design of an ALU subsystem: Design of 4-bit adder, adder element requirements, a standard adder element, Implementing ALU functions with an adder. A further consideration of adders: Manchester carry chain, carry select adder, carry skip adder.

UNIT – IV

VLSI design flow, Introduction to ASICs, Full Custom ASICs, standard cell based ASICs, Gate array based ASICs, Programmable logic devices, PLAs, PALs, CPLDs and FPGAs.

UNIT – V

VHDL Hardware Description Language: Program Structure, Types and Constants, functions and Procedures, Libraries and Packages, Structural Design Elements, Dataflow design Elements, Behavioral design Elements, VHDL programs, The Time Dimension and Simulation, Synthesis.

TEXTBOOKS:

1. Douglas A.Pucknell and Kamran Eshranghian, Basic VLSI Design, 3rd edition, PHI, 2002.
2. Debaprasad Das, VLSI Design, Oxford University Press, 2nd edition, 2015.
3. Michael John Sebastian Smith, Application Specific Integrated Circuits, Addison Wesley, 2003.
4. K Lal Kishore and VSV Prabhakar, VLSI Design, I K International Publishing House, 2009
5. J.Bhasker, A VHDL Primer, Pearson Education India, 3rd edition, 2015.
6. John F Wakerly, Digital Design Principles & Practices, 3rd Edition, Pearson Education, 2002.

REFERENCES:

1. Neil H E Weste and Kamran Eshranghian, Principles of CMOS VLSI Design, A system perspective, 2nd edition, Pearson Education, 2002.
2. Stephen Brown and Z Vonko Vranesic, Fundamentals of Digital Logic with VHDL Design, TMH, 2002.
3. Douglas L. Perry, VHDL Programming by Example, McGraw Hill Education, 4th edition 2017

EC 315/2	MIXED SIGNAL DESIGN	L	T	P	M	C
		3	0	0	100	3

UNIT –I

Analog and discrete-time signal processing, introduction to sampling theory;Analog continuous-time filters: passive and active filters; Basics of analog discrete-time filters and Z-transform.

UNIT – II

Switched-capacitor filters- Nonidealities in switched-capacitor filters; Switched-capacitor filter architectures; Switched-capacitor filter applications.

UNIT – III

Basics of data converters; Successive approximation ADCs, Dual slope ADCs,Flash ADCs, Pipeline ADCs, Hybrid ADC structures, High-resolution ADCs, DACs.

UNIT – IV

Mixed-signal layout, Interconnects and data transmission; Voltage-mode signaling and data transmission; Current-mode signaling and data transmission.

UNIT – V

Introduction to frequency synthesizers and synchronization; Basics of PLL, Analog PLLs; Digital PLLs; DLLs.

Text/Reference Books:

1. R. Jacob Baker, CMOS mixed-signal circuit design, Wiley India, IEEE press, reprint 2008.

2. Behzad Razavi , Design of analog CMOS integrated circuits, McGraw-Hill, 2003.

3. R. Jacob Baker, CMOS circuit design, layout and simulation, Revised second edition, IEEE press, 2008. 4. Rudy V. dePlassche, CMOS Integrated ADCs and DACs, Springer, Indian edition, 2005.

5. Arthur B. Williams, Electronic Filter Design Handbook, McGraw-Hill, 1981.

6. R. Schauman, Design of analog filters by, Prentice-Hall 1990 (or newer additions).

7. M. Burns et al., An introduction to mixed-signal IC test and measurement by, Oxford university press, first Indian edition, 2008.

EC 315/3	HIGH SPEED ELECTRONICS	L	T	P	M	C
		3	0	0	100	3

UNIT – I

Transmission line theory (basics) crosstalk and non ideal effects; signal integrity: impact of packages, vias, traces, connectors; non-ideal return current paths, high frequency power delivery, methodologies for design of high speed buses; radiated emissions and minimizing system noise; Noise Analysis: Sources, Noise Figure, Gain compression, Harmonic distortion, Inter modulation, Cross-modulation, Dynamic range

UNIT – II

Devices: Passive and active, Lumped passive devices (models), Active (models,low vs highfrequency)

UNIT -III

RF Amplifier Design, Stability, Low Noise Amplifiers, Broadband Amplifiers (and Distributed) Power Amplifiers, Class A, B, AB and C, D E Integrated circuit realizations, Cross-over distortion Efficiency RF power output stages

UNIT – IV

Mixers –Upconversion Downconversion, Conversion gain and spurious response.Oscillators Principles.PLL Transceiver architectures

UNIT – V

Printed Circuit Board Anatomy, CAD tools for PCB design, Standard fabrication, Micro via Boards.

Board Assembly: Surface Mount Technology, Through Hole Technology, Process Control and Design challenges.

Text /Reference Books:

1. Stephen H. Hall, Garrett W. Hall, James A. McCall “High-Speed Digital System Design: A Handbook of Interconnect Theory and Design Practices”, August 2000, Wiley-IEEE Press

2. Thomas H. Lee, “The Design of CMOS Radio-Frequency Integrated Circuits”, Cambridge University Press, 2004, ISBN 0521835399.

3. Behzad Razavi, “RF Microelectronics”, Prentice-Hall 1998, ISBN 0-13-887571-5.

4. Guillermo Gonzalez, “Microwave Transistor Amplifiers”, 2nd Edition, Prentice Hall.

5. Kai Chang, “RF and Microwave Wireless systems”, Wiley.

6. R.G. Kaduskar and V.B.Baru, Electronic Product design, Wiley India, 2011

EC 351	ANALOG COMMUNICATIONS LAB	L	T	P	M	C
		0	0	3	100	1.5

1. Amplitude Modulation and Demodulation
2. DSB SC Modulation and Demodulation
3. SSB SC Modulation and Demodulation
4. Frequency Modulation and Demodulation
5. Pre Emphasis - De Emphasis Circuits
6. Verification of Sampling Theorem
7. PAM and Reconstruction.
8. PWM and PPM: Generation and Reconstruction
9. Effect of Noise on the Communication Channel
10. Time Division Multiplexing & amp; De multiplexing
11. Frequency Synthesizer.
12. AGC Characteristics.
13. PLL as FM Demodulator.
14. Spectrum analyzer and analysis of AM & amp; FM signals
15. Frequency Division Multiplexing & amp; De multiplexing

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

EC 352	DIGITAL SIGNAL PROCESSING LAB	L	T	P	M	C
		0	0	3	100	1.5

Experiments Based on Tool Boxes

1. Simulation of AM.
2. Simulation of FM.
3. Simulation of LPF and HPF.
4. Fourier Transforms.
5. Simulation of M-ary PSK.
6. Simulation of DPCM.
7. Evaluation of DFT and IDFT of 16 Sample Sequence using DIT Algorithm.
8. Evaluation of DFT and IDFT of 16 Sample Sequence using DIF Algorithm.
9. Design of IIR Butterworth Filter using Impulse Invariant Method.
10. Design of FIR Filter using Windowing Technique.
11. Convolution of Two Signals.
12. Correlation of Two Signals.
13. DFT Analysis of a Noise Corrupted Signal.

NOTE: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

EC 353	VHDL LAB	L	T	P	M	C
		0	0	3	100	1.5

VHDL Modelling and Synthesis of the following Experiments

1. Logic gates
2. Adders (Hall adder & Full Adder)
3. Code Converter (Binary to Gray & Gray to Binary)
4. 4x16 Decoder
5. 16x4 Encoder
6. Comparator
7. Arithmetic Logic Unit (ALU)
8. BCD to 7-Segment Display
9. Multiplexer/De-multiplexer
10. Flip Flops: JK/T/D
11. Counter
12. Moore state Machine
13. Mealy State Machine
14. Traffic light controller
15. Universal Asynchronous Receiver Transmitter (UART)

Additional experiments beyond the syllabus

1. Stop Watch
2. Sine Wave Generator
3. Delay Generator
4. PN Sequence Generator
5. Cyclic Redundancy Checker

NOTE: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

EC 354	MOBILE APP DEVELOPMENT	L	T	P	M	C
		0	0	3	100	2

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop an application that makes use of databases.
4. Develop an application that makes use of Notification Manager
5. Develop a native application that uses GPS location information
6. Implement an application that for basic calculator
7. Implement an application that creates an alert upon receiving a message
8. Write a mobile application that makes use of RSS feed
9. Develop a mobile application to send an email.
10. Develop a Mobile application for simple needs (Mini Project)

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ELECTRONICS AND COMMUNICATION ENGINEERING BRANCH

SCHEME OF INSTRUCTION AND EXAMINATION, w.e.f. 2019-2022

III/IV B. TECH - SEMESTER II

S.No.	Course Details		Category	Scheme of Instruction			Scheme of Examination		
	Code	Subject Name		Hours in a Week			Marks		Credits
				L	T	P	Internal	External	
1	EC 321	Microwave and Radar Engineering	PC	3	0	0	40	60	3
2	EC 322	Digital Communication	PC	3	0	0	40	60	3
3	EC 323	Computer Networks	PC	3	0	0	40	60	3
4	EC 324	**Program Elective Courses-II**	**PE**	3	0	0	40	60	3
5	EC 325	**Open Elective /Job Oriented Courses-II**	**OEC**	3	0	0	40	60	3
6	EC 361	Digital Communication Lab	PC	0	0	3	40	60	1.5
7	EC 362	Verilog HDL Lab	PC	0	0	3	40	60	1.5
8	EC 363	Microwave Lab	PC	0	0	3	40	60	1.5
9	EC 364	Electronic Circuit Simulation	Skill Oriented Course	0	0	3	40	60	2
Total Credits									21.5

PROGRAM ELECTIVE COURSES-II (PE)

EC 324/1 Antennas and Wave Propagation

EC 324/2 Adaptive Signal Processing

EC 324/3 Error Correcting Codes

OPEN ELECTIVE (OEC)/JOB ORIENTED COURSES-II (JOEC)

EC 325/1 Embedded Systems

EC 325/2 Scientific Computing

EC 325/3 DSP Processors

EC 321 **MICROWAVE AND RADAR ENGINEERING** **L T P M C**
3 0 0 100 3

UNIT-I

Introduction to Microwave Engineering-Microwave frequency band designations, Advantages and applications of Microwaves. Cavity Resonators-Rectangular cavity resonators, circular cavity Resonators. Wave guide components-Microwave TEE junctions-Coupling mechanism and scattering parameters for H-plane TEE,E-plane TEE, Magic Tee, ideal transmission line of length L. Power transmission in wave guides. Applications of Magic Tee. Directional couplers and applications. Faraday rotation-based Isolator and circulator. Measurement of- Impedance, frequency, Power and VSWR.

UNIT-II

Limitations of conventional tubes at Microwave Frequencies. Microwave Tubes-Linear Beam (O type) tubes-Two cavity Klystron- amplifier process, Expression for output power and efficiency, multi cavity klystron, Reflex klystron- Mathematical theory of bunching, power output and efficiency. Structure of TWT and amplification process. M type tubes- eight cavity cylindrical magnetron, resonance and π mode operation, Hull cut-off voltage equation, separation of π mode, sustained oscillations in magnetron.

UNIT-III

Microwave semiconductor devices-Transferred Electron Devices - Gunn Diode - Operation and characteristics of Gunn Diode, Domain formation, RWH theory of Gunn Diode, equivalent circuit of Gunn Diode, Basic modes of operations, Applications. Tunnel Diode, Avalanche transit time devices- IMPATT diode, TRAPATT diode, PIN Diode, Schottky Diode, Varactor Diode.

UNIT-IV

Introduction of RADAR, The simple form of Radar equation, Radar Block diagram and operation, prediction of Range performance, minimum detectable signal, Pulse repetition frequency and range Ambiguities. Integration of Radar pulse. Receiver Noise, Signal to Noise ratio. Probability of detection and false alarm. Radar cross section of Targets,

UNIT-V

CW and Frequency modulated Radar. MTI radar, Non-coherent MTI, delay line cancellers, Range gated Doppler filters. Pulse Doppler radar. Tracking with Radar- Sequential lobing, conical scan, Mono pulse Tracking radars. Super heterodyne Receivers, Low Noise front ends. Display. Duplexer types. Receiver Protectors, Radomes.

TEXT BOOKS:

1. Foundation for Microwave Engineering By RE Collin, IEEE Press Series, 2003
2. Microwave Devices & Circuits By Samuel Y Liao, 3rd Edition, Pearson Education, 2003
3. Microwave & Radar Engineering By M.Kulakarni, Umesh Publications, 2001.
4. Introduction to Radar Systems By Merill Skolnik, 2nd Edition, TMH, 2003

REFEERENCE BOOKS:

1. Microwave Engineering By ML. Sisodia and V.I. Gupta, New Age International, 2005
2. Radar Systems and Radio Aids of Navigation By A.K. Sen and A.B.Bhattacharya, Khanna Publishers.

EC 322	DIGITAL COMMUNICATION	L	T	P	M	C
		3	0	0	100	3

UNIT – I

Pulse Code Modulation: Quantization Process, Quantization Noise, Pulse Code Modulation Line Codes Noise Considerations in PCM Systems Virtues, Limitations, and Modifications of PCM Delta Modulation, Differential Pulse Code Modulation, Adaptive differential Pulse Code Modulation.
Base Band Pulse Transmission: Matched filter, Properties, Error Rate due to Noise Intersymbol interference, Nyquist's criterion for Distortionless Baseband Binary Transmission, Correlative level coding, Optimum Linear receiver Eye Pattern.

UNIT – II

Digital Passband Transmission: Geometric representation of signals, Conversion of the continuous AWGN channel into A vector channel Likelihood Functions Maximum Likelihood decoding Correlation Receiver probability of error Passband Transmission model coherent BPSK, QPSK, M-PSK Coherent BFSK, MSK, GMSK Non Coherent BFSK DPSK Comparison of Digital Modulation Schemes.

UNIT – III

Spread Spectrum Modulation: PN sequence A Notion of spread spectrum direct Sequence spectrum spread spectrum with Coherent BPSK Signal Space Dimensionality and Processing gain Probability of error frequency Hop spread spectrum.

UNIT - IV

Fundamental Limits in Information Theory: Uncertainty, Information, Entropy, Source Coding Theorem, Data Compaction, Discrete memoryless channels, Mutual information, Channel capacity, Channel coding theorem, Information capacity theorem, Data Compression.

UNIT – V

Error Control Coding: Discrete Memoryless channels Linear Block codes, Cyclic Codes, Convolution Codes, Maximum Likelihood and Sequential Decoding of Convolution Codes.

TEXT BOOKS:

1. Simon Haykin, Communication Systems, 4th edition John Wiley & Sons, 2001
2. Modern Digital and Analog Communication Systems, 3rd edition, OUP, 1998
3. Leon W Couch II, Digital and Analog Communication Systems, 6th Edition, Pearson, 2004

REFERENCE BOOKS:

1. John G Proakis, Digital Communications,4th Edition, McGraw Hill,2001
2. Bernard Sklar, Digital Communication,2nd Edition, Pearson Education,2001
3. Taub and Schilling, Principles of Communication Systems, 2nd Edition,TMH,1986

EC/CI/CS 323 **COMPUTER NETWORKS**

L	T	P	M	C
3	0	0	100	3

Course Objectives:

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

1. Build an understanding of the fundamental concepts of data communication and computer networking.
2. Understand how errors detected and corrected that occur in transmission
3. How collisions to be handled when many stations share a single channel
4. Know about routing mechanisms and different routing protocols
5. Understand transport layer functions
6. Know about different application layer protocols

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

1. Describe the basis and structure of an abstract layered protocol model
2. Independently understand basic computer network technology.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network
6. Understand and building the skills of subnetting and routing mechanisms.
7. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation
8. Understand how the Internet works today.

UNIT I:

Introduction: Uses of Computer Networks, Network Hardware, LANs, MANs, WANs, Network Software. Reference Models: The OSI Reference Model, TCP/IP Reference Model, the comparison of OSI, and TCP/IP reference models. The Physical Layer: Guided transmission media: Magnetic Media, Twisted Pair, Coaxial Cable, and Fiber Optics.

UNIT II:

The Data Link Layer: Data link layer design issues, Error detection and correction, Elementary data link protocols, and Sliding window protocols. The Medium Access Control Sub layer: The channel allocation problem, multiple access protocols, ETHERNET, and Wireless LANs.

UNIT III:

The Network Layer: Network Layer Design Issues, Routing Algorithms: Shortest Path, Flooding, DVR, and Link State routing algorithm, Congestion Control Algorithms, and Quality of Service. IP protocol and IP address.

UNIT – IV:

The Transport Layer: The Transport Service, Elements of Transport Protocols, and the Internet Transport Protocols: UDP- Remote Procedure Call, The Real-Time Transport Protocol, TCP- Introduction to TCP, The TCP Service model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, TCP Connection Management Modeling, TCP Transmission Policy, Congestion Control, TCP Timer Management.

UNIT - V:

Application Layer: The Domain Name System (DNS) – Resource Records, Name Servers, E-Mail – Architecture and Services, POP3, IMAP, World Wide Web – Architectural Overview, Server side, Uniform Resource Locators, Statelessness and Cookies.

Text Books/Reference Books:

1.Andrew S Tanenbaum, Computer Networks.4 ed, Pearson Education / PHI.
2.Behrouz A.Forouzan, Data Communications and Networking. 4 ed, TATA McGraw Hill
3.Kurose and Ross, Computer Networks – A Top-down Approach Featuring the Internet.'Pearson Education.

EC 324/1 **ANTENNAS AND WAVE PROPAGATION**

L	T	P	M	C
3	0	0	100	3

UNIT-I

RADIATION: Radiation Mechanism, Potential functions-heuristic approach, Maxwell's equation approach, Potential functions for sinusoidal oscillations, alternating current element, Power radiated by current element, Application to short antennas, assumed current distribution, Radiation from quarter wave Monopole / half wave dipole, Traveling wave antennas and the effect of the point of feed on standing wave antennas.

UNIT-II

Antenna Fundamentals: Isotropic, Directional, Omni-directional patterns, principal pattern, near-andfar-field regions, Radiation density, Radiation intensity, reciprocity, directivity and power gain, effective aperture, Half power Beam width, polarization, input impedance, efficiency, Friss transmission equation.

UNIT-III

Array Antennas: Two element array, Uniform linear array, Side lobe level and beam width of broadside array, Beam width of end fire array, Principle of multiplication of patterns, Effect of earth on vertical patterns, Binomial array, Basic principle of Dolph-Tschebyscheff array.

UNIT-IV

Characteristics of Typical Antennas: V and Rhombic antennas, Folded Dipole, Loop antenna, Yagi- Uda array, Helical antenna, Log periodic antenna, Pyramidal and conical Horn antenna, Corner reflector antenna, Parabolic reflector antennas - Paraboloid and parabolic cylinder, Cassegrain system of reflectors, Basic principles of slot antennas, Basic characteristics of micro strip antennas, feedingmethods, methods of analysis, design of rectangular and circular patch antennas.

UNIT-V

Radio Wave Propagation: Ground wave Propagation, Earth constants, Space-wave Propagation, Effect of curvature of an Ideal Earth, Variations of Field strength with height in space-wave Propagation, Atmospheric effects in space-wave Propagation, Radio-Horizon, Duct Propagation, Extended-range Propagation resulting from Tropospheric Scattering, ionospheric Propagation, Gyro frequency, Refraction and reflection of Sky Waves by the Ionosphere, Critical Frequency, Skip Distance, Maximum Usable Frequency.

TEXT BOOKS:

1. Edward C Jordan and Keith G Balmain, Electromagnetic Waves and Radiating Systems, 2nd Edition, PHI, 2003
2. Constantine A Balanis, Antenna Theory: Analysis and Design, Harper and Row Publishers, 2002
3. G.S.N.Raju, Antennas and Wave Propagation, 1st Edition, Pearson Publication, Singapore.
4. J.D. Kraus, Antennas, McGraw Hill, 1988.

REFERENCE BOOKS:

1. R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill, 1985.
2. R.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw ill, 1984.
3. I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House, 1980.
4. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill, 2005
5. F.E. Terman, Electronic and Radio Engineering, Mc Graw Hill, 1985.

EC 324/2	ADAPTIVE SIGNAL PROCESSING	L	T	P	M	C
		3	0	0	100	3

UNIT-I

General concept of adaptive filtering and estimation, applications and motivation, Review of probability, random variables and stationary random processes, Correlation structures, properties of correlation matrices.

UNIT-II

Optimal FIR (Wiener) filter, Method of steepest descent, extension to complex valued The LMS algorithm (real, complex), convergence analysis, weight error correlation matrix, excess mean square error and mis-adjustment

UNIT-III

Variants of the LMS algorithm: the sign LMS family, normalized LMS algorithm, block LMS and FFT based realization, frequency domain adaptive filters, Sub-band adaptive filtering. Signal space concepts - introduction to finite dimensional vector space theory, subspace, basis, dimension, linear operators, rank and nullity, inner product space, orthogonality, Gram Schmidt orthogonalization, concepts of orthogonal projection, orthogonal decomposition of vector spaces.

UNIT-IV

Vector space of random variables, correlation as inner product, forward and backward projections, Stochastic lattice filters, recursive updating of forward and backward prediction errors, relationship with AR modeling, joint process estimator, gradient adaptive lattice.

UNIT-V

Introduction to recursive least squares (RLS), vector space formulation of RLS estimation, pseudo inverse of a matrix, time updating of inner products, development of RLS lattice filters, RLS transversal adaptive filters. Advanced topics: affine projection and subspace based adaptive filters, partial update algorithms, QR decomposition and systolic array.

Text/Reference Books:

1. S. Haykin, Adaptive filter theory, Prentice Hall, 1986.

2. C.Widrow and S.D. Stearns, Adaptive signal processing, Prentice Hall, 1984.

EC 324/3	ERROR CORRECTING CODES	L	T	P	M	C
		3	0	0	100	3

UNIT-I

Linear block codes: Systematic linear codes and optimum decoding for the binary symmetric channel; Generator and Parity Check matrices, Syndrome decoding on symmetric channels;

UNIT-II

Hamming codes; Weight enumerators and the McWilliams identities; Perfect codes, Introduction to finite fields and finite rings;factorization of (X^n-1) over a finite field;

UNIT-III

Cyclic Codes. BCH codes; Idempotents and Mattson-Solomon polynomials; Reed-Solomon codes, Justeen codes, MDS codes, Alterant, Goppa and generalized BCH codes; Spectral properties of cyclic codes. ;

UNIT-IV

Decoding of BCH codes: Berlekamp's decoding algorithm, Massey's minimum shift register synthesis technique and its relation to Berlekamp's algorithm. A fast Berlekamp - Massey algorithm.

UNIT-V

Convolution codes; Wozencraft's sequential decoding algorithm, Fann's algorithm and other sequential decoding algorithms; Viterbi decoding algorithm.

Text/Reference Books:

1. F.J. McWilliams and N.J.A. Slone, The theory of error correcting codes, 1977.

2. R.E. Balahut, Theory and practice of error control codes, Addison Wesley, 1983.

EC 325/1	EMBEDDED SYSTEMS	L	T	P	M	C
		3	0	0	100	3

UNIT – I

Introduction - Introduction to Embedded Systems : Processor Technology, Role of Processor Selection in Embedded Systems, Design cycle in the development phase for an Embedded System, Using of target system or its Emulator and in-Circuit emulator, Use of software tools for development of an Embedded Systems.
Design Technology : Design of custom single purpose processor, optimization of custom single purpose processor, RT level - combination logic and sequential logic.

UNIT – II

RTOS and Overview:
Real Time Operating Systems: Architecture of Kernel, Task, Task States and Task Scheduler, Message Queues, Event Registers, Pipes, Signals, Semaphores, Memory Management, Interrupt Routines in an RTOS environment, Basic Design Using RTOS.

UNIT – III

ARM Microcontroller Overview
ARM-32 bit Microcontroller: Thumb-2 technology and applications of ARM, Architecture of ARM Cortex M3, Various Units in the Architecture, Debugging support, General Purpose Registers, Special Registers, Exceptions, Interrupts, Stack operation, Reset sequence

UNIT – IV

ARM Cortex M3 Microcontroller
ARM Cortex M3 Instruction Sets and Programming: Assembly basics, Instruction list and description, Thumb and ARM instructions, Special instructions, Useful instructions, CMSIS, Assembly and C language Programming

UNIT – V
Networks for Embedded Systems: The I^2C Bus, The CAN bus, SHARC link ports, Ethernet, Bluetooth: specification, Core protocol, IEEE 1149.1 (JTAG) Testability.

TEXT BOOKS:

1. Raj kamal "Embedded systems architecture, programming and design" Tata McGraw-Hill Publishing company Limited.
2. Embedded System Design: A Unified Hardware/Software Introduction Frank Vahid and Tony Givargis
3. Joseph Yiu, The Definitive Guide to the ARM Cortex-M3, 2nd Edition, Newnes, (Elsevier), 2010

REFERENCE BOOKS:

1. Jonathan W Valvano, Embedded Microcomputer Systems, Brooks/cole, Thompson Learning
2. David E. Simon, An Embedded Software Primer, Pearson edition.
3. KVKK Prasad, Embedded and real time systems, Dreemtech Press, 2005.
4. ARM System Developer's Guide-Designing and Optimizing System Software, Andrew N.Sloss, Dominic SYMES, Chris Wright

EC 325/2	SCIENTIFIC COMPUTING	L	T	P	M	C
		3	0	0	100	3

UNIT – I

Introduction: Sources of Approximations, Data Error and Computational, Truncation Error and Rounding Error, Absolute Error and Relative Error, Sensitivity and Conditioning, Backward Error Analysis, Stability and Accuracy.Computer Arithmetic: Floating Point Numbers, Normalization, Properties of Floating Point System, Rounding, Machine Precision, Subnormal and Gradual Underflow, Exceptional Values, Floating Point Arithmetic, Cancellation

UNIT – II

System of liner equations: Linear Systems, Solving Linear Systems, Gaussian elimination,Pivoting, Gauss-Jordan, Norms and Condition Numbers, Symmetric Positive Definite Systems and Indefinite System, Iterative Methods for Linear Systems.Linear least squares: Data Fitting, Linear Least Squares, Normal Equations Method, Orthogonalization Methods, QR factorization, Gram-Schmidt Orthogonalization, Rank Deficiency, and Column Pivoting

UNIT – III

Eigen values and singular values: Eigen values and Eigenvectors, Methods for Computing All Eigenvalues, Jacobi Method, Methods for Computing Selected Eigenvalues, Singular Values Decomposition, Application of SVD.Nonlinear equations: Fixed Point Iteration, Newton's Method, Inverse Interpolation Method Optimization: One-Dimensional Optimization, Multidimensional Unconstrained Optimization, Nonlinear Least Squares

UNIT – IV

Interpolation: Purpose for Interpolation, Choice of Interpolating, Function, Polynomial Interpolation, Piecewise Polynomial Interpolation Numerical Integration And Differentiation: Quadrature Rule, Newton-Cotes Rule, Gaussian Quadrature Rule, Finite Difference Approximation, Initial Value Problems for ODES, Euler's Method, Taylor Series Method, Runga-Kutta Method, Extrapolation Methods, Boundary Value Problems For ODES, Finite Difference Methods, Finite Element Method, Eigenvalue Problems

UNIT – V

Partial Differential Equations, Time Dependent Problems, Time Independent Problems, Solution for Sparse Linear Systems, Iterative Methods.Fast Fourier Transform, FFT Algorithm, Limitations, DFT, Fast polynomial Multiplication, Wavelets, Random Numbers And Simulation, Stochastic Simulation, Random Number Generators, Quasi-Random Sequences

Text/ Reference Books:

1. Heath Michael T., "Scientific Computing: An Introductory Survey", McGraw-Hill, 2nd Ed., 2002

2. Press William H., Saul A. Teukolsky, Vetterling William T and Brian P. Flannery, "Numerical Recipes: The Art of Scientific Computing", Cambridge University Press, 3rd Ed., 2007

3. Xin-she Yang (Ed.)., "Introduction To Computational Mathematics", World Scientific Publishing Co., 2nd Ed., 2008

EC 325/3	DSP PROCESSORS	L	T	P	M	C
		3	0	0	100	3

UNIT – I

Realtime concepts, structural level of processing, digital signal processing and DSP systems, comparison between general purpose processors and DSP processors, examples of DSP processors, motivation for the specialized processors.

UNIT – II

Numeric representation and arithmetic fixed point verses floating point representation, native data word widths, relation between data word size and instruction word sizes, effects of finite word registers.

UNIT – III

Key features of TMS 320C6713 processor, architecture and addressing modes of 6713 processor, instruction set of TMS 320C6713 processor.

UNIT – IV

Programming the TMS 320 c 6713 processor, implementation of circular convolution, linear convolution, FFT algorithms,FIR filters, IIR filters and multi rate filters on the DSP processor.

UNIT-V

Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example

Text Books:

1. John G Ackenhhusin, Realtime signal processing, Printice Hall of India, 1999.

2. Phil Lapsly, Jeff Bier, Amit Sheham, dDSP processor fundementals and

architectures and features, S Chand & Co. New Delhi.

References:

TMX 32C 67133 User Guide.

EC 361	DIGITAL COMMUNICATION LAB	L	T	P	M	C
		0	0	3	100	1.5

1. Generation and Detection of Time Division Multiplexing.
2. Generation and Detection of Pulse Code Modulation.
3. Generation and Detection of Delta Modulation.
4. Generation and Detection of DPCM.
5. Generation and Detection of DPSK.
6. Generation and Detection of Spread spectrum.
7. Generation and Detection of QPSK.
8. Generation and Detection of ASK.
9. Generation and Detection of FSK.
10. Generation and Detection of PSK.
11. Study of Companding system.
12. Error detection and correction using hamming code.
13. Adaptive Delta Modulation and CVSD.
14. Differential Pulse Code Modulation and Demodulation.
15. Differential Phase Shift Keying.

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

EC 362	VERILOG HDL LAB	L	T	P	M	C
		0	0	3	100	1.5

Verilog Modelling and Synthesis of the following Experiments

1. Logic gates
2. Adders (Hall adder & Full Adder)
3. Code Converter (Binary to Gray & Gray to Binary)
4. 4x16 Decoder
5. 16x4 Encoder
6. Comparator
7. Arithmetic Logic Unit (ALU)
8. BCD to 7-Segment Display
9. Multiplexer/De-multiplexer
10. Flip Flops: JK/T/D
11. Counter
12. Moore state Machine
13. Mealy State Machine
14. Traffic light controller
15. Universal Asynchronous Receiver Transmitter (UART)

Additional experiments beyond the syllabus

1. Stop Watch
2. Sine Wave Generator
3. Delay Generator
4. PN Sequence Generator
5. Cyclic Redundancy Checker

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

EC 363	MICROWAVE LAB	L	T	P	M	C
		0	0	3	100	1.5

1. To study Microwave Components.
2. To Plot the V-I Characteristics of Gunn diode and determine the threshold Voltage.
3. To study the Characteristics of reflex Klystron Oscillator.
4. Measurement of guided wavelength of the given Rectangular wave guide (Klystron or Gunn or both)
5. Calculate Low VSWR High VSWR using VSWR Meter.
6. Attenuation and power measurement due to component under test and with the frequency.
7. Measure an unknown Impedance of a given load (using smith chart also)
8. Measurement of scattering parameters of Magic Tee or Circulators.
9. Scattering coefficient measurement using the Vector Network Analyzer.
10. To demonstrate Spectrum Analysis Measurement techniques of a signal source and measure frequency using spectrum analyzer.
11. Gain of Horn Antenna, radiation Pattern and beam width.
12. To measure the dielectric constant of given solid material.
13. To measure coupling coefficient, Insertion loss & Directivity of a Direction Coupler.
14. To measure the Q- factor of the given wave guide.
15. To determine isolations, coupling coefficients and input VSWR' s for E and H plane waveguide Tee and Magic Tee junctions.

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

EC 364 **ELECTRONIC CIRCUIT SIMULATION** **L T P M C**
0 0 3 100 2

1. Obtain the V-I characteristics of silicon and Germanium diodes.
2. Design a Zener diode voltage regulator.
3. Design and verify the operating point for a self-bias circuit.
4. Study the characteristics of a half wave and full wave rectifier.
5. Study the characteristics of a bridge rectifier.
6. Obtain the frequency response of a CE amplifier.
7. Obtain the frequency response of a two stage RC couple CE amplifier.
8. Design and simulate class A power Amplifier.
9. Simulate a differentiator and integrator using OPAMP.
10. Simulate a low pass and high pass filter using OPAMP.
11. Simulate a RC phase shift and Wein bridge oscillator using OPAMP.
12. Design and simulate a constant resistance and bridged T equalizer.
13. Simulate an Amplitude Modulator and Demodulator.
14. Simulate a Clipping and Clamping Circuit.
15. Simulate a Frequency Modulator and Demodulator.

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

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ELECTRONICS AND COMMUNICATION ENGINEERING BRANCH

SCHEME OF INSTRUCTION AND EXAMINATION, w.e.f. 2019-2022

IV/IV B.TECH. - SEMESTER I

S. No.	Course Details		Category	Scheme of Instruction			Scheme of Examination		
	Code	Subject Name		Hours in a Week			Marks		Credits
				L	T	P	Internal	External	
1	EC 411	Image and Video Processing	PC	3	0	0	40	60	3
2	EC 412	Wireless Communications and Cellular Networks	PC	3	0	0	40	60	3
3	EC 413	Fiber Optic Communication	PC	3	0	0	40	60	3
4	EC 414	Program Elective Courses-III	PEC	3	0	0	40	60	3
5	EC 415	Open Elective /Job Oriented Courses-III	OEC	3	0	0	40	60	3
6	EC 416	Industrial Management and Entrepreneur Development	BS	3	0	0	40	60	3
7	EC 451	High-Frequency Structure Simulator (HFSS)	Skill Oriented Course	0	0	3	40	60	2
8	EC 452	Industrial/Research Internship (2 Months) after 3rd Year	MC	0	0	3	100	0	3
Total Credits									**23**

PROGRAM ELECTIVE COURSES-III (PE)

EC 414/1 Information Theory and Coding
EC 414/2 Speech & Audio Signal Processing
EC 414/3 Satellite Communication

OPEN ELECTIVE (OEC)/JOB ORIENTED COURSES-III (JOEC)

EC 415/1 Artificial Neural Networks
EC 415/2 Machine Learning
EC 415/3 Computer Vision Applications

EC411 **IMAGE AND VIDEO PROCESSING** **L T P M C**
4 0 0 100 3

UNIT – I

INTRODUCTION: Origin of Digital Image Processing, Fields that uses Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System. **DIGITAL IMAGE FUNDAMENTALS:** Elements of Visual perception, Image sampling and Quantization, Basic relationships between Pixels, Linear and Non-linear operations.

UNIT – II

IMAGE ENHANCEMENT IN SPATIAL DOMAIN: Some basic Grey level transformations, Histogram processing, Enhancement using Arithmetic/Logic operations, Smoothing Spatial Filters, Sharpening Spatial Filters.
IMAGE ENHANCEMENT IN FREQUENCY DOMAIN: Introduction to Fourier Transform and the Frequency Domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters.

UNIT – III

IMAGE RESTORATION: Noise models, Restoration in the presence of Noise, only Spatial Filtering, Periodic Noise reduction by Frequency Domain Filtering, Linear, Position- Invariant Degradations, Inverse Filtering, Wiener Filtering.
IMAGE COMPRESSION: Fundamentals – Image Compression models – Error Free Compression, Lossy Compression.

UNIT – IV

IMAGE SEGMENTATION: Detection of discontinuities, Thresholding, Edge based Segmentation and Region based Segmentation.
IMAGE REPRESENTATION AND DESCRIPTION: Representation schemes, Boundary Descriptors, Regional Descriptors.
VIDEO REPRESENTATION: Video formation, perception and representation, Analog Video Raster, Analog Color Television Systems, Digital Video

UNIT – V

VIDEO SAMPLING-Basics of Lattice Theory, Sampling of Video Signals.
VIDEO MODELLING-Two-dimensional Motion Models, Two-Dimensional Motion Estimation-Types, Optical Flow, Pixel Based Motion, Block matching Algorithm.

TEXT BOOK:

1. R C Gonzalez and Richard E Woods, Digital Image Processing, Pearson Education, Second Edition, 2002
2. Video Processing and Communication – 1st edition - Yao Wang, J.Ostermann, Ya Zhang, Prentice Hall, 2001.

REFERENCE BOOKS:

1. A K Jain, Digital Image Processing, PHI, 1989
2. B Chanda and D Dutta Majumder, Digital Image Processing and Analysis, PHI,
3. MilanSonka, Vaclav Hlavac and Roger Boyle, Image Processing Analysis and Machine Vision, Thomson learning, Second Edition, 2001.
4. Multidimensional, signal, image and video processing and coding, - Woods, Elsevier, Academic press, 2006

EC412 WIRELESS COMMUNICATIONS AND CELLULAR NETWORKS

L	T	P	M	C
4	0	0	100	3

UNIT – I

INTRODUCTION TO MOBILE COMMUNICATION: Evolution of Mobile Radio Communication, Mobile Radio Telephony in US and around the world, Examples of Wireless Communication Systems: Paging system, Cordless telephones systems, Cellular telephone Systems, Trends in Cellular Radio and personal Communications.

The Cellular concept: Frequency reuse, Channel Assignment strategies, Hand off Strategies, Interference and system capacity, improving coverage and capacity in cellular systems.

UNIT – II

MOBILE RADIO PROPAGATION: Large Scale Fading: Introduction, Free space propagation model, Relating power to electric field, TheThree basic propagation mechanisms: Reflection, Ground reflection (Two-Ray) model, Diffraction, scattering, Practical Link budget design using path loss models.

Small Scale Fading: Small-scale Multipath Propagation, Impulse response model of a multipath channel, Parameters of mobile multipath channels, Types of small scale fading: Fading effects due to multipath time delay spread and Doppler spread Rayleigh and Ricean distributions.

UNIT – III

Equalization: Fundamentals of equalizers, Equalizers in a communication receiver, Linear equalizers, Nonlinear equalizers: Decision feedback equalizers, Maximum likelihood sequence Estimation (MLSE) equalizer.

Diversity Techniques: Space diversity: Selection diversity, feedback, MRC, EGC diversity, Polarization diversity, Frequency diversity, Time diversity, Rake Receiver.

UNIT – IV

Multiple Access in Wireless communications: Principle and applications of Multiple Access Techniques FDMA, TDMA, CDMA, Spread Spectrum Multiple Access.

UNIT – V

Wireless Generations Technologies up to 3G:1G, TDMA-based 2G, IS-95, 2.5G, 3G development, Air interface technologies , Internet speeds of 2G, 2.5G, and 3G technologies, Limitations of 3G, Quality of services (QOS) in 3G. 4GTechnology:4G evolution, Advantages of 4G over 3G, Applications of 4G, Limitations of 4G.

Text/Reference Books:

1. WCY Lee, Mobile Cellular Telecommunications Systems, McGraw Hill, 1990.
2. WCY Lee, Mobile Communications Design Fundamentals, Prentice Hall, 1993.
3. Raymond Steele, Mobile Radio Communications, IEEE Press, New York, 1992.
4. AJ Viterbi, CDMA: Principles of Spread Spectrum Communications, Addison Wesley, 1995.
5. VK Garg &JE Wilkes, Wireless & Personal Communication Systems, Prentice Hall, 1996.

EC413	FIBER OPTIC COMMUNICATION	L	T	P	M	C
		4	0	0	100	3

UNIT – I

INTRODUCTION: Historical development, Elements of an Optical Fiber transmission link, Advantagesof Optical Fibers, Applications of Optical Fiber, Ray Theory Transmission, Total internal reflection, Acceptance angle, Critical angle, Numerical Aperture.

Fiber types: Step Index, Graded Index: Modes of Propagation: single mode and multimode fibers, Fiber materials.

UNIT – II

TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS: Attenuation, absorption, scattering and bending losses in fibers, Dispersion: Intermodel and intramodel.

FIBER OPTIC COMPONENTS: Splicing, Connectors, Connection losses, Fiber Optic couplers, Fiber Optic Switches.

UNIT – III

OPTICAL SOURCES: General characteristics, Principles of Light Emission. Light Emitting Diodes Types-Planar,Dome, Surface emitting, Edge emitting, Super luminescent LED's. LED Characteristics – Optical output power & efficiency, output spectrum, modulation bandwidth, reliability.

LASER: Working of DH injection laser, DFB laser and Threshold condition for lasing.

DETECTORS: Principles of photo detection. PIN Photodiode, Avalanche Photodiode and their characteristics.

UNIT – IV

OPTICAL FIBER SYSTEMS: Optical Transmitter Circuits - source limitations, LED drive circuits. Optical Receiver Operation-Digital system transmission, error sources, receiver configuration, Preamplifier types, Digital receiver performance-probability of error, Quantum limit, System considerations – Link power budget, rise time budget, Advanced Multiplexing Strategies – OTDM, WDM.

UNIT – V

OPTICAL FIBER MEASUREMENTS: Numerical Aperture, attenuation, refractive index, dispersion losses, cutback and OTDR.

OPTICAL NETWORKS: Basic Networks. Network Topologies, Performance of passive linear buses.

SONET/ SDH: Transmission formats and speeds, Optical interfaces, SONET/SDH Rings, SONET/ SDH Networks.

TEXT BOOS:

1. John M Senior, Optical Fiber Communications: Principles and Practice, 2nd Edition, PHI, 2002.
2. Henry Zanger and Cynthia Zanger, Fiber Optics: Communication and other Applications, Maxwell Macmillan Edition.
3. JC Palais, Fiber Optic Communications, 2nd Edition, PHI, 2001.
4. W.Tomasi, Advanced Electronic Communication Systems, Pearson Education, 2002.

EC414/1	INFORMATION THEORY AND CODING	L	T	P	M	C
		4	0	0	100	3

Unit I

Introduction: Measure of information, Average information content of symbols in long independent and dependent sequences, Entropy calculation for extension of source. Mark-off statistical model for information source, Entropy and information rate of mark-off source.

Unit II

Encoding of source output Shannon‘s encoding algorithm for dependent and independent sequences. Discrete communication channels, Continuous channels. Source coding theorem, Huffman coding, discrete memory less Channels, Mutual information, Properties of mutual information, Channel Capacity. Channel coding theorem, Differential entropy and mutual information for continuous ensembles, Channel capacity Theorem

Unit III

Error Control coding: Introduction, Types of errors, examples, Types of codes.
Linear Block Codes: Matrix description, Error detection and correction, Standard arrays and table look up for decoding.

Unit IV

Binary cycle codes: Algebraic structures of cyclic codes, encoding using an (n-k) bit shift register, Syndrome calculation, BCH codes, RS Codes, Olay codes, Shortened cyclic codes, Burst error correcting codes. Burst and Random Error correcting codes.

Unit V

Convolution Codes: Block diagram of encoder, Impulse response of encoder, Time domain approach and Transform domain approach. State representation and state diagram, Tree diagram, Trellis diagram.

Text Books

1. K. Sam Shanmugam, ―Digital and Analog communication systems‖, John Wiley, (1996).
2. Simon Haykin, ―Digital communication‖, John Wiley, (2003).
3. R Bose, ―Information Theory, Coding and Cryptography‖, TMH 2007

Reference books:

1. Elements of Information Theory by Thomas Cover, Joy Thomas
2. Channel Codes: Classical and Modern by William Ryan, Shu Lin
3. Information Theory and Reliable Communication by Robert Gallager
4. Kennedy, ―Electronic Communication systems‖, McGraw Hill, 4th Ed., 1999.

EC414/2	SPEECH AND AUDIO SIGNAL PROCESSING	L	T	P	M	C
		4	0	0	100	3

UNIT-I

Introduction- Speech production and modeling - Human Auditory System; General structure of speech coders; Classification of speech coding techniques – parametric, waveform and hybrid ; Requirements of speech codecs –quality, coding delays, robustness.

UNIT-II

Speech Signal Processing- Pitch-period estimation, all-pole and all-zero filters,convolution; Power spectral density, periodogram, autoregressive model, autocorrelation estimation. Linear Prediction of Speech- Basic concepts of linear prediction;

UNIT-III

Linear Prediction Analysis of non stationary signals –prediction gain, examples; Levinson-Durbin algorithm; Long term and short-term linear prediction models; Moving average prediction. Speech Quantization- Scalar quantization–uniform quantizer, optimum quantizer, logarithmic quantizer, adaptive quantizer, differential quantizers; Vector quantization – distortion measures, codebook design, codebook types.

UNIT-IV

Scalar Quantization of LPC- Spectral distortion measures, Quantization based onreflection coefficient and log area ratio, bit allocation; Line spectral frequency – LPC to LSF conversions, quantization based on LSF. Linear Prediction Coding-LPC model of speech production; Structures of LPCencoders and decoders; Voicing detection; Limitations of the LPC model.

UNIT-V

Code Excited Linear Prediction-CELP speech production model; Analysis-by-synthesis; Generic CELP encoders and decoders; Excitation codebook search – state-save method, zero-input zero-state method; CELP based on adaptive codebook, Adaptive Codebook search; Low Delay CELP and algebraic CELP. Speech Coding Standards-An overview of ITU-T G.726, G.728 and G.729standards

Text/Reference Books:

1. “Digital Speech” by A.M.Kondoz, Second Edition (Wiley Students‟ Edition), 2004.
2. “Speech Coding Algorithms: Foundation and Evolution of Standardized Coders”, W.C. Chu, WileyInter science, 2003.

EC414/3	SATELLITE COMMUNICATION	L	T	P	M	C
		4	0	0	100	3

UNIT-I

Introduction to Satellite Communication: Principles and architecture of satellite Communication, Brief history of Satellite systems, advantages, disadvantages, applications and frequency bands used for satellite communication.

UNIT-II

Orbital Mechanics: Orbital equations, Kepler's laws, Apogee and Perigee for an elliptical orbit, evaluation of velocity, orbital period, angular velocity etc. of a satellite, concepts of Solar day and Sidereal day.

UNIT-III

Satellite sub-systems: Study of Architecture and Roles of various sub-systems of a satellite system such as Telemetry, tracking, command and monitoring (TTC & M), Attitude and orbit control system (AOCS), Communication sub-system, power sub-systems etc.

UNIT-IV

Typical Phenomena in Satellite Communication: Solar Eclipse on satellite, its effects, remedies for Eclipse, Sun Transit Outage phenomena, its effects and remedies, Doppler frequency shift phenomena and expression for Doppler shift. Satellite link budget Flux density and received signal power equations, Calculation of System noise temperature for satellite receiver, noise power calculation, Drafting of satellite link budget and C/N ratio calculations in clear air and rainy conditions.

UNIT-V

Modulation and Multiple Access Schemes: Various modulation schemes used in satellite communication, Meaning of Multiple Access, Multiple access schemes based on time, frequency, and code sharing namely TDMA, FDMA and CDMA.

Text /Reference Books:

1. Timothy Pratt Charles W. Bostian, Jeremy E. Allnutt: Satellite Communications: Wiley India. 2nd edition 2002
2. Tri T. Ha: Digital Satellite Communications: Tata McGraw Hill, 2009
3. Dennis Roddy: Satellite Communication: 4th Edition, McGraw Hill,2009

ECE415/1	ARTIFICIAL NEURAL NETWORKS	L	T	P	M	C
		4	0	0	100	3

UNIT-I

Fundamentals of Artificial Neural Networks, Evolution of Neural Networks, Structure and functions of biological and artificial neuron, Models of Artificial Neural Networks, Activation functions, Neural network architectures, Important Terminologies in ANN

UNIT-II

Neural Network Learning Rules (Hebbian learning rule, Perceptron learning rule, Delta learning rule, Widrow-Hoff learning rule, Winner–takes all learning rule). McCulloch Pitts Neuron Model, Linear separability, Adaline and Madaline.

UNIT-III

Backpropagation Algorithm, Importance of learning parameter and momentum term, Polynomial Networks. Counter Propagation Networks, Kohonen Self-Organizing maps, Learning Vector Quantizers, Adaptive Resonance Theory, Hamming Net, Max Net.

UNIT-IV

Associative memories, Recurrent and Associative Memory, Continuous and Discrete Hopfield Networks, Boltzman Machines, Bi-directional Associative Memory, Optimization of Neural Networks.

UNIT-V

Learning from examples and generalization, Support Vector Machines, Applications to image classification, Radial Basis Function networks, Regularization Theory route to RBFN Generalized Radial Basis function network, Learning in RBFN, Application to Face recognition.

Text Books:

1. Introduction to Artificial Neural Systemsby Jacek M. Zurada
2. Introduction to Neural Networks using Matlab 6.0 by S.N Sivanandam, S.Sumathi, S.N Deepa
3. Neural Networks and Deep Learning, Charu C. Aggarwal
4. Satish Kumar, “Neural Networks, A Classroom Approach”, Tata McGraw -Hill, 2007.

Reference Books:

1. B. Yegnanarayana, Artificial Neural Networks, PHI, New Delhi
2. Kishan Mehrotra, Chelkuri K. Mohan, Sanjav Ranka, elements of ArtificialNeuralNetworks, Tenram International
3. Simon Haykin, “Neural Networks, A Comprehensive Foundation”, 2nd Edition, Addison Wesley Longman, 2001.

EC415/2	MACHINE LEARNING	L	T	P	M	C
		4	0	0	100	3

UNIT – I

Introduction to machine learning: Concept Learning and the General to Specific Ordering: Concept learning task, concept learning as search, Find-S: finding a Maximally Specific hypothesis,Version Spaces and the Candidate-Elimination algorithm, remarks on Version Spaces and Candidate-Elimination and inductive bias. **Decision Tree Learning:** Decision Tree representation, appropriate problems for Decision Tree learning, hypothesis space search in Decision Tree learning, inductive bias in Decision Tree learning and issues in Decision Tree learning.

UNIT – II

Artificial Neural Networks: Neural Network representations, appropriate problems for Neural Network learning, Perceptrons, Multilayer Networks and the Back propagation algorithm and remarks on the Back propagation algorithm. **Evaluating Hypotheses**: Estimating hypothesis accuracy, basics of sampling theory, general approach for deriving confidence intervals, difference in error of two hypotheses and comparing learning algorithms.

UNIT – III

Bayesian Learning: Bayes theorem and concept learning, maximum likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classier, Gibbs algorithm, Naive Bayes classier, Bayesian belief networks and EM algorithm.

UNIT-IV

Computational learning theory: Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis spaces and sample complexity for infinite hypothesis spaces and mistake bound model of learning.

UNIT – V

Instance Based Learning: Introduction, k-Nearest Neighbour learning, locally weighted regression,radial basis functions, Case Based Reasoning and remarks on Lazy and Eager learning. **Genetic Algorithms**: Introduction, hypothesis space search, Genetic programming and models of evolution and learning.

TEXT BOOKS:

1. Tom M. Mitchell, “Machine Learning”, Mc. Graw Hill Publishing

EC415/3	COMPUTER VISION APPLICATIONS	L	T	P	M	C

4	**0**	**0**	**100**	**3**

Unit-I

Image formation and Image Processing: Introduction to Computer Vision; Geometric primitives and transformations: Geometric primitives, 2D transformations, 3D transformations, 3D rotations, 3D to 2D projections; Image Processing: Histogram Processing, Linear filtering, Fourier transforms, Image Enhancement, Restoration.

Unit-II

Local Image Features Extraction: Edges: Edge detection, Edge linking; Lines: Hough transforms, Orientation Histogram, HOG, SIFT, SURF; Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.

Unit-III

Image Segmentation and Recognition: Active contours: Snakes, Dynamic snakes and Condensation, Scissors, Level Sets; Graph-based segmentation, Texture Segmentation; Object detection: Face detection, Detecting Humans, Detecting Boundaries, Datasets and Resources.

Unit-IV

Pattern Analysis: Clustering: K-Means, K-Medoids, Mixture of Gaussians; Classifiers: SVM, ANN, CNN; Dimensionality Reduction: PCA, LDA, ICA, Case Study and

Unit-V

Applications: Study of Facebook, Google, Netflix, LinkedIn, Instagram and Amazon use various image processing algorithms for face recognition, human identification, scene analysis and content analysis. Develop a computer vison model for face detection

Text Books:

1. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited 2011.
2. Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, 2011.

References Text Books

1. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004.
2. K. Fukunaga; Introduction to Statistical Pattern Recognition, Second Edition, Academic Press, Morgan Kaufmann, 1990.
3. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Addison- Wesley, 1992.

EC416 INDUSTRIAL MANAGEMENT AND ENTREPRENEUR DEVELOPMENT

L	T	P	M	C
4	**0**	**0**	**100**	**3**

UNIT -I

Forecasting: Techniques of Forecasting, methods of forecasting, moving average, least squares, simple exponential smoothing, linear regression, correlation coefficient, problems. Entrepreneurial Development: Entrepreneurship, Qualities of Entrepreneur, Role of Entrepreneur, Expectations of Entrepreneur, SSI, Registration of SSI.

UNIT – II

Materials Management and MRP: Functions of materials management, purpose of inventories, types of inventories, EOQ, EPQ, Buffer stock, Reserve stock, Safety stock, relevant costs in inventory control, ABC and VED analysis,Single period inventory model.

Materials requirement planning (MRP): Importance of MRP, MRP system inputs and outputs, bill of materials, Source Selection, Vendor rating.

UNIT – III

General Management: Principles of scientific management, Principles of general management, Levels of Management, Managerial skills, brief treatment of managerial functions: planning, organizing, staffing, directing, coordinating and controlling.

Forms of Business Organization: Salient features of sole proprietorship, partnership, Joint Stock Company: private limited and public limited companies.

UNIT – IV

Marketing Management: Concept of selling and marketing – differences, functions of marketing, market research, Purchasing methods, selection of vendor, advertising and sales promotion methods, distribution channels-types, product life cycle.

Financial Management: Functions of finance, simple and compound interest, depreciation, common methods of depreciation: straight line method, declining balance method, sum of years digits method, Types of depreciation, Cash flow diagram.

UNIT-V

Personnel Management: The personnel Management function, Training and Development, recruitment, selection, performance appraisal, Styles of Leader ship, Theories of Motivation.Job Design and Analysis: Job design, Approaches of Job design, Job enrichment, Techniques of Job enrichment, Job Analysis,job description, job specification

TEXT BOOKS:

1. KK Ahuja, Industrial Management, Vol. I & II, Dhanpat Rai, 1978.
2. E.Paul Degarmo, John R Chanda, William G Sullivan, Engineering Economy, Mac Millan Publishing Co, 1979

REFERENCE BOOKS:

1. Philip Kotler, Marketing Management, 11th Edition, Pearson Education, 2004.
2. P. Gopalakrishnan, Hand Book of Materials Management, PHI, 1999

EC 452 HIGH FREQUENCY STRUCTURE SIMULATOR (HFSS)

L	T	P	M	C
0	0	3	100	2

1. Introduction to HFSS
2. Study of optimization and preprocessing steps
3. Design and simulation of monopole antenna
4. Design and simulation of Dipole antenna
5. Design and simulation of Rectangular patch antenna
6. Design and simulation of Probe feed patch antenna
7. Design and simulation of Triangular microstrip antenna
8. Design and simulation of slot antenna
9. Study of antenna arrays.
10. Design of antenna array using tool kit.
11. Design and simulation 1D arrays using HFSS

NOTE: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for University Practical Examination.

ELECTRONICS AND COMMUNICATION ENGINEERING BRANCH

SCHEME OF INSTRUCTION AND EXAMINATION, w.e.f. 2019-2022

IV/IV B.TECH. - SEMESTER II

S. No.	Course Details		Category	Scheme of Instruction			Scheme of Examination		
	Code	Subject Name		Hours in a Week			Marks		Credits
				L	T	P	Internal	External	
1	EC 461	Project Work	Project	0	0	0	50	100	8
2	EC 462	Seminar	Seminar	0	0	0	50	0	2
3	EC 463	MOOCs	MOOC	0	0	0	100	0	2
Total Credits									**12**