JAMIA HAMDARD

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CBCS ENABLED SYLLABUS
B.TECH. (ELECTRONICS AND COMMUNICATION ENGINEERING)

SYLLABUS FOR B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based credit system (CBCS)

Approval Date: 26th June 2022

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

JAMIA HAMDARD

Deemed to be University

Accredited in 'A' Grade by NAAC

Declared to be designated as Institute of Eminence (IoE) by MHRD, GOI,

New Delhi-110062

www.Jamiahamdard.edu.in

PROGRAMME NAME: B.TECH. (ELECTRONICS & COMMUNICATION ENGINEERING)

PROGRAMME CODE: 333 & 209 (Lateral Entry)

ACADEMIC SESSION OF INTRODUCTION OF THE PROGRAMME: (2022-23)

SCHOOL NAME: SEST

DEPARTMENT NAME: COMPUTER SCIENCE & ENGINEERING

APPROVAL DATE OF THE BOARD OF STUDIES (BOS) MEETING FOR THE PRESENT SYLLABUS
26 JUNE 2022

APPROVAL DATE NUMBER OF ACADEMIC COUNCIL OF MEETING FOR THE PRESENT SYLLABUS

ADMISSION & EXAMINATION
BYE-LAWS

FOR

BACHELOR OF TECHNOLOGY
(ELECTRONICS &COMMUNICATION ENGINEERING)
B. TECH. (ECE)
Program Code: 333
&

BACHELOR OF TECHNOLOGY
(ELECTRONICS &COMMUNICATION ENGINEERING)
B. TECH. (ECE) (Lateral Entry)
Program Code: 209

CHOICE BASED CREDIT SYSTEM (CBCS)
(with effect from 2022-23)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
School of Engineering Sciences& Technology
JAMIA HAMDARD
(DEEMED TO BE UNIVERSITY)
Hamdard Nagar, New Delhi-110 062
Ph. 011 26059688, Extn. - 5858

Content

Board of Studies (BoS) Meetings

1. Date of Revision B.Tech (ECE) : 02-11-2018
2. Date of Revision B.Tech (ECE)-Lateral Entry : 20-09-2019
3. Date of Revision B.Tech (ECE) : 40-02-2020
4. Date of Revision B.Tech (ECE) : 03-06-2022
5. Date of Revision B.Tech (ECE)-Lateral Entry : 03-06-2022

SCHOOL OF EGINEERING SCIENCES AND TECHNOLOGY

Vision Statement: To become the best institution in the national and international map in terms of quality of teaching and research, technical knowledge and academics in the field Computer Science & Engineering, Electronics & Communication Engineering, Bioinformatics with sincere honesty adding values in the core aspect of students' life.

Mission Statements:

MS1: To offer state-of-the-art undergraduate, postgraduate and doctoral programs in Computer Science & Engineering, Electronics and Communication Engineering & Engineering and Bioinformatics.

MS 2: To provide one of the best working environments to motivate faculty and students to work towards vision of the Department.

MS 3: To develop association with industry, other Universities/Institute/Research Laboratories and work in collaboration with them.

MS 4: To use our expertise in all the relevant disciplines for helping society in solving its real-life problem.

MS 5: To develop entrepreneurship skills in the students so that they can become problem solver and innovative developer and contribute to the society by providing employment to others.

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PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Upon the completion of Academic Programme (B.Tech. in Electronics & Communication Engineering), students will be able to:

PEO-1 : To establish technical and profesional foundation that yield them to go for higher studies in the field of Electronics & Communication.

PEO-2: In deth understanding of subject can lead to successful designing new products with Good efficiency and low cost for mass acceptibility.

PEO-3: The sound health and knowledge can invent novel solution for particular problema in the ara multidisciplinary work environmnet.

PEO-4: Life long learning is the core mantra to renovate new idea into the field of evolving technology.

PEO-5: The profesional ethics, leadership and profesional communication among diversified group leads to achieve targetted goal.

Mapping Program Educational Objectives (PEOs) with Mission Statements (MS)

	MS-1	MS-2	MS-3	MS-4	MS-5
PEO-1	3	2	2	1	1
PEO-2	2	1	3	3	3
PEO-3	1	2	2	3	3
PEO-4	2	3	2	2	2
PEO-5	3	2	3	3	3

Write ‘3’ in the box for ‘high-level’ mapping, 2 for ‘Medium-level’ mapping, 1 for ‘Low-level’ mapping.

Program Outcomes
PO1: Apply the knowledge of mathematics, science, engineering fundamentals, and Engineering specialization to the solution of complex engineering problems. PO2: Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences. PO3: Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations. PO4: Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. PO5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. PO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. PO7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. PO9: Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings. PO10: Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions. PO11: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments. PO12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1: The ability to absorb and apply fundamental knowledge of core Electronics and Communication Engineering subjects in the analysis, design, and development of various types of integrated electronic systems.

PSO2: To interpret and synthesize the experimental data leading to valid conclusions for a practical system.

PSO3: Excellent adaptability to changing work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

Mapping of Program Outcomes (POs) and Program Specific Outcomes (PSOs) with Program Educational Objectives (PEOs)

	PEO-1	PEO-2	PEO-3	PEO-4	PEO-5
PO-1	3	3	2	2	1
PO-2	3	3	1	2	1
PO-3	3	2	2	2	3
PO-4	2	3	2	3	2
PO-5	3	2	2	3	2
PO-6	2	3	3	1	2
PO-7	2	3	3	2	2
PO-8	2	3	2	3	1
PO-9	1	2	3	2	3
PO-10	2	2	1	2	2
PO-11	2	2	3	2	1
PO-12	1	2	2	3	3
PSO-1	3	2	3	2	3
PSO-2	2	3	2	2	2
PSO-3	3	2	3	2	3

Mapping of Program Specific Outcomes (PSOs) where applicable.

Write ‘3’ in the box for ‘high-level’ mapping, 2 for ‘Medium-level’ mapping, 1 for ‘Low-level’ mapping.

ADMISSION & EXAMINATION RULES
For
BACHELOR OF TECHNOLOGY
(ELECTRONICS & COMMUNICATION ENGINEERING)
B. TECH. (ECE)

1. THE PROGRAMME

Highlights of the course are described in the following table:

1.1 BTECH ECE

a.	Name of the Programme	BACHELOR OF TECHNOLOGY (ELECTRONICS & COMMUNICATION ENGINEERING) - B. TECH. (ECE)
b.	Nature	Regular and Full Time
c.	Duration	Four Years (8 Semesters)
d.	Total number of credits	198
e.	Medium of Instruction and English Examinations	English
f.	Eligibility Criteria	A candidate seeking admission to this program must have passed Senior Secondary (12th / Intermediate) examination with Mathematics and Physics compulsory, and one subject out of the following: Computer Science, Chemistry, Electronics from CBSE or any other Board recognized by Jamia Hamdard as equivalent thereto, securing at least 50% marks or equivalent CGPA in aggregate.
g.	Selection procedure	Selection will be based on merit in Paper-1 (B.E./B.Tech.) of JEE (Main). In case the seats remain unfilled, Jamia Hamdard may admit candidates on the basis of merit of qualifying examination or the merit of internal test and/or Interview conducted by Jamia Hamdard which will be announced separately, if situation arises.
h.	Total Seats	60; inclusive of seats reserved for NRI / sponsored candidates; additional seats are available for Foreign Nationals.
i.	Period of Completion	Not more than 07 years (14 Semesters)
j.	Commencement of the Programme	July of every academic session

1.2. BTECH ECE (Lateral Entry)

a.	Name of the Programme	BACHELOR OF TECHNOLOGY (ELECTRONICS & COMMUNICATION ENGINEERING) - B. TECH. (ECE) (Lateral Entry)
b.	Nature	Regular and Full Time
c.	Duration	Three Years (6 Semesters)
d.	Total number of credits	154
e.	Medium of Instruction and English Examinations	English
f.	Eligibility Criteria	A candidate seeking admission to B.Tech (ECE) lateral entry must have passed Diploma Engineering in Electronics and Communication Engineering/Electrical Engineering/Computer Science and Engineering/ Information Technology/Allied Branches examination from a recognized institution /university securing at least 50% marks or equivalent CGPA in aggregate.
g.	Selection procedure	Jamia Hamdard will admit candidates on the basis of merit of qualifying examination.
h.	Total Seats	Maximum of 10% of "Approved Intake", plus the unfilled vacancies of First year.
i.	Period of Completion	Not more than 06 years (12 Semesters)
j.	Commencement of the Programme	July of every academic session

2. PROGRAMME STRUCTURE (B.Tech ECE)

Semester-wise course structure, guidelines for teaching, practical and associated assessment of the programme is described in the following tables:

Course Type	**Subject Area**	**Credits**	**Percentage (%)** *(Approx)*
Foundation Core (FC)	Humanities and Social Sciences (HS), including Management courses	12	22
	Basic Sciences (BS) including Mathematics, Physics, Chemistry, Biology	31	
Departmental Core (DC)	Engineering Sciences (ES), including workshop, drawing, basics of electrical/mechanical/computer etc.	35	63
	Professional Core (PC) courses, relevant to the chosen specialization/ branch; (May be split into Hard (no choice) and Soft (with choice), if required)	72	
	Project Work, Seminar and/or Internship in Industry or elsewhere.	18	
Departmental Electives (DE)	Departmental Electives, relevant to the chosen specialization/ branch/MOOC*	18	9
Open Electives (OE)	Open Subjects- Electives (OE), from other technical and/or emerging subjects	12	6
Mandatory Courses (MC)	Mandatory Courses (MC) [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge]	0	Non-Credit
Total		**198**	**100**

*** The list of online courses to be cleared through MOOCs shall be floated in the respective semester after approval from the Board of Studies with provision for inhouse examination.**

3. PROGRAMME STRUCTURE (B.Tech ECE Lateral Entry)

Semester-wise course structure, guidelines for teaching, practical and associated assessment of the programme is described in the following tables:

Course Type	Subject Area	Credits	Percentage (%) (Approx)
Foundation Core (FC)	Humanities and Social Sciences (HS), including Management courses	9	10
	Basic Sciences (BS) including Mathematics, Physics, Chemistry, Biology	7	
Professional Core (PC)	Engineering Science (ES) courses including Workshop, Drawing, Basics of Electrical/ Mechanical/ Computer etc	18	70
	Professional core courses (PC)	72	
	Project Work, Seminar and/or Internship in Industry or elsewhere.	18	
Departmental Electives (DE)	Departmental Elective (DE) courses relevant to chosen specialization/branch/MOOC*	18	12
Open Electives (OE)	Open subjects – Electives (OE) from other technical and /or emerging subjects	12	8
Mandatory Courses (MC)	Mandatory Courses (MC)	0	Non-Credit
Total		154	100

*** The list of online courses to be cleared through MOOCs shall be floated in the respective semester after approval from the Board of Studies with provision for inhouse examination.**

Course Codes:

Course code	**Definitions**
BS	Basic Science Courses
ES	Engineering Science Courses
HS	Humanities and Social Sciences including Management courses
PC	Professional core courses
DE	Departmental Elective courses
OE	Open Elective courses
LC	Laboratory course
MC	Mandatory courses
PROJ	Project
DISS	Dissertation
MOOCs	Massive Open Online Courses

Mandatory Induction Program of 3 weeks duration (Non-Credit)
Induction program for students will be offered right at the start of the first year.

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

L-T-P stands for number of contact hours as Lecture-Tutorial-Practical in a week.

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hours Practical (Lab)/week	1 credit

B. Range of credits:
A total credit of 150 is required for a student to be eligible to get Undergraduate degree in Engineering. A student will be eligible to get Undergraduate degree with Honours or additional Minor Engineering, if he/she completes an additional 20 credits. These could be acquired through MOOCs.

Semester – I

Paper Code	Title of the Paper	Course type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTECE 101	Applied Physics – I	BS	40	60	100	3-1-0	4
BTECE 102	Mathematics – I	BS	40	60	100	3-1-0	4
BTECE 103	Basic Electrical Engineering	ES	40	60	100	3-1-0	4
BTECE 104	Engineering Graphics & Design	ES	40	60	100	1-0-0	1
BTECE 105	Applied Physics – I Lab	BS	40	60	100	0-0-4	2
BTECE 106	Basic Electrical Engineering Lab	ES	40	60	100	0-0-2	1
BTECE 107	Engineering Graphics & Design Lab	ES	40	60	100	0-0-4	2
BTECE 108	Essence of Indian Traditional knowledge	MC	40	60	100	2-0-0	0
					Total	**12-3-10**	**18**

Semester – II

Paper Code	Title of the Paper	Course type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTECE 201	Applied Physics – II	BS	40	60	100	3-1-0	4
BTECE 202	Mathematics-II	BS	40	60	100	3-1-0	4
BTECE 203	Programming for Problem Solving	ES	40	60	100	3-1-0	4
BTECE 204	Workshop /Manufacturing Practices	ES	40	60	100	1-0-0	1
BTECE 205	English Language	HS	40	60	100	2-0-0	2
BTECE 206	Applied Physics – II Lab	BS	40	60	100	0-0-4	2
BTECE 207	Programming for Problem Solving Lab	ES	40	60	100	0-0-4	2
BTECE 208	Workshop /Manufacturing	ES	40	60	100	0-0-4	2

	Practices Lab						
BTECE 209	English Language Lab	HS	40	60	100	0-0-2	1
BTECE 210	Basic Engineering Mechanics	BS	40	60	100	3-1-0	4
*BTECE 211	Environmental Sciences	MC	40	60	100	2-0-0	0
					Total	**17-4-14**	**26**

These subjects may be taught in either of the semesters (Semester-I and Semester-II) at the discretion of the Department. However, Semester Examination will be conducted only at the end of Semester-II.

Semester – III

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTECE 301	Electronic Devices	ES	40	60	100	3-1-0	4
BTECE 302	Chemistry	BS	40	60	100	3-1-0	4
BTECE 303	Signals and Systems	PC	40	60	100	3-1-0	4
BTECE 304	Network Theory	PC	40	60	100	3-1-0	4
BTECE 305	Digital System Design	ES	40	60	100	3-1-0	4
BTECE 306	Humanities-I (Effective Technical Communication)	HS	40	60	100	3-0-0	3
BTECE 307	Electronic Devices Lab	ES	**40**	**60**	100	0-0-2	1
BTECE 308	Digital System Design Lab	ES	**40**	**60**	100	0-0-2	1
BTECE 309	Introduction to IoT	ES	**40**	**60**	100	3-1-0	4
BTECE 310	Java Programming	ES	**40**	**60**	100	3-1-0	4
					Total	**24-7-4**	**33**

Semester – IV

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTECE 401	Analog and Digital Communication	PC	40	60	100	3-1-0	4
BTECE 402	Analog Circuits	PC	40	60	100	3-1-0	4

BTECE 403	Microcontrollers	PC	40	60	100	3-1-0	4
BTECE 404	Electronics Instrumentation & Measurement	PC	40	60	100	3-1-0	4
BTECE 405	Organizational Behaviour	HS	40	60	100	3-0-0	3
BTECE 406	Antennas and Propagation	PC	40	60	100	3-1-0	4
BTECE 407	Analog and Digital Communication Lab	PC	40	60	100	0-0-2	1
BTECE 408	Analog Circuits Lab	PC	40	60	100	0-0-2	1
BTECE 409	Microcontrollers Lab	PC	40	60	100	0-0-2	1
BTECE 410	Disaster Management	PC	40	60	100	3-0-0	3
					Total	**21-5-6**	**29**

Semester – V

Paper Code	**Title of the Paper**	**Course type**	**Marks**			**L-T-P**	**Credits**
			Internal Assessment	**Semester Exam**	**Total**		
BTECE 501	Electromagnetic Waves	PC	40	60	100	3-1-0	4
BTECE 502	Computer Architecture	PC	40	60	100	3-1-0	4
BTECE 503	Probability Theory and Stochastic Processes	PC	40	60	100	3-1-0	4
BTECE 504	Digital Signal Processing	PC	40	60	100	3-1-0	4
BTECE 505	Electromagnetic Waves Lab	PC	40	60	100	0-0-2	1
BTECE 506	Digital Signal Processing Lab	PC	40	60	100	0-0-2	1
BTECE 507	Constitution of India	MC	40	60	100	0-0-0	0
	Departmental Elective –I	DE	40	60	100	3-0-0	3
	Open Elective –I	OE	40	60	100	3-0-0	3
					Total	**18-4-4**	**24**

Semester – VI

Paper Code	Title of the Paper	Course type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTECE 601	Project – I	PROJ	40	60	100	0-0-6	3
BTECE 602	Control Systems	PC	40	60	100	3-1-0	4
BTECE 603	Computer Networks	PC	40	60	100	3-1-0	4
BTECE 604	Humanities II (Professional Practice, Law & Ethics)	HS	40	60	100	3-0-0	3
BTECE 605	Electronic Measurement Lab	PC	40	60	100	0-0-2	1
BTECE 606	Computer Networks Lab	PC	40	60	100	0-0-4	2
BTECE 607	Sensors and Instrumentation	PC	40	60	100	3-0-0	3
	Departmental Elective – II	DE	40	60	100	3-0-0	3
	Open Elective – II	OE	40	60	100	3-0-0	3
					Total	**18-2-12**	**26**

Semester – VII

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTECE 701	Project-II	PROJ	200	100	300	0-0-12	6
BTECE 702	Biology	BS	40	60	100	2-1-0	3
BTECE 703	Information Theory and Coding	PC	40	60	100	3-0-0	3
BTECE 704	Wireless Communicatio n	PC	40	60	100	3-0-0	3
	Departmental Elective – III	DE	40	60	100	3-0-0	3
	Departmental Elective – IV	DE	40	60	100	3-0-0	3
	Departmental Elective – V	DE	40	60	100	3-0-0	3
					Total	**17-1-12**	**24**

Semester – VIII

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTECE 801	Dissertation	DISS	300	200	500	0-0-18	9
	Departmental Elective – VI	DE	40	60	100	3-0-0	3
	Open Elective – III	OE	40	60	100	3-0-0	3
	Open Elective – IV	OE	40	60	100	3-0-0	3
					Total	**9-0-18**	**18**

*** The list of online courses to be cleared through MOOCs shall be floated in the respective semester after approval from the Board of Studies with provision for inhouse examination.**

Total Credits – 198

Departmental Electives (DE) & Open Electives (OE)

There will be Departmental Electives and Open Elective. The department may permit students to take 50% of these (Departmental electives + open electives) from other disciplines, based on the choices of the students and consent of course advisors.

There should be at least two electives from the open elective choices; the rest two can be taken from the others, if intended.

Pls. see the Table.

On-line MOOC courses may contribute up to 20% of the credits, with in-house examination being conducted.

Departmental Electives (DE)

Paper Code	Title of the Paper	Marks			L-T-P	Credits
		Internal Assessment	Semester Exam	Total		
Departmental Elective –I						
BTECE DEI11	Microwave Theory and Techniques	40	60	100	3-0-0	3
BTECE DEI12	Fibre Optic Communication	40	60	100	3-0-0	3
BTECE DEI13	MOOCs 1	40	60	100	3-0-0	3
Departmental Elective –II						
BTECE DEI21	MOOCs 2	40	60	100	3-0-0	3
BTECE DEI22	Introduction to MEMS	40	60	100	3-0-0	3
BTECE DEI23	Adaptive Signal Processing	40	60	100	3-0-0	3
Departmental Elective –III						
BTECE DEI31	MOOCs 3	40	60	100	3-0-0	3
BTECE DEI32	Bio-Medical Electronics	40	60	100	3-0-0	3
BTECE DEI33	Mobile Communication and Networks	40	60	100	3-0-0	3
Departmental Elective –IV						
BTECE DEI41	Digital Image and Video Processing	40	60	100	3-0-0	3
BTECE DEI42	Mixed Signal Design	40	60	100	3-0-0	3
BTECE DEI43	Wireless Sensor Networks	40	60	100	3-0-0	3
Departmental Elective –V						
BTECE DEI51	CMOS Design	40	60	100	3-0-0	3

BTECE DEI52	Power Electronics	40	60	100	3-0-0	3
BTECE DEI53	Satellite Communication	40	60	100	3-0-0	3
Departmental Elective –VI						
BTECE DEI 61	Switching System	40	60	100	3-0-0	3
BTECE DEI 62	Speech and Audio Processing	40	60	100	3-0-0	3
BTECE DEI 63	Embedded System	40	60	100	3-0-0	3

Open Electives

Paper Code	**Title of the Paper**	**Marks**		**L-T-P**		**Credits**
		Internal Assessment	**Semester Exam**	**Total**		
Open Elective –I						
BTECE OE11	ICT for Development	40	60	100	3-0-0	3
BTECE OE12	Soft Skills and Interpersonal Communication	40	60	100	3-0-0	3
BTECE OE13	Cyber Law and Ethics	40	60	100	3-0-0	3
Open Elective –II						
BTECE OE21	History of Science and Engineering	40	60	100	3-0-0	3
BTECE OE22	Sustainable Development	40	60	100	3-0-0	3
BTECE OE23	Ethical Hacking	40	60	100	3-0-0	3
Open Elective –III						
BTECEOE31	Data Mining	40	60	100	3-0-0	3
BTECE OE32	Enterprise Resource and Planning	40	60	100	3-0-0	3
BTECE OE33	Rural Technology & Community	40	60	100	3-0-0	3

Open Elective –IV						
BTECE OE41	Green Computing	40	60	100	3-0-0	3
BTECE OE42	Customer Relationship Management	40	60	100	3-0-0	3
BTECE OE43	Infrastructure Systems Planning	40	60	100	3-0-0	3

4. MODE OF CURRICULUM DELIVERY

Mode of curriculum delivery includes classroom teaching, assignments, test, lab work, presentations, participation in relevant events and regularity.

5. THE GRADING SYSTEM

As per University Rule

6. CALCULATION OF SGPA AND CGPA OF A STUDENT IN A SEMESTER

As per University Rule

7. ADMISSION

A candidate, aspiring for admission to **B. Tech. (ECE) and B. Tech (ECE - Lateral Entry) Programme**, shall have to apply in the prescribed application form that is complete in all respect, on or before the last date of submission.

NOTE:

a. Different procedure may be adapted for admission of foreign/NRI/Industry-sponsored candidates, who apply for admission in the prescribed form and fulfill the eligibility requirements.

a. The admission committee, duly constituted for purpose, would prepare a merit list on the basis of the selection criteria.

c. Admission committee shall display/publish the list of candidates that are declared eligible for admission, after the due approval of the competent authority.

d. Eligible candidates shall have to complete the prescribed formalities, for completion of admission, within the stipulated period of time; otherwise, they will forfeit the right to admission.

8. ATTENDANCE

a. All students are supposed to attend every lecture and practical classes. However, the attendance requirement for appearing in the examination shall be a minimum of 60% of the classes held.

b. Each one-period teaching shall account for one attendance unit.

c. The concerned teacher will take a roll call in every scheduled class, maintains and consolidate the attendance record, which would be submitted to the Head of the Department at the conclusion of the semester.

d. Attendance on account of participation (with prior permission from the head of the department) in the co-curricular/extra-curricular activities can be granted by the Dean on receipt of certificates or recommendations of the respective activity issued by the Head of the Department.

e. Attendance records displayed on Notice Board from time to time, in respect of short attendance, shall be deemed to be a proper notification and no individual notice shall be sent to the students/local guardian.

f. In case a student is found to be continuously absent from the classes without information for a period of 30 days, the concerned teacher shall report it to the Head of the Department.

g. Head of the department may recommend for striking off the name of a student from rolls, after ensuring '**one-month continuous absence'**, from all the concerned teachers.

h. A student, whose name has been struck off on account of long absence may apply to the Dean for readmission within 15 days of the notice of striking off the name. The readmission shall be affected on payments of prescribed readmission fees.

i. A student with less than 60% attendance, in aggregate shall not be allowed to appear in the semester examination. The Head of the Department shall recommend all such cases to the Dean of the faculty.

j. The Dean, on the recommendation of the Head of the Department, may consider the relaxation of attendance up to 10% on account of sickness and /or any other valid reason. No application for relaxation of attendance (duly certified by a Registered Medical Practitioner/Public hospital or a competent authority) will be entertained after 15 days from the recovery from illness etc.

k. A student detained on account of short attendance will start afresh in the same class in the next academic year on payment of current fees except enrollment fee, identity card fee and security deposits etc.

9. INTERNAL ASSESSMENT

a. Internal assessment, to be made by concerned teachers, will be based on minor tests, quizzes, presentation, programming test, demonstrations and assignments.

b. There will be Three (02) internal assessment (Unit Test) with a total of 30 marks (each of 15 marks). Other modes of assessment shall account for remaining 10 marks (Assignments, attendance etc).

c. Dates for unit test will be announced at the beginning of the semester, by the examination coordinator.

d. The teacher concerned shall maintain a regular record of the marks obtained by students in minor tests and display the same in due course.

e. The concerned teachers shall submit the compiled internal assessment marks to the Head of the Department, on the conclusion of teaching of the current semester.

f. The Head shall display a copy of the compiled sheet, of internal assessment marks of all the papers, before forwarding it to the Controller of Examination, i.e., at the conclusion of the semester.

g. A promoted candidate, who has to reappear in the examination of a paper, will retain internal assessment marks.

h. In the case of re-admission, the candidates shall have to go through the internal assessment process afresh and shall retain nothing of the previous year.

10. SEMESTER EXAMINATIONS

Prescriptions for conducting semester examinations of theory and lab papers, those shall be conducted after the conclusion of each of the semesters, are presented in the following table:

S.N.	Classification	Theory	Lab
1.	Mode	Written Only	Written, Demo, Programming and viva- voce etc.
2.	Duration	02 Hour 30 Minute	03 Hour
3.	Total Marks	60 (Sixty Only)	60 (Sixty Only)

11. DISSERTATION

a. Each student of the final semester will have to carry out a project under the guidance of one or two faculty members.

b. There shall be a mid-term evaluation of the progress and the internal supervisors.

c. All the candidates shall submit ***Two (02***) hard copies of the project report that are duly approved and signed by internal as well as external (if applicable) supervisors.

d. An external examiner, appointed for the purpose, shall evaluate the project report.

e. Head of the department shall forward the compiled total marks (awarded in internal assessment, project Report and Viva-voce Examination), in the project-semester of each of the candidate, to the Controller of Examination.

12. EXAMINATION

a. The performance of a student in a semester shall be evaluated through continuous class assessment and end semester examination. The continuous assessment shall be based on class tests, assignments/ tutorials, quizzes/ viva voce and attendance. The end semester examination shall be comprised of written papers, practical and viva voce, inspection of certified course work in classes and laboratories, project work, design reports or by means of any combination of these methods.

b. The marks obtained in a subject shall consist of marks allotted in end semester theory paper, practical examination and sessional work.

c. The minimum pass marks in each subject including sessional marks (Theory, Practical or Project etc.) shall be 50%.

13. PROMOTION SCHEME

a. A student will be required to clear minimum **40% of his/her papers** (including Labs, excluding non-credit papers) in a semester/annual examination to be eligible **for promotion to the next semester/year**. A student may appear in the supplementary examination after each semester/annual examination and can have a choice to appear in the backlog papers in the supplementary examination or in the subsequent regular semester/annual examination with a prescribed fee. A student detained due to shortage of attendance will repeat his/her paper in the subsequent semester concerned (even/odd).

b. A **detained** Student is not allowed to re-appear in the internal assessment (Unit test). His/her old internal assessment marks will remain same

A student who cleared all the papers of a semester/annual examination of a programme/course will be eligible for improvement examination as per university rule.

After having passed all the EIGHT/SIX semesters, the students shall be eligible for the award of B. Tech. Electronics & Communication Engineering (ECE) degree of JAMIA HAMDARD.

14. CLASSIFICATION OF SUCCESSFUL CANDIDATES

The result of successful candidates, who fulfill the criteria for the award of **B. Tech. (ECE)**, shall be classified at the end of last semester, on the basis of his/her final CGPA (to be calculated as per university rule).

Syllabus

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE-101 **Title of the Course: Applied Physics-I**
L-T-P: 3-1-0
Credits: - 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

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

CO-1 Explain the conduction mechanism of semiconductors. (Cognitive level: Understand)
CO-2. Identify the important differences in the operation of ordinary light and laser light. (Cognitive level: Analyze)
CO-3 Specify how optical fibers can be used for communication. (Cognitive level: Apply)
CO-4 Apply the phenomena of interference and diffraction to everyday optical observations. (Cognitive level: Apply)
CO-5 Demonstrate a familiarity with some of the extraordinary properties of superconductors. (Cognitive level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	1	1	-	1	-	1	3	2	1
CO2	2	3	2	3	1	-	1	-	1	-	-	1	2	2	1
CO3	3	2	2	2	3	1	1	1	-	-	1	-	2	3	-
CO4	3	2	1	2	2	-	-	1	-	1	-	1	3	3	1
CO5	2	2	2	2	1	1	1	-	1	-	-	1	2	2	1

Detailed Syllabus:

UNIT 1: Semiconductor Physics **(10 Hours)**
Energy bands in solids, Fermi level and Fermi distribution function, Intrinsic and extrinsic semiconductors, P-N junction, Forward and reverse bias, V-I characteristics, Mobility of electrons and holes, Drift velocity, Electrical conductivity, resistivity, Zener diode.

UNIT 2: Lasers **(10 Hours)**
Einstein's theory of matter radiation interaction and A and B coefficients, amplification of light by population inversion, different types of lasers: He-Ne, Ruby, Properties of laser beams: monochromaticity, coherence, directionality and brightness, applications of lasers in science, engineering and medicine.

UNIT 3: Fiber Optics **(10 Hours)**

Numerical aperture, step index and graded index fibers, attenuation and dispersion mechanism in optical fibers (Qualitative only), applications of optical fibers, optical communication (Block diagram only).

UNIT 4: Wave Optics (10 Hours)

Huygens' Principle, superposition of waves and interference of light by wave front splitting and amplitude splitting, Young's double slit experiment, Newton's rings, Fraunhofer diffraction from a single slit and N slit, Diffraction gratings, dispersive and resolving power of grating.

UNIT 5: Superconductivity (8 Hours)

Introduction, Meissner effect, Type I and Type II superconductors, BCS Theory (Qualitative only), London's equations, applications of superconductors.

Reference Books:

1. B.G. Streetman, "Solid State Electronic Devices", Prentice Hall of India, 1995.
2. O. Svelto, "Principles of Lasers", Springer Science & Business Media, 2010.
3. Ghatak, "Optics", McGraw Hill Education, 2012.

Teaching-Learning Strategies in brief:

1. Encourage participation of students in learning.
2. Connect the subject matter with the student's everyday life.
3. Encourage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment conducive for learning.

Assessment methods and weightages in brief:

1. Two sessional examinations.
2. Assignments.
3. Oral quizzes in the class.
4. End semester examination.
5. **Internal Assessment: 40 Marks, End Semester Examination :60 Marks &Total Marks: 100.**

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE-102 **Title of the Course: Mathematics-I**
L-T-P: 3-1-0
Credits: 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to:
CO-1 Apply the concept of curvature , evaluate the definite integral by using Beta and Gamma function and calculate the surface area and volume of solid revolutions by the help of definite integral. (Cognitive Level: Apply)
CO-2 Verify Rolles Theorem and mean value theorem for the function defined in a closed interval, find an infinite expansion of a function and calculate the value of indeterminate forms. (Cognitive Level: Evaluate)
CO-3 Discuss the nature of sequence and series and find the infinite series in terms of $\sin\theta$ and $\cos\theta$ of any continuous or discontinuous function in a bounded interval. (Cognitive Level: Evaluate)

CO-4 Use the concept of function of several variables analyze the nature of the continuity and differentiability of function of two variable and find the maxima and minima of the function in R^2. (Cognitive Level: Analyze)

CO-5 Find the rank and inverse of the matrix, find the eigen value and the eigen-vector of a square matrix and solve system of homogenous and non-homogenous equations containing m equataions and n variables. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	1	-	-	1	-	-	1	1	1	1
CO2	3	2	3	2	2	-	-	-	-	1	1	-	-	1	-
CO3	3	2	3	2	2	1	-	1	-	1	1	-	1	1	1
CO4	3	3	2	2	2	-	1	-	1	-	-	1	1	-	2
CO5	3	3	3	2	3	1	-	1	-	1	-	1	1	1	1

Detailed Syllabus:

Unit – I: **Calculus-I** **(8 Hours)**
Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Unit – II: Calculus-II **(10 Hours)**

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

Unit – III: **Sequences and series** **(10 Hours)**

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit – IV: **Multivariable Calculus** **(10 Hours)**

Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence

Unit – V: **Matrices** **(10 Hours)**

Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
6. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.

5. Internal assessment (40 Marks) & Semester Examination (Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (Electronics & Communication Engineering)

Course Code: BTECE-103 **Title of the Course:** Basic Electrical Engineering
L-T-P: 3-1-0 **Credits:** - 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this course students will be able to:

CO1: Understand basic electric and magnetic circuits. (Cognitive level: Understand)

CO2: Analyze and solve complex AC, DC circuits. (Cognitive level: Analyze)

CO3: Understand the working principles of electrical machines and power converters. (Cognitive level: Understand)

CO4: Remember the requirement of transformers in transmission and distribution of electric power and other applications. (Cognitive level: Remember)

CO5: Analyze the components of low voltage electrical installations. (Cognitive level: Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1							1				
CO2	3	3	3	2	1			1				1		1	
CO3	3	3	3	2	1					1			1		
CO4	3	3	3	2		1			1				1		1
CO5	3	3	2	1	1		1							1	

Detailed Syllabus

UNIT 1: DC Circuits **(10 Hours)**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT 2: AC Circuits **(10 Hours)**

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 R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT 3: Transformers **(10 Hours)**

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT 4: Electrical Machines
(10 Hours)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT 5: Power Converters and Electrical Installations (8 Hours)

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Reference Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Build a positive and peaceful environment in the classroom.
2. Provide subject materials to develop and explore different perspectives.
3. Encourage students for reasoning when solving problems.
4. Learning through discussion among the peer group
5. Experimental Learning

Assessment methods and weightages in brief (4 to 5 sentences)

1. By taking two sessional examinations.
2. By giving assignments and quizzes
3. By taking semester examinations
4. Internal Assessment: 40 , Semester Exam: 60, Total marks = 100.

Name of the Academic Program: B. Tech. (Electronics & Communication Engineering)

Course Code: BTECE 104 Title of the Course: Engineering Graphics and Design

L-T-P: - 1-0-2. **Credits**: - 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO-1 Acquire knowledge of basic principles of Engineering graphics, lettering, dimensioning, sketching, and use of drafting equipment. (Cognitive Level: Remember)

CO-2 Need for scaling the dimension of an object, different types of scaling and scale (plain diagonal and vernier scales). (Cognitive Level: Analyze)

CO-3 Create geometric constructions; drawing parallel and perpendicular lines, and to construct engineering curves like ellipse, parabola, hyperbola, involute and cycloidal. (Cognitive Level: Create)

CO-4 Gain knowledge on types of projections and draw Orthographic projections of Lines, Planes, Solids, and Section of Solids. (Cognitive Level: Remember)

CO-5 Construct isometric scale, isometric projections and views and Conversion of orthographic views to isometric views and vice versa. (Cognitive Level: Create)

CO-6 Create 2-D computer drawing: setting up working space (units, grids etc.), creating and editing 2-D geometries. (Cognitive Level: Create)

CO-7 Create 3-D computer drawing: use industry-standard Computer Aided Design (CAD) software to model solid objects proceeding from basic sketching techniques to the creation of solid features through the use of extrusions, cuts, rotations, patterns and sweeps. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	1	2	3	1	2	1	-	1	-	2	1	2	1	2	1
CO2	2	2	3	2	2	-	1	-	1	2	-	2	1	2	-
CO3	2	2	3	2	3	1	1	1	-	3	1	2	2	1	1
CO4	1	3	2	2	2	-	-	-	1	2	-	2	2	1	1
CO5	2	2	3	2	2	1	-	1	-	3	1	2	2	2	-
CO6	2	2	3	2	2	1	1	-	1	3	-	2	1	1	1
CO7	2	2	3	3	3	-	1	-	1	3	1	2	1	2	1

Detailed Syllabus

UNIT 1 **(8 Hours)**

Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the

Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

UNIT 2 **(8 Hours)**

Orthographic Projections covering, Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes; **Projections of Regular Solids** covering, those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

UNIT 3 **(8 Hours)**

Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT 4 **(9 Hours)**

Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions; **Overview of Computer Graphics** covering, listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

UNIT 5 **(9 Hours)**

Customization& CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. (iii)Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5. (Corresponding set of) CAD Software Theory and User Manuals

Teaching-Learning Strategies in brief

Engineering graphics subject is full drawing-oriented subject. First fundamentals of different topics of engineering graphic are delivered and then explain the procedure of constructions step by steps. Later on, assignment issued to check the understanding. I explain the construction of drawing on both ways Manual drawing as well as on CAD software (Autocad and ProE) in lectures. I Provide study material, sample question and ppt. I always encourage students to raise their doubts and questions and create friendly environment for them.

Assessment methods and weightages in brief

1. Theory Assessment is based on performance in two internal
2. Lab assessment is based on performance and number of sheets drawn.
3. Performance in Semester exam

Internal assessment (40 Marks) & Semester Examination (60 Marks)
Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 105 Title of the Course: Applied Physics Lab-I

L-T-P: 0-0-4
Credits: 2
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to develop the experimental skills and thinking capabilities. (Cognitive level: create).

CO2: Able to understand different phenomenon related to optics through experimentation (Cognitive level: understand).

CO3: Able to understand the theoretical concepts of optics through experimentation. (Cognitive level: understand).

CO4: Able to differentiate harmonic oscillations and waves and apply the knowledge in mechanical and electrical systems (Cognitive level: understand).

CO5: Able to apply the experimental knowledge in the real life (Cognitive level: apply).

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS O1	PS O2	PS O3
CO1	1	1	-	-	-	-	1	1	2	1	2	1	1	1	2
CO2	-	1	3	-	1	-	2	1	-	1	2	1	2	2	2
CO3	1	1	3	1	-	1	-	2	1	2	-	1	3	2	3
CO4	-	1	-	-	1	-	1	-	-	-	1	-	1	1	2
CO5	1	-	3	-	-	1	1	1	1	2	-	1	1	2	3

List of experiments

1. To determine wavelength (λ) of sodium light by measuring the diameters of Newton's Rings.

2. To determine wavelength (λ) of any three lines of mercury light by Diffraction Grating.

3. To determine frequency of AC mains using sonometer.

4. To determine frequency of AC mains by Melde's Experiment.

5. To determine g using Bar Pendulum.

6. To determine g at a particular location using Kater's Pendulum.

7. To determine spring constant by using a) Static Method b) Dynamic Method.

8. To determine the moment of inertia of a flywheel about its own axis of rotation.

9. To find the relationship between potential difference across a capacitor and time during it's charging and discharging using metronome (time-ticker).

10. To determine the wavelength of Laser in diffraction grating.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech (Electronics and Communication Engineering)

Course Code: **BTECE 106** **Title of the Course: Basic Electrical Engg. Lab**
L-T-P: 0-0-2

Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Understand basic components of electric circuits. (Cognitive level: Understand)

CO2: Able to apply Kirchhoff's laws. (Cognitive level: Create)

CO3: Understand theorems and apply it to the electric circuits. (Cognitive level: Understand)

CO4: Analyze RLC circuits. (Cognitive level: Analyze)

CO5: Understand and apply RLC circuit for finding resonant frequency. (Cognitive level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS O1	PS O2	PS O3
CO1	1	1	-	-	-	-	1	1	1	1	2	1	1	1	
CO2	-	3	3	-	1	-	2	1	-	1	2	1	2	2	
CO3	3	1	3	1	-	1	-	2	1		-	1			
CO4	-	1	-	-	1	-	1	-	-	-	1	-	1	1	2
CO5	1	-	3	-	-	1	1	1	1	2	-	1	1		

List of Experiments

1. Study of different instruments in basic electrical lab.

2. Verification of Ohm's Law.

3. Verification of KCL.

4. Verification of KVL.

5. Verification of Superposition Theorem.

6. Verification of Thevenin's Theorem.

7. Verification of Norton's Theorem.

8. Verification of Maximum Power Transfer Theorem.

9. To analyse RLC circuit.

10. To find Resonance Frequency in an RLC circuit.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)
Course Code: BTECE 107 Title of the Course: Basic Engineering Graphics and Design
L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Need for scaling the dimension of an object, different types of scaling and scale (plain diagonal and vernier scales).
CO2: Create geometric constructions; drawing parallel and perpendicular lines, and to construct engineering curves like ellipse, parabola, hyperbola, involute and cycloidal.
CO3: Gain knowledge on types of projections and draw Orthographic projections of Lines, Planes, Solids, and Section of Solids.
CO4: Construct isometric scale, isometric projections and views and Conversion of orthographic views to isometric views and vice versa.
CO5: Create 2-D and 3-D computer drawing: setting up working space (units, grids etc.), creating and editing 2-D geometries, use industry-standard Computer Aided Design (CAD) software to model solid objects proceeding from basic sketching techniques to the creation of solid features through the use of extrusions, cuts, rotations, patterns and sweeps.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3		1	1				1		1	1		1
CO2	1	2	3	2	1					2		1		1	1
CO3	1	2	3	2	3	1		1		3	1	1		1	1
CO4	1	3	2	2	2		1			2		1	1		1
CO5	1	2	3	1	3				1	3		1	1	1	1

List of experiments

S.No.	List of Assignments
1.	Lettering
2.	Dimensioning Practice
3.	Engineering Scale: - Plain Diagonal & Vernier Scale
4.	Engineering Curve: - Involute, Conic Section, Cycloid, Hypocycloid and Epicycloids
5.	Projection of point & Projection of Line
6.	Projection of Plane
7.	Projection of Solid & Section of Solid

8. Isometric Projection of Plane
9 Isometric Projection of Solid
10 CAD Drawing: - 2D and 3D

Teaching-Learning Strategies in brief

Engineering graphics subject is full drawing-oriented subject. First fundamentals of different topics of engineering graphic are delivered and then explain the procedure of constructions step by steps. Later on, assignment issued to check the understanding. I explain the construction of drawing on both ways Manual drawing as well as on CAD software (Autocad and ProE) in lecturesI Provide study material, sample question and ppt. I always encourage students to raise their doubts and questions and create friendly environment for them.

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Assessment methods and weightages in brief

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1. By conducting quizzes.
2. By conducting viva.
3. By taking semester examination.
4. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (Electronics & Communication Engineering)

Course Code: BTECE-201 **Title of the Course: Applied Physics-II**

L-T-P: 3-1-0
Credits: - 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

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

CO 1: Apply basic physical principles to explain the functioning of some semiconductor devices. (Cognitive level: Apply)
CO 2: Apply Maxwell theory underlying the electric and magnetic processes to the propagation of electromagnetic waves. (Cognitive level: Apply)
CO 3: Analyze the inadequacy of classical mechanics and beauty of the quantum ideas. (Cognitive level: Analyze)
CO 4: Apply the Newtonian mechanics principles to a few mechanical oscillatory systems. (Cognitive level: Apply)
CO 5: Understand the Physics behind the working of X- rays. (Cognitive level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	PSO 1	PS O2	PS O3
CO1	3	2	3	2	3	1	-	-	1	-	1	-	2	1	1
CO2	3	2	2	3	3	-	-	1	-	-	-	1	3	2	-
CO3	2	3	1	3	2	1	1	-	-	1	-	-	1	1	1
CO4	3	2	2	2	3	-	-	-	1	-	1	1	3	2	-
CO5	2	2	2	2	2	-	1	-	-	1	-	-	2	3	1

Detailed Syllabus:

UNIT 1: Semiconductor Materials (10 Hours)

Semiconductors materials of interest for optoelectronic devices, LEDs: device structure, materials, characteristics and figures of merit, Semiconductor photodetectors- P-N junction, Avalanche and Zener breakdown: structures, materials, working principle and characteristics, Noise limits on performance, Solar cells.

UNIT 2: Electromagnetic Theory (10 Hours)

Motion of charged particles in crossed electric and magnetic fields, Velocity selector, Gauss law, continuity equation, Inconsistency in Ampere's law, Maxwell's equations (differential and integral forms), Poynting theorem and Poynting vector, Propagation of plane electromagnetic waves in conducting and non-conducting medium.

UNIT 3: Quantum Mechanics **(10 Hours)**

Introduction to Quantum mechanics, wave nature of particles, Time-dependent and time-independent Schrodinger equation for wave function, expectation values, Wave-packets, uncertainty Principle, Solution of stationary state Schrodinger equation for particle in a box problem, Single step barrier, tunnelling effect.

UNIT 4: Mechanical Systems **(8 Hours)**

Newton's laws, Conservative and non-conservative forces, Concept of potential energy, Work energy theorem, Periodic and oscillatory motion, Simple harmonic motion, Time period, Frequency, Phase and phase constant, Energy in simple harmonic motion, Damped and forced oscillations.

UNIT 5: X-Rays **(12 Hours)**

Crystalline and amorphous solids, Bragg's law, Historical background: Discovery of X-rays, Production of X-rays, Moseley's law, Properties of X-rays, Continuous and characteristic X-rays, Soft and hard X-rays, Applications.

Reference Books:

1. Arthur Beiser, "Concepts of Modern Physics".
2. B.G. Streetman, "Solid State Electronic Devices", Prentice Hall of India, 1995.
3. David Griffiths, "Introduction to Electrodynamics".
4. R. Robinett, "Quantum Mechanics," OUP Oxford, 2006.

Teaching-Learning Strategies in brief:

1. Encourage participation of students in learning.
2. Connect the subject matter with the student's everyday life.
3. Encourage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment conducive for learning.

Assessment methods and weightages in brief:

1. Two sessional examinations.
2. Assignments.
3. Oral quizzes in the class.
4. End semester examination.
5. **Internal Assessment: 40 Marks, End Semester Examination :60 Marks &Total Marks: 100.**

Name of the Academic Program: B. Tech. (Electronics & Communication Engineering)

Course Code: BTECE-202 **Title of the Course: Mathematics-II**
L-T-P: 3-1-0
Credits: 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to:
CO-1 Discuss the problems of basic Probability and probability distribution of discrete random variables. (Cognitive Level: Understand)
CO-2 Disribe the probability distribution of continuous random vriables and apply to solve problems. (Cognitive Level: Apply)
CO-3 Find Bivariate Distributions and distribution of some and quotients. (Cognitive Level: Evaluate)
CO-4 Solve the problems on Measures of central tendency and some others probabolitiy distributin like, Binomial and Normal Distributions. (Cognitive Level: Evaluate)
CO-5 Use the Application of Statistics like, Curve fitting and diffrent sample test of single prortions. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	3	2	3	2	1	-	1	1	1	-	-	1	1	-	1
CO2	3	3	3	2	2	1	-	1	-	1	-	-	-	1	-
CO3	3	2	3	2	2	-	1	1	1	-	1	1	1	1	1
CO4	3	3	3	2	1	1	1	-	-	1	1	-	-	1	-
CO5	3	3	2	2	1	1	-	1	1	-	-	1	1	-	1

Detailed Syllabus:

Unit – I: Basic Probability **(10 Hours)**

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

Unit – II: Continuous Probability Distributions **(10 Hours)**

Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.

Unit – III: Bivariate Distributions **(10 Hours)**

Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

.**Unit – IV: Basic Statistics** **(10 Hours)**

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation

Unit – V: Applied Statistics **(10 Hours)**

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
7. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.

5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE-203 Title of the Course: Programming for Problem Solving
L-T-P: 3-1-0 Credits: 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students will learn:

CO1: Formulate simple algorithms for arithmetic and logical Problems (Cognitive Level: Create)

CO2: Solve mathematical problems through Conditional branching, iteration (Cognitive Level: Apply)

CO3: Develop and Demonstrate the application of derived data types such as arrays, functions, structure, pointers to Solve real time Problems (Cognitive Level: Create)

CO 4: Understand and apply the concept of searching and sorting Technique (Cognitive Level: Understand)

CO5: Understand and Use File Handling Concepts. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	2	2	1	-	-	-	-	3	3	2	2
CO2	3	2	3	2	2	-	2	-	-	1	-	3	2	2	1
CO3	3	3	3	3	1	2	-	-	1	-	-	3	3	2	2
CO4	3	3	3	2	1	3	1	2	1	-	3	3	3	2	3
CO5	3	3	3	2	2	2	-	2	1	1	-	3	2	3	3

Detailed Syllabus:

Unit 1: (10 Hours)

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.): Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudo-code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

Unit 2: (10 Hours)

Arithmetic expressions and precedence, Conditional Branching, Writing and evaluation of conditionals and consequent branching**,** Iteration and loops

Unit 3 (10 Hours)

Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required), Arrays: Arrays (1-D, 2-D), Character arrays and Strings

UNIT 4 **(10 Hours)**

Function: Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference, Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT 5 **(8 Hours)**

Structure: Structures, Defining structures and Array of Structures, Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation), File handling (only if time is available, otherwise should be done as part of the Laboratory)

Suggested Text Books

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Two sessional examinations.
2. Assignments.
3. Class tests.
4. Quiz
5. Semester examination.

Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 204 Title of the Course: Workshop/Manufacturing Practices
L-T-P: - 1-0-2. Credits: - 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOME(CO)

CO1: Understand the appropriate tools, materials, instruments required for specific operations in workshop. (Cognitive Level: Understand)
CO2: Apply techniques to perform basic operations with hand tools and power tools such as centre lathe machine, drilling machine using given job drawing. (Cognitive Level: Apply)
CO3: Understand the figures of the hand tools used in fitting, carpentry, foundry, welding shop and machine tools such as lathe machine and drilling machine. (Cognitive Level: Understand)
CO4: Understand a report related to hand tools and machine tools description referring to library books and laboratory manuals. (Cognitive Level: Understand)
CO5: Understand report of procedures followed for a given task in fitting, carpentry, foundry, sheet metals, welding and machine shops. (Cognitive Level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	-	1	-	1	-	1	1	1	-	1
CO2	1	-	-	-	1	-	1	-	1	1	-	-	-	1	-
CO3	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1
CO4	1	-	-	-	-	1	-	1	-	1	-	1	1	1	-
CO5	1	1	1	1	1	-	1	1	1	1	1	1	1	-	1

Detailed contents

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
2. CNC machining, Additive manufacturing
3. Fitting operations & power tools
4. Electrical &Electronics
5. Carpentry
6. Plastic molding, glass cutting
7. Metal casting
8. Welding (arc welding & gas welding), brazing

Reference Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology – I" Pearson Education, 2008.
4. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
5. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017.

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Review the theory and technique briefly before the students commence the lab.
2. Corelate the relation between the lab to the lecture and to real world applications.
3. Are eager to help and answer questions.
4. Walk around and check with students to make sure that they are progressively understanding.
5. Enquire questions that make students inclined to think more intensely about what they are doing and why

Assessment methods and weightages in brief (4 to 5 sentences)

1. Theory Assessment is based on performance in two internal
2. Lab assessment is based on performance in lab work.
3. Assessment is also based on lab file work.
4. Performance in Semester exam

Internal assessment (40 Marks) & Semester Examination (60 Marks)
Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 205 Title of the Course: Communication Skills
L-T-P: **2-0-0**
Credits: - 02
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: To develop competence in communication skills related to production & presentation of messages in multiple formats & understand the importance of body language. (Cognitive Level: Create)
CO2: To apply the writing skills of the students so that they are capable of communicating efficiently. (Cognitive Level: Apply)
CO3: To familiarize students with the basics of the English language and help them to learn to identify language structures for correct English usage. (Cognitive Level: Remember)
CO4: To cultivate students with the basics of the English language and help them to learn to identify language structures for correct English usage. (Cognitive Level: Remember)
CO5: To enhance vocabulary skills and make students fluent, thereby improving receptive and expressive skills. (Cognitive Level: Understand)

Mapping of Course Outcome (COs) with Program Outcomes (POs) & Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	2	3	3	3	2	3	---	---	2
CO2	-	-	1	-	1	-	2	3	3	3	2	3	1	1	2
CO3	1	-	-	1	-	-	2	3	3	3	2	3	---	1	2
CO4	-	1	-	-	-	1	2	3	3	3	2	3	1	---	2
CO5	-	-	1	-	1	-	2	3	3	3	2	3	---	1	2

Detailed Syllabus:

UNIT 1: Vocabulary Building **(6 Hours)**

The concept of Word Formation, Root words from foreign languages and their use in English Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
Synonyms, antonyms, and standard abbreviations.

UNIT 2 : Basic Writing Skills **(6 Hours)**

Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely

UNIT 3: **Identifying Common Errors in Writing** **(6 Hours)**

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés

UNIT 4 : **Nature and Style of sensible Writing** **(6 Hours)**

Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion

UNIT 5 Writing Practices and Oral Communication **(6 Hours)**

Comprehension, Précis Writing, Essay Writing,

Oral Communication

(This UNIT involves interactive practice sessions in Language Laboratory)

Listening Comprehension, Pronunciation, Intonation, Stress and Rhythm, Common Everyday Situations: Conversations and Dialogues Communication at Workplace, Interviews, Formal Presentations

Reference Books:

1. “Practical English Usage”, Michael Swan. OUP. 1995.
2. “Remedial English Grammar”. F.T. Wood. Macmillan.2007
3. "On Writing Well“, William Zinsser. Harper Resource Book. 2001
4. “Study Writing” , Liz Hamp-Lyons and Ben Heasly, Cambridge University Press. 2006.
5. “Communication Skills”, Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
6. “Exercises in Spoken English”, Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Teaching-Learning Strategies in brief:

1. Build positive and peaceful environment in the classroom.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief:

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting group discussions.
4. By taking speeches/short presentations.
5. By taking semester examination.

Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 206 Title of the Course: Applied Physics Lab-II

L-T-P: 0-0-4
Credits: 2
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to understand the standard value and characteristics of different experiment (Cognitive level: understand).

CO2: Able to compare the value of Plank's constant through different LED (Cognitive level: compare).

CO3: Able to perform experiment related to semiconductor devices (Cognitive level: understand).

CO4: Able to understand characteristics of voltage and current through different potentiometer. (Cognitive level: understand).

CO5: Once the students perform the experiments they can apply the knowledge in the real life (Cognitive level: understand).

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS O1	PS O2	PS O3
CO1	1	1	-	-	-	-	1	1	2	1	2	1	1	1	2
CO2	-	1	3	-	1	-	2	1	-	1	2	1	2	2	2
CO3	1	1	3	1	-	1	-	2	1	2	-	1	3	2	3
CO4	-	1	-	-	1	-	1	-	-	-	1	-	1	1	2
CO5	1	-	3	-	-	1	1	1	1	2	-	1	1	2	3

List of experiments

1. To determine the value of specific charge e/m of an electron by Thomson Method

2. To determine the value of Plank's constant using Light Emitting Diode (LED).

3. Draw the V-I characteristic for Light Emitting Diode (LED) and determine the value of Plank's

constant.

4. Determination of Plank's Constant by plotting a curve between Threshold voltage and wavelength

of LED.

5. To determine the value of Plank's constant using photo cell.

6. Calibration of Voltmeter using (a) DC potentiometer (b) Crompton DC potentiometer.

7. Calibration of Ammeter using (a) DC potentiometer (b) Crompton DC potentiometer.

8. To Study of various Lissajous Pattern.

9. To determine and find the value of voltage and frequency using Lissajous Pattern.

10. To determine the thermal conductivity of bad conductors such as card board, glass etc.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.

Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE-207
Title of the Course: Programming for Problem Solving Lab
L-T-P: 0-0-4 **Credits**: 02
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students will learn:

CO 1 :To work with an IDE to create, edit, compile, run and debug programs (Cognitive Level : Apply)
CO 2 :To analyze the various steps in program development. (Cognitive Level: Analyze)
CO 3:Develop programs to solve basic problems by understanding basic concepts in Clike operators, control statements etc. (Cognitive Level : Create)
CO 4 :To develop modular, reusable and readable C Programs using the concepts likefunctions, arrays etc. (Cognitive Level: Create)
CO 5: To Write programs using the Dynamic Memory Allocation concept. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	2	2	1	-	-	-	-	3	3	2	2
CO2	3	2	3	2	2	-	2	-	-	1	-	3	2	2	1
CO3	3	3	3	3	1	2	-	-	1	-	-	3	3	2	2
CO4	3	3	3	2	1	3	1	2	1	-	3	3	3	2	3
CO5	3	3	3	2	2	2	-	2	1	1	-	3	2	3	3

List of Programs

1. Write program that declares Class awarded for a given percentage of marks, wheremark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70%= Distinction. Read percentage from standard input.

2. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
3. Write a C program that uses functions to perform the following:
   i. Addition of Two Matrices
   ii. Multiplication of Two Matrices
   iii. iii. Transpose of a matrix with memory dynamically allocated for the new matrix asrow and column counts may not be same.
4. Write a C program to display the contents of a file to standard output device.

5. Write a C program that does the following:
6. It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function)
7. Write a C program that does the following:
   It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function)
   The program should then read all 10 values and print them back.
8. Write a C program to merge two files into a third file (i.e., the contents of the firs tfile followed by those of the second are put in the third file).
9. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
10. Write a C program to construct a pyramid of numbers as follows:

```
*          1          1          *
* *        2 3        2 2        * *
* * *      4 5 6      3 3 3      * * *
                      4 4 4 4    * *
                                 *
```

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. Internal Viva-voce
2. External Viva-voce / Semester Examination
3. Class tests.
4. Quiz
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100

Suggested Reference Books for solving the problems:

i. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
ii. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning,(3^{rd} Edition)
iii. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,

Prentice
iv. Hall of India
v. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
vi. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
vii. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

Program: B.Tech. (ECE)

Course Code: BTECE 208 Title of the Course: Workshop/Manufacturing Practices

L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Understand the appropriate tools, materials, instruments required for specific operations in workshop.

CO2: Apply techniques to perform basic operations with hand tools and power tools such as centre lathe machine, drilling machine using given job drawing

CO3: Able to make different joints, fits and rectangular Tray in carpentry, welding, fitting and sheet metal shops.

CO4: Able to prepare sand mold using the single and split piece pattern.

CO5: Able to control lamp for different configuration.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			2	2	3	2	2	3	3	2	3	1		1
CO2	2	2	3	2	2	2	2	3	3	3	2	3		2	1
CO3	3	2	3	2	1	2	2	3	2	3	1	3	1	1	1
CO4	2	2	3	2	2	3	2	3	2	3	2	3		2	
CO5	2	2	3	2	2	3	1	3	2	3	2	3	2		1

List of Experiments

EXPT.NO	Shop	Aim
1 DOVETAIL LAP JOINT	CARPENTRY	To make a dovetail lap joint.
2 CROSS HALF LAP JOINT		to make a cross half lap joint.

3 SQUARE CUTTING	**Fitting**	To make a Square fit from the given mid steel pieces
4 MOULD FOR A SOLID	**Foundry**	To prepare a sand mold, using the given single piece pattern.
5 RECTANGULAR TRAY	**Sheet Metal**	To make a rectangular Tray as per required dimensions
6 BUTT JOINT	WELDING	To make a Butt joint using the given two M.S pieces by arc welding.
7 LAPJOINT		To make a Lap joint, using the given two M.S pieces and by arc welding.
8	HOUSE (ELECTRICAL)WIRING	To control one lamp by a one switch with provision for plug socket with switch control.
9		To control two lamps by a one switch with provision for plug socket with switch control.
10		To control two lamps by two independent switches located at two different places.

Teaching-Learning Strategies in brief

1. Review the theory and technique briefly before the students commence the lab.
2. Corelate the relation between the lab to the lecture and to real world applications.
3. Are eager to help and answer questions.
4. Walk around and check with students to make sure that they are progressively understanding.
5. Enquire questions that make students inclined to think more intensely about what they are doing and why

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Assessment methods and weightages in brief (4 to 5 sentences)

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Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.

Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. Electronics and Communication Engineering

Course Code: BTECE 209 Title of the Course: English Language Lab

L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: To expose the students to a variety of self-instructional learner-friendly modes of language learning. (Cognitive level: understand).

CO2: To enable them to learn better pronunciation through stress on word accent, Intonation and rhythm and to increase vocabulary. (Cognitive level: create).

CO3: To train them to use language effectively to face interviews, group discussions, and public speaking. (Cognitive level: create).

CO4: To train them to give positive feedback in various situations, to use appropriate body language and avoid barriers to effective communication. (Cognitive level: understand).

CO5: To acquaint them with the uses of resume /CV preparation, report writing, format making etc. and to improve writing skills (Cognitive level: create).

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS O1	PS O2	PS O3
CO1	1	2	2	2	2	3	1	1	3	2	2	2	2	2	2
CO2	2	1	3	2	1	2	2	3	2	2	2	2	2	2	2
CO3	1	2	3	1	2	1	3	2	1	2	1	2	3	2	3
CO4	3	1	2	2	1	2	3	3	2	3	3	2	2	1	2
CO5	1	2	3	3	3	1	1	1	1	2	2	3	2	2	3

List of experiments

1. Experiment 1: Listening Skills • The student should be able to listen to s text read aloud at normal speed with a focus on intonation. • After listening the student can fill in blanks, choose a suitable title, make a summary, supply required information and be able to answer comprehension questions from the passage read aloud.
2. Experiment 2: Speaking Skill • Reading aloud dialogues, texts, poems, and speeches focusing on intonation. • Self-introduction • Role plays on any two situations. • Telephonic Conversations.
3. Experiment 3: Personality Development • Initiation • Physical Appearance • Audience Purpose.
4. Experiment 4: Interpersonal Skills • Appropriate use of non-verbal skills in face-to-face communication i.e. Viva –interviews, GDs and public speaking, extempore
5. Experiment 5: Presenting in GD, Seminars and Conferences. • Leadership Quality • Time Management • Achieving the target

6. Experiment 6: Activities on Interpersonal Communication and Building Vocabulary i.e Role of Body Language in Communication
7. Experiment 7: Activities on Reading Comprehension
8. Experiment 8: Activities on Writing Skills i.e Resume, Cover Letter, E-mails
9. Experiment 9: Technical Report Writing i.e Reports, notice, memorandum, Minutes of meeting
10. Experiment 10: Activities on Group Discussion and Interview Skills

Teaching-Learning Strategies in brief :

1. Build a positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking.

Assessment methods and weightages in brief :

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) & Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 211 Title of the Course: Environmental Sciences

L-T-P: 2-0-0

Credits: 00

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to

CO1. Gaining in-depth knowledge on natural processes that sustain life and govern economy. (Cognitive Level: Remember)

CO2. Predicting the consequences of human actions on the web of life, global economy and quality of human life. (Cognitive Level: Create)

CO3. Developing critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development. (Cognitive Level: Create)

CO4. Acquiring values and attitudes towards understanding complex environmental economic-social challenges and participating actively in solving current environmental problems and preventing the future ones. (Cognitive Level: Evaluate)

CO5. Adopting sustainability as a practice in life, society, and industry. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	-	-	1	-	1	-	3	1	2
CO2	3	3	3	2	2	-	1	-	-	1	-	1	3	1	2
CO3	3	2	3	2	1	-	1	-	1	-	-	-	3	1	2
CO4	3	3	3	2	1	-	-	1	-	-	1	-	3	1	2
CO5	3	3	2	2	2	-	-	-	-	-	-	1	3	1	2

Detailed Syllabus:

UNIT 1 **(6 Hours)**

Concepts of Environmental Sciences covering, Environment, Levels of organizations in environment, Structure and functions in an ecosystem; Biosphere, its Origin and distribution on land, in water and in air, Broad nature of chemical composition of plants and animals;

UNIT 2 **(6 Hours)**

Natural Resources covering Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative);

UNIT 3 **(6 Hours)**

Biodiversity and its conservation covering, Biodiversity at global, national and local levels; India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation; Environmental Pollution covering, Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear; Pollution prevention; Management of pollution- Rural/Urban/Industrial waste management [with case study of any one type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management;

UNIT 4 **(6 Hours)**

Environmental Biotechnology covering, Biotechnology for environmental protection- Biological indicators, bio-sensors, bio-pesticides, bio-fertilizers; Social Issues and Environment covering, Problems relating to urban environment- Population pressure, water scarcity, industrialization; remedial measures; Climate change- Reasons, effects (global warming, ozone layer depletion, acid rain) with one case study.

UNIT 5 **(6 Hours)**

Environmental Monitoring covering, Monitoring- Identification of environmental problem, Identification of biological resources (plants, animals, birds) at a specific location. Legal issues- Environmental legislation (Acts and issues involved), Environmental ethics; Case study- Discussion of real-life cases that have an impact on the natural environment.

REFERNECE BOOKS:

1. S. M. Khopkar, “Environmental Pollution Monitoring & Control”, New Age
2. T. G. Spiro, W. M. Stigliani, “Chemistry of Environment”, PHI
3. A.K. Das, “Textbook on Medical Aspects of Bioinorganic Chemistry”, CBS
4. Nelson Cox and Lehninger, “Biochemistry”
5. M. Ather & S. B. Vohra, “Heavy Metal & Environment”, New Age
6. S. S. Dara, “Environmental Chemistry » latest édition

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 301 Title of the Course: Electronic Devices

L-T-P: 3-1-0
Credits: 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to

CO1: To understand the importance of quantum mechanics in the electronic devices and the fundamentals of the semiconductor physics. (Cognitive level: Understand)
CO2: To study and analyze different types of diodes and their characteristic in context of semiconductor physics. (Cognitive level: Analyze)
CO3: To apply the characteristic knowledge of Junction behaviour in the construction of Bipolar Junction Transistor and evaluate different types of working of transistors in various configurations. (Cognitive level: Apply)
CO4: To study and analyze the physics behind MOSFET and its characteristics. (Cognitive level: Analyze)
CO5: To understand the basics for creation of semiconductor devices in a phased manner. (Cognitive level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	1	1	--	--	1	--	--	1	1	2	1	1
CO2	2	2	1	1	1	--	1	--	1	2	--	--	2	3	1
CO3	2	1	1	1	3	1	--	1	--	1	--	--	3	1	
CO4	1	2	2	2	1	--	--	--	--	2	1	1	1	2	1
CO5	1	1	1	1	1	1	1	--	1	--	1	--	2	1	1

Detailed Syllabus

Unit-1: Introduction to Semiconductor Physics **(10 Hours)**

Introduction to semiconductor physics; review of quantum mechanics, Electrons in Periodic lattices, E-k diagram, energy bands in intrinsic and extrinsic silicon; carrier transport; diffusion current, drift current, mobility and resistivity; sheet resistance, design of resistors

Unit-II: PN Junction Diode **(10 Hours)**

Generation and recombination of carriers; poisson and continuity equation, P-N junction characteristics, I-V characteristics, and small signal switching models; avalanche breakdown, Zener diode, Schottky diode, types of diodes

Unit-III: Bipolar Junction Transistor **(10 Hours)**

Bipolar junction transistor, I-V characteristics, Configuration of Transistors: CE, CC, CB and their applications, Ebers-Moll Model,

Unit-IV: Metal Oxide Semiconductor Field Effect Transistor (MOSFET) **(10 Hours)**

MOSFET: construction, MOS Capacitor, C-V characteristics, I-V characteristics, small signal models of MOS transistors, LED, Photodiode and solar cell

Unit-V: Integrated Circuit Fabrication **(10 Hours)**

Integrated circuit fabrication process: Oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process

Text Books:

1. Millman's Integrated Electronics - Analog and Digital Circuit and Systems, McGraw Hill Education, 2nd edition
2. S.M. Sze and K.N. Kwok, "Physics of Semiconductor Devices", 3rd Edition, John Wiley & Sons, 2006

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 303 Title of the Course: Signals and Systems

L-T-P: 3-1-0
Credits: 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes:

CO1: Analyze various types of signals, classify them, and perform various mathematical operations on them. (Cognitive level: Analyze)

CO2: Analyze various types of systems, classify them, and evaluate their response behavior. (Cognitive level: Evaluate)

CO3: Appreciate use of transforms in evaluating frequency response of signals and system. (Cognitive level: Evaluate)

CO4: Carry simulation on signals and systems for observing effects of applying various properties and operations. (Cognitive level: Apply)

CO5: Create strong foundation of communication and signal processing to be studied in the subsequent semester. (Cognitive level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12	PSO1	PS O2	PS O3
CO1	3	--	2	1	2	2	--	--	--	1	--	1	2	2	1
CO2	3	--	--	2	--	--	2	1	1	--	1	--	2	1	1
CO3	1	1	3	2	2	2	--	--	--	1	1	1	3	3	
CO4	--	3	1	--	2	--	--	1	1	--	1	--	1	2	1
CO5	2	--	--	2	1	2	2	2	--	1	--	2	3	1	1

Detailed Syllabus:

Unit – I: Signals and its Classifications **(10 Hours)**

Signals and systems as seen in everyday life, and in various branches of engineering and science. Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, Inverse System.

Unit – II: Linear shift-invariant (LSI) systems **(10 Hours)**

Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input- output behavior with aperiodic convergent inputs. Characterization of causality

and stability of linear shift-invariant systems. System representation through differential equations and difference equations.

Unit – III: Fourier Series and Fourier Transform **(10 Hours)**

Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. The idea of signal space and orthogonal bases,

Unit – IV: Laplace Transform **(10 Hours)**

The Laplace Transform, notion of eigen functions of LSI systems, a basis of eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behavior.

Unit – V: Z-transform and State Space Analysis **(10 Hours)**

The z-Transform for discrete time signals and systems- eigen functions, region of convergence, z-domain analysis.

State-space analysis and multi-input, multi-output representation. The state-transition matrix and its role. The Sampling Theorem and its implications- Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on. Aliasing and its effects. Relation between continuous and discrete time systems.

Text Books:

1. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall, 1983.
2. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998.

Reference book:

1. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th edition, Prentice Hall,1998.
2. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", TMH New Delhi, 2001.
3. Douglas K. Lindner, "Introduction to Signals and Systems", McGraw Hill International Edition:c1999.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 304 Title of the Course: Network Theory

L-T-P: 3-1-0
Credits: 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to

CO-1 Understand about various types of signals, classify them, analyse them, and perform various operations on them. (Cognitive Level: Understand)

CO-2 Analyze various types of systems, classify them, evaluate and understand their response behavior. (Cognitive Level: Analyze)

CO-3 Create an equivalent circuit between time domain and frequency domain with the help of RLC series and parallel circuits. (Cognitive Level: Create)

CO-4 Apply and analyze the impact of different signals on a systems and observe the effects. (Cognitive Level: Analyze)

CO-5 Create strong foundation of communication and signal processing to be studied in the subsequent semester. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	--	1	1	1	1	1	1	2	1	--	2	1	1
CO2	2	1	1	1	2	--	--	1	1	2	1	--	1	1	1
CO3	3	1	--	2	2	1	1	1	--	1	1	1	1	2	2
CO4	2	2	--	3	3	1	2	1	--	2	1	--	3	2	1
CO5	1	1	1	1	1	--	--	1	1	1	1	1	2	1	1

Detailed Syllabus:

Unit – I: Electrical Circuits and Network Theorems **(10 Hours)**

Node and Mesh Analysis, matrix approach of network containing voltage and current sources and reactances, source transformation and duality. Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC. circuits.

Unit – II: Fourier series and Fourier Transforms **(10 Hours)**

Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.

Unit – III: Laplace Transform **(10 Hours)**

Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.

Unit – IV: Network Behavior **(10 Hours)**

Transient behavior, concept of complex frequency, Driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem and Two four port network and interconnections, Behaviors of series and parallel resonant circuits

Unit – V: Introduction to passive Filters **(10 Hours)**

Introduction to band pass, low pass, high pass and band reject filters.

Text Books:(in IEEE format; not more than 2 books)

1. Van, Valkenburg.; " Network analysis"; Prentice hall of India, 2000
2. A William Hayt, " Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education
3. Sudhakar, A., Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill, New Delhi,1994

Teaching-Learning Strategies in brief (4 to 5 sentences)

The teaching learning strategies are based on classroom teaching methodologies which includes lectures, discussions, presentations, doubt sessions numerical solving etc

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 305 Title of the Course: Digital System Design

L-T-P: 3-1-0
Credits: 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of this course students will demonstrate

CO1: Understand the working of logic gates and solve expression with Boolean Algebra by remembering Boolean laws and theorems. (Cognitive Level: Understand)
CO2: Understanding the working combinational logic circuits and apply K-Maps to derive logical expression. (Cognitive Level: Understand)
CO3: Analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder. (Cognitive Level: Analyze)
CO4: Use basic flip-flops SR, JK, D and T, Analyze and Evaluate synchronous and asynchronous sequential logic circuits. (Cognitive Level: Evaluate)
CO5: Synthesize efficient HDL algorithms without any error and design digital systems. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	2	3	2	1	3	-	1	-	-	1	1	3	2	1
CO2	2	2	3	2	1	3	1	-	1	1	1	-	3	2	2
CO3	3	3	-	1	2	3	-	1	-	1	-	1	3	1	1
CO4	2	3	1	1	2	3	1	1	1	1	-	-	3	2	1
CO5	2	3	-	1	1	3	1	-	1	-	-	1	3	3	1

Detailed Syllabus:

Unit – I: Logic Simplification and Combinational Logic (10 Hours)

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion.

Unit – II: MSI Combinational Circuits (10 Hours)

MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

Unit – III: Sequential Logic Design (10 Hours)

Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation.

Unit – IV: Logic Families and Semiconductor Memories (10 Hours)

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

Unit – V: VLSI Design Flow (10 Hours)

VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

Reference book:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
3. A. Anand Kumar. "Fundamentals of Digital Circuits", PHI, 4th edition, 2016.
4. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition, 2006.
5. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
6. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting Lab viva.
3. By conducting quizzes.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 306 Title of the Course: Humanities-I (Effective Technical Communication)

L-T-P: 3-0-0
Credits: 3
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of this course students will be able to

CO1: Design and Develop different kinds of technical documents. (Cognitive Level: Create)
CO2: Do Technical Writing, Grammar and Editing. (Cognitive Level: Create)
CO3: Self-assess themselves. (Cognitive Level: Analyze)
CO4: Do Communication and Technical Writing. (Cognitive Level: Apply)
CO5: Identify and use strategies for effective communication, including giving. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	-	1	-	-	-	1	2	2	1	2	1	1	1	2
CO2	-	1	-	-	1	-	2	1	-	1	2	1	-	2	2
CO3	1	1	-	1	-	1	-	2	1	2	-	1	1	2	3
CO4	-	1	-	-	1	-	1	2	-	-	1	-	-	1	2
CO5	1	-	1	-	-	1	2	1	1	2	-	1	1	2	3

Detailed Syllabus

Unit – I: Information Design and Development **(8 Hours)**

Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

Unit – II: Technical Writing, Grammar and Editing **(8 Hours)**

Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Hunan factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

Unit – III: Self Development and Assessment **(8 Hours)**

Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

Unit – IV: Communication and Technical Writing **(8 Hours)**

Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

Unit – V: Ethics **(10 Hours)**

Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

Reference Books:

1. David F. Beer and David Mc Murrey, Guide to writing as an Engineer, John Willey. New York, 2004

2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)

3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.

4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.

5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)

6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 307 Title of the Course: Electronic Devices Lab

L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to understand characteristics of PN junction diode, Zener Diodes (Cognitive level: understand).

CO2: Able to design rectifier circuits (Cognitive level: create).

CO3: Able to design voltage regulator circuits using Zener diode (Cognitive level: create).

CO4: Able to understand characteristics of BJT and MOSFET (Cognitive level: understand).

CO5: Able to design electronic circuits (Cognitive level: create).

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O1	PS O2	PS O3
CO1	1	1	-	-	-	-	1	1	2	1	2	1	1	1	2
CO2	-	1	3	-	1	-	2	1	-	1	2	1	2	2	2
CO3	1	1	3	1	-	1	-	2	1	2	-	1	3	2	3
CO4	-	1	-	-	1	-	1	-	-	-	1	-	1	1	2
CO5	1	-	3	-	-	1	1	1	1	2	-	1	1	2	3

List of experiments

1. To study V-I characteristics of PN Junction diode.
2. To apply switching characteristics of PN Junction diode to create AC to pulsating DC and find efficiency.
3. To study Zener diode in reverse biased condition.
4. Design voltage regulator using Zener diode and find its percentage regulation.
5. To study V-I characteristics of BJT in CE configuration.
6. To study V-I characteristics of BJT in CC configuration.
7. To study V-I characteristics of BJT in CB configuration.
8. To study V-I characteristics of MOSFET.
9. To study characteristics of LED.
10. To design electronics circuit of any application using basic electronics components.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Name of Academic Program: Bachelor of Technology (ECE)

Course Code: BTECE 308 **Title of the Course:** Digital System Design Lab
L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this course, the students should be able to.
CO1: Understand the working of logic gates and solve expression with Boolean Algebra by remembering Boolean laws and theorems (Cognitive Level: Understand)
CO2: Understanding the working combinational logic circuits and apply K-Maps to derive logical expression. (Cognitive Level: Apply)
CO3: Analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder. (Cognitive Level: Analyze)
CO4: Use basic flip-flops SR, JK, D and T, Analyze and Evaluate synchronous and asynchronous sequential logic circuits. (Cognitive Level: Evaluate)
CO5: Synthesize efficient HDL algorithms without any error and design digital systems. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O1	PS O2	PS O3
CO1	1	2	3	2	1	3	-	1	-	-	1	1	3	2	1
CO2	2	2	3	2	1	3	1	-	1	1	1	-	3	2	2
CO3	3	3	-	1	2	3	-	1	-	1	-	1	3	1	1
CO4	2	3	1	1	2	3	1	1	1	1	-	-	3	2	1
CO5	2	3	-	1	1	3	1	-	1	-	-	1	3	3	1

List of Experiments

1. Introduction to VHDL
2. Design of Basic Gates: NOT, AND, OR
3. Design of Universal Gates
4. Design of MUX and DEMUX using basic gates
5. Design of Half Adder, Full Adder and Half subtractor
6. Design of binary to gray code converter
7. Design of 3:8 Decoder
8. Design of all Flip-Flops
9. Design of Counters
10. Design of Synchronous Counters

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.

4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 401 Title of the Course: Analog and Digital Communication

L-T-P: 3-1-0
Credits: 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of this course students will demonstrate the ability to

CO1: Analyze and compare different analog modulation schemes for their efficiency and bandwidth. (Cognitive Level: Evaluate)
CO2: Understand the behavior of a communication system in presence of noise. (Cognitive Level: Understand)
CO3: Apply pulsed modulation system and analyze their system performance. (Cognitive Level: Apply)
CO4: Evaluate different digital modulation schemes and can compute the bit error performance. (Cognitive Level: Evaluate)
CO5: Design and Evaluate various pulse modulation techniques. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O1	PS O2	PS O3
CO1	1	2	3	2	1	3	-	1		1	1	-	3	3	1
CO2	2	2	3	2	1	3	1	-	1	1	-	1	3	2	-
CO3	3	3	-	1	2	3	-	1	-	-	1	-	3	3	1
CO4	2	3	-	1	2	3	1	-	1	1	-	1	3	2	-
CO5	2	3	-	1	1	3	-	1	1		1	1	3	3	1

Detailed Syllabus:

Unit I: **(10 Hours)**

Review of signals and systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

Unit – II: **(10 Hours)**

Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and De- emphasis, Threshold effect in angle modulation.

Unit – III: **(10 Hours)**

Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.

Unit – IV: **(10 Hours)**

Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion. Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying.

Unit – V: **(10 Hours)**

Digital Modulation tradeoffs. Optimum demodulation of digital signals over band-limited channels- Maximum likelihood sequence detection (Viterbi receiver). Equalization Techniques. Synchronization and Carrier Recovery for Digital modulation.

Text Books:

1. Haykin S., "Communications Systems", John Wiley and Sons,2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.

Reference Book:

1. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering", John Wiley,1965.
2. Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication", Kluwer Academic Publishers,2004.
3. Proakis J.G., ``Digital Communications", 4th Edition, McGraw Hill,2000.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 402 **Title of the Course: Analog Circuits**

L-T-P: 3-1-0
Credits: 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of this course students will demonstrate the ability to

CO1: Analyze the behavior of diodes and transistors for circuit design. (Cognitive Level: Analyze)

CO2: Design and analyze various rectifier and amplifier circuits. (Cognitive Level: Create)

CO3: Design sinusoidal and non-sinusoidal oscillators. (Cognitive Level: Create)

CO4: Create and design OP-AMP based circuits. (Cognitive Level: Create)

CO5: Design of ADC and DAC for different applications. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	1	--	--	--	--	1	--	--	--	1	--	1
CO2	1	2	3	--	--	1	1	1	--	--	1	1	1	2	
CO3	--	--	2	--	3	--	1	1	--	1	1	--	2	3	1
CO4	1	2	1	2	3	1	--	1	1	--	--	1	3	2	
CO5	--	3	1	--	2	--	1	--	--	1	--	1	2	2	1

Detailed Syllabus

Unit – I: Low Frequency Signal Analysis: **(10 Hours)**

Diode Circuits, Amplifier models: Voltage amplifier, current amplifier, trans conductance amplifier and trans-resistance amplifier. Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers.

Unit – II: High Frequency Signal Analysis: **(10 Hours)**

High frequency transistor models, frequency response of single stage and multistage amplifiers, cascode amplifier. Various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues. Feedback topologies: Voltage series, current series,

voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation with practical circuits, concept of stability, gain margin and phase margin.

Unit – III: Oscillators: **(10 Hours)**

Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), non-sinusoidal oscillators. Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load. Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR. OP-AMP design: design of differential amplifier for a given specification, design of gain stages and output stages, compensation.

Unit – IV: OP-Amp Applications: **(10 Hours)**

Review of inverting and non-inverting amplifiers, integrator and differentiator, summing amplifier, precision rectifier, Schmitt trigger and its applications. Active filters: Low pass, high pass, band pass and band stop, design guidelines.

Unit – V: ADC/DAC **(10 Hours)**

Weighted resistor, R-2R ladder, resistor string etc. Analog- to-digital converters (ADC): Single slope, dual slope, successive approximation, flash etc. Switched capacitor circuits: Basic concept, practical configurations, application in amplifier, integrator, ADC etc.

Text Books:

1. J. Millman and A. Grabel, Microelectronics, 2nd edition, McGraw Hill,1988.P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press,1989.
2. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder'sCollege11

Publishing, EditionIV

Reference book:

1. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill,1992.
2. Paul R. Gray and Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3rdEdition

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 403 **Title of the Course: Microcontrollers**

L-T-P: 3-1-0
Credits: 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of this course students will demonstrate the ability to

CO1: Do assembly language programming for engineering solutions. (Cognitive Level: Evaluate)

CO2: Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc. (Cognitive Level: Create)

CO3: Develop systems using different microcontrollers for real time applications. (Cognitive Level: Create)

CO4: Design and develop ARM microcontroller-based systems. (Cognitive Level: Create)

CO5: Develop assembly language program for specified application. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	--	2	2	--	--	1	--	--	1	1	2	2	1
CO2	2	--	1	--	3	1	1	--	1	--	1	--	2	3	-
CO3	--	2	3	1	1	--	1	1	--	1	--	1	2	2	1
CO4	--	--	3	1	2	--	--	1	--	1	--	1	2	1	1
CO5	--	2	--	2	--	2	1	--	1	--	2	--	3	1	1

Detailed Syllabus

Unit – I:8085 Microprocessor **(10 Hours)**

Overview of microcomputer systems and their building blocks, memory interfacing, concepts of interrupts and Direct Memory Access, instruction sets of microprocessors with example of 8085.

Unit – II: 8086 Microprocessor **(10 Hours)**

Overview of microcomputer systems and their building blocks, memory interfacing, concepts of interrupts and Direct Memory Access, instruction sets of microprocessors with example of 8086.

Unit – III: Interfacing with peripherals: **(10 Hours)**

Timer, serial I/O, parallel I/O, A/D and D/A converters; Arithmetic Coprocessors; System level interfacing design.

Unit – IV: Advanced Processors and Controllers **(10 Hours)**

Concepts of virtual memory, Cache memory, Advanced coprocessor Architectures- 286, 486, Pentium; Microcontrollers: 8051 systems.

Unit – V: Introduction to RISC Processor: **(10 Hours)**

Introduction to RISC processors; ARM microcontrollers interface designs

Text Books:

1. R. S. Gaonkar, Microprocessor Architecture: Programming and Applications with the 8085/8080A, Penram International Publishing,1996
2. Kenneth J. Ayala, the 8051 Microcontroller, Penram International Publishing,1996.

Reference book:

1. D A Patterson and J H Hennessy, "Computer Organization and Design The hardware and software interface. Morgan Kaufman Publishers.
2. Douglas Hall, Microprocessors Interfacing, Tata McGraw Hill,1991

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 404 Title of the Course: Electronics Instrumentation & Measurement

L-T-P: 3-1-0
Credits: 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of this course students will demonstrate the ability to

CO1: Apply basic physics to understand the measuring methods and instruments of electrical quantities. (Cognitive Level: Apply)
CO2: To analyze the design aspects and performance criterion of measuring instruments. (Cognitive Level: Analyze)
CO3: To analyze and evaluate the working principle of various transducers. (Cognitive Level: Analyze)
CO4: To create and synthesis different types of AC bridges used for measurement of electrical parameters. (Cognitive Level: Create)
CO5: To understand the basic principle of transducers. (Cognitive Level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	3	2	3	2	1	-	2	-	1	-	1	-	3	1	1
CO2	3	3	3	2	2	1	-	2	-	1	-	1	3	2	1
CO3	3	2	3	2	1	2	2	1	1	1	-	1	3	1	1
CO4	3	3	3	2	1	-	2	1	-	-	1	-	3	2	1
CO5	3	3	2	2	2	1	-	-	1	-	-	1	3	2	-

Detailed Syllabus:

Unit-I **(10 Hours)**

Introduction to static and dynamic characteristics of instruments, study of errors in measurement, types of static error, gross error, systematic error, random error and their source. Introduction of moving coil and moving iron type instruments, electrical standard and calibration.

Unit-II **(10 Hours)**
Operation and construction of Galvanometer (DC and AC) Ammeter and Voltmeter, Multirange Ammeter and Voltmeter, Digital Voltmeter, Digital Multimeter, Digital frequency meter.

Unit-III **(10 Hours)**

Measurement of resistance, inductance and capacitance, measurement of low medium and high resistance, measurement of insulation resistance, measurement of AC bridge for inductance and capacitance, introduction to instrument transformer.

Unit-IV **(10 Hours)**

Introduction to CRO, basic principles and block diagram understanding of single/dual beam CRO, delay time based oscilloscope, sampling oscilloscope, Digital storage oscilloscope (DSO) and their application.

Unit-V **(10 Hours)**

Fixed/variable frequency audio oscillator, function generator (sine, square, triangular), introduction to digital data recording system.

REFERENCE BOOKS

1. David A. Bell ‘’Electronic instrumentation and measurement”, PHI publication.
2. H.S.Kalsi “Electronic instrumentation”, TMH publication.
3. Reissland, M.U. “Electrical measurement: fundamentals, concept, application”, new age international (P) ltd. Publishers.
4. W.D.Cooper, “Modern electronics instrumentation and measurement technique”, PHI publishers.
5. A.K.Shawney,” Electrical and electronics measurement and instruments” Dhanpatrai & sons publication.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 405 Title of the Course: ORGANISATIONAL BEHAVIOUR

L-T-P: 3-0-0
Credits: 3
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: To understand the conceptual framework of the discipline of OB and its practical applications in the organizational set up. (Cognitive Level: Understand)
CO2: To deeply understand the role of individual, groups and structure in achieving organizational goals effectively and efficiently. (Cognitive Level: Understand)
CO3: To critically evaluate and analyze various theories and models that contributes in the overall understanding of the discipline. (Cognitive Level: Evaluate)
CO4: To develop creative and innovative ideas that could positively shape the organizations. (Cognitive Level: Create)
CO5: To accept and embrace in working with different people from different cultural and diverse background in the workplace. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	1	1	2	1	1	3	2	2	1	3	3	3
CO2	1	2	2	1	2	3	2	2	3	2	2	2	3	3	3
CO3	2	2	3	2	2	2	2	2	3	2	3	2	3	2	3
CO4	2	2	3	2	2	2	3	2	3	2	3	2	3	3	3
CO5	2	1	1	1	1	3	2	2	3	2	3	1	3	3	3

Detailed Syllabus:

Unit I: Fundamentals of OB (8 Hours)
Fundamentals and goals of Organizational Behavior, Models of Organizational Behavior, Emerging aspects of Organizational Behavior

Unit II: Value, Attitude and Motivation (8 Hours)

Values and Attitude, Job Satisfaction; Motivation and its importance, Theories of Motivation: Maslow's Need Hierarchy Theory, Mc Gregor's Theory X and Theory Y, Alderfer's Two Need Model

Unit III: Personality and Perception (8 Hours)
Concept of Personality, Determinants of personality, Type A and Type B assessment of personality; Concept of Perception, Errors and distortions in perception

Unit IV: Group Dynamics and Leadership (8 Hours)

Concept of Group, Stages of group building; Leadership, Leadership Styles, Leader Vs Manager, Managerial Grid; Communication

Unit V: Stress and Conflict (8 Hours)

Concept, symptoms, sources of stress, Burnout, Stress Management; Concept of conflict, Conflict Management; Organizational Change and Development

Reference Books

1. Essentials of Organizational Behavior, Stephen P Robbins, Timothy A Judge, latest edition
2. Organizational Behavior, Fred Luthans, McGraw-Hill International edition
3. Organizational Behavior, K. Aswathappa, latest edition
4. Organization Theory and Behavior, T N Chhabra, B P Singh, latest edition
5. An Introduction to Organizational Behavior, Dr. Namita Rajput, Jyotsna, latest edition

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 406 Title of the Course: Antenna and Propagation

L-T-P: 3-1-0 Credits: 04

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to -

CO1: Understand the properties and various types of antennas. (Cognitive Level: Understand)

CO2: Analyze the properties of different types of antennas and their design. (Cognitive Level: Analyze)

CO3: Understand antenna design software tools and come up with the design of the antenna of required specifications. (Cognitive Level: Understand)

CO4: Apply antenna design and measurement of different types of antennas at different frequencies. (Cognitive Level: Apply)

CO5: Understand mechanism of radio wave propagation with their associated factors. (Cognitive Level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	3	3	2	1	-	-	-	1	-	-	1	-	1	-	1
CO2	3	3	3	2	1	-	1	-	1	-	1	1	1	1	-
CO3	3	3	3	2	2	-	1	-	1	1	-	1	-	2	-
CO4	3	3	3	3	-	1	1	1	1	-	1	-	2	-	1
CO5	3	3	2	1	1	-	-	1	-	1	-	1	1	2	-

Detailed Syllabus:

UNIT I: **(10 Hours)**

Fundamental Concepts- Physical concept of radiation, Radiation pattern, near-and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions.

UNIT II: **(10 Hours)**

Radiation from Wires and Loops- Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.

UNIT III: **(10 Hours)**

Aperture and Reflector Antennas- Huygens' principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts, prime-focus parabolic reflector and Cassegrain antennas.

Broadband Antennas- Log-periodic and Yagi-Uda antennas, frequency independent antennas, broadcast antennas.

Micro strip Antennas- Basic characteristics of micro strip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas.

UNIT IV: **(10 Hours)**

Antenna Arrays- Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays, synthesis of antenna arrays using Schelkunoff polynomial method, Woodward-Lawson method.

UNIT V: **(10 Hours)**

Basic Concepts of Smart Antennas- Concept and benefits of smart antennas, fixed weight beam forming basics, Adaptive beam forming.

Different modes of Radio Wave propagation used in current practice.

Reference Books:

1. J.D. Kraus, Antennas, McGraw Hill,1988.
2. C.A. Balanis, Antenna Theory - Analysis and Design, John Wiley,1982.
3. R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill,1985.
4. sR.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw ill,1984.
5. I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House,1980.
6. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill,2005
7. R.E. Crompton, Adaptive Antennas, JohnWiley

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning by doing numerical
2. Learning through discussion among the peer group
3. Learning through Case Studies
4. Group Projects
5. Through Field Studies
6. Experiential Learning

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 407 Title of the Course: Analog & Digital Communications Lab

L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: students will be able to understand the modulation and demodulation techniques and will be able to observe how signal varies with changing of different signal parameters. (Cognitive level: Understand)

CO2: students will be able to understand and observe different types of analog modulation and demodulation techniques used in various applications. (Cognitive level: Understand)

CO3: students will be able to understand various modulation and demodulation techniques used in various digital communication systems and its different variations. (Cognitive level: Understand)

CO4: students will be able to perform different modulation and demodulation techniques on both the experimental kits and simulations based on MATLAB software. (Cognitive level: Apply)

CO5: students will be able to use the acquired knowledge for their project based on communication system. (Cognitive level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	1	1	-	-	1	2	1	-	2	2	1	1	1	1
CO2	-	1	2	-	1	-	-	-	1	2	3	1	1	2	1
CO3	2	-	2	1	-	1	2	1	-	1	1	1	2	2	1
CO4	-	1	-	-	1	-	-	-	2	-	-	1	1	3	2
CO5	1	1	3	1	2	1	1	1	1	1	1	2	2	1	1

List of experiments

1. To generate amplitude modulated wave and determine the percentage modulation and to Demodulate the modulated wave using envelope detector
2. To generate AM-Double Side Band Suppressed Carrier (DSB-SC) signal.
3. To generate the SSB modulated wave.
4. To generate frequency modulated signal and determine the modulation index and bandwidth for various values of amplitude and frequency of modulating signal and demodulate a Frequency Modulated signal using FM detector

5. To verify the sampling theorem.
6. A) To generate the Pulse Amplitude modulated and demodulated signals.

   B) To generate the pulse width modulated and demodulated signals and to generate pulse position modulation and demodulation signals and to study the effect of amplitude of the modulating signal on output.
7. write a MATLAB code performing signal sampling and quantization using MATLAB
8. Write a MATLAB code performing Pulse code Modulation and Demodulation using MATLAB. Verify the same result with the help of an experimental Kit
9. Write a MATLAB code performing Delta Modulation and demodulation using MATLAB
10. Write a MATLAB code performing ASK, FSK, PSK, BFSK, and BPSK using MATLAB

Teaching-Learning Strategies in brief

1. Encourage students to develop a practical based knowledge
2. To build the purpose of generating something in lab making it inherent part of their engineering education system.
3. To provide students with a platform where they can understand various intricate observations which are difficult to provide in otherwise theory based classroom atmosphere
4. Encourage to the students to implement the practical knowledge into projects

Assessment methods and weightages in brief

1. By conducting quiz based on experiments
2. By conducting viva .
3. By taking semester examination.
4. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 408 Title of the Course: Analog Circuit Lab

L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to design amplifiers (Cognitive level: create).

CO2: Able to analyze multistage amplifiers (Cognitive level: analyze).

CO3: Able to design oscillators for specified frequency (Cognitive level: create).

CO4: Able to analyze and compare different oscillator circuits (Cognitive level: evaluate).

CO5: Able to design electronic circuits using operational amplifier (Cognitive level: create).

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	1	3	1	-	-	1	1	2	1	2	1	2	1	2
CO2	-	3	-	1	1	-	2	1	-	1	2	1	2	2	1
CO3	1	1	3	1	-	1	-	2	1	2	-	1	3	2	3
CO4	-	1	-	3	1	-	1	-	-	-	1	-	3	1	2
CO5	1	-	3	1	-	1	1	1	1	2	-	1	3	2	3

List of experiments

1. To design amplifier for small signals using BJT.

2. To design amplifier for small signals using FET.

3. To study power amplifier using push pull amplifier.

4. To study RC coupled Amplifier and find its overall gain.

5. Design phase shift oscillator for specify frequency.

6 Design Weign bridge oscillator for specify frequency

7. Design Colpits oscillator for specify frequency.

8. Design Hertley oscillator for specify frequency.

9. To design integrator and differentiator using operational amplifier.

10. To design adder and subtractor circuit using operational amplifier.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.

2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 409 Title of the Course: Microcontroller Lab

L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to understand assembly language programming. (Cognitive level: understand).

CO2: Able to analyze and compare difference between microprocessor/microcontroller programming (Cognitive level: evaluate).

CO3: Able to write assembly language program for microprocessor/microcontroller (Cognitive level: apply).

CO4: Able to interface microprocessor/ microcontroller with other device (Cognitive level: create).

CO5: Able to design application specific modules using microcontroller (Cognitive level: create).

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	1	-	1	-	-	1	1	2	1	2	1	1	1	1
CO2	-	1	-	1	3	-	2	1	-	1	2	1	1	2	1
CO3	1	3	-	1	-	1	-	2	1	2	-	1	2	2	3
CO4	-	1	3	3	1	-	1	-	-	-	1	-	3	2	3
CO5	1	-	3	1	-	1	1	1	1	2	-	1	3	2	3

List of experiments

1. Write an assembly language program for addition of two 8-bit numbers with carry using 8085.

2. Write an assembly language program for subtraction of two 8-bit numbers with borrow using 8085.

3. Write an assembly language program for multiplication of two 8-bit numbers using 8085..

4. Write an assembly language program for transfer of data in blocks from one place to another place using 8086.

5. Write an assembly language program for interfacing of 8085 with keyboard.

6. Write an assembly language program for interfacing of 8086 with LCD display.

7. Write an assembly language program for finding two’s compliment using PIC Microcontroller.

8. Write an assembly language program for interfacing of stepper motor using Microcontroller.

9. Write an assembly language program for interfacing of traffic light control using Microcontroller.

10. To design microprocessor/microcontroller based application.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 410 **Title of the Course: Disaster Management**
L-T-P: 3-0-0

Credits: 03

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to …….

CO1: To understand basic conceptual understanding of disasters and its relationships with development. (Cognitive Level: Understand)
CO2: To understand and analyze approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction. (Cognitive Level: Understand)
CO3: To analyze Medical and Psycho-Social Response to Disasters. (Cognitive Level: Analyze)
CO4: To apply preventive measures and control Public Health consequences of Disasters. (Cognitive Level: Apply)
CO5: To create and evaluate awareness of Disaster Risk Management institutional processes in India. (Cognitive Level: Create)
CO6: To create skills to respond to disasters. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	1	2	1	1	-	2	-	2	1	2
CO2	3	3	3	1	1	-	2	2	-	1	2	1	2	1	1
CO3	3	3	3	-	1	-	2	1	-	-	-	1	2	1	1
CO4	3	3	2	1	-	1	2	2	1	-	2	1	3	2	2
CO5	3	3	2	-	1	1	2	2	-	1	2	-	2	1	2
CO6	3	-	3	1	-	-	2	2	1	1	2	-	2	2	1

Detailed Syllabus:

UNIT-1: Introduction to Disaster **(8 Hours)**

Concepts of Hazard, Vulnerability, Risks, Natural Disasters (earthquake, Cyclone, Floods, Volcanoes), and Man Made Disaster (Armed conflicts and civil strip, Technological disasters, Human Settlement, Slow Disasters (famine, draught, epidemics) and Rapid Onset

Disasters(Air Crash, tidal waves, Tsunami) Risks, Difference between Accidents and Disasters, Simple and Complex Disasters, Refugee problems, Political, Social, Economic impacts of Disasters, Gender and Social issues during disasters, principles of psychosocial issues and recovery during emergency situations, Equity issues in disasters, Relationship between Disasters and Development and vulnerabilities, different stake holders in Disaster Relief. Refugee operations during disasters, Human Resettlement and Rehabilitation issues during and after disasters, Inter-sectoral coordination during disasters, Models in Disasters.

UNIT-II: Approaches to Disaster Risk Reduction **(8 Hours)**

Disaster Risk Reduction Strategies, Disaster Cycle, Phases of Disaster, Preparedness Plans, Action Plans and Procedures, Early warning Systems Models in disaster preparedness, Components of Disaster Relief-(Water, food, sanitation, shelter, Health and Waste Management), Community based DRR, Structural nonstructural measures in DRR, Factors affecting Vulnerabilities, , Mainstreaming disaster risk reduction in development, Undertaking risk and vulnerability assessments, Policies for Disaster Preparedness Programs, Preparedness Planning, Roles and Responsibilities, Public Awareness and Warnings, Conducting a participatory capacity and vulnerability analysis, , Sustainable Management, Survey of Activities Before Disasters Strike, Survey of Activities During Disasters, DRR Master Planning for the Future, Capacity Building, Sphere Standards. Rehabilitation measures and long-term reconstruction. Psychosocial care provision during the different phases of disaster.

UNIT- III: Prinicples of Disaster Medical Management **(8 Hours)**

Introduction to disaster medicine, Various definitions in disaster medicine, Disaster life cycle, Disaster planning, Disaster preparation, Disaster recovery in relation to disaster medical management, Medical surge, Surge capacity, Medical triage, 260 National Assessing the nature of hazardous material - Types of injuries caused, Self protection contaminated area and decontaminated area – Pre hospital medical management of victims – Triaging medical & psychosocial identification of hospitals and other medical facilities to offer efficient disastrous medical service – Safe patient transportation –Identification of valuable groups (Pregnancy, pediatric and geriatric other people with associated medical co morbidities) (DM, Systemic Hypertension / Cardiac, Pulmonary, Cerebral and Renal) – knowledge about antidotes, - and Body decontaminations procedures (skin, GI tract, Respiratory tract and from blood) – Poly trauma Care - Specific treatment in emergency and Intensive Care Units – allocation of specialists in Local EMS System including equipments, safe use of equipments.

UNIT-IV: Public Health Response and International Cooperation **(8 Hours)**

Principles of Disaster Epidemiology, Rapid Health Assessment, Rapid Health needs assessment. Outbreak Investigation Environment health hygiene and sanitation issues during disasters, Preventive and prophylactic measures including Measles immunization, ORS, water, supply, chemoprophylaxis, food fortification, food supplements, MISP-Reproductive Health Care, International cooperation in funding on public health during disaster, To identify existing and potential public health problems before, during and after disasters. (168 countries Framework Disaster Risk Reduction), International Health Regulation, United Nation International Strategy for Disaster Risk Reduction (UNISDR), United Nation Disaster Management Team, International Search and Rescue Advisory Group, (INSARAG, Global

Facility for Disaster Risk Reduction (GFDRR), Asean Region Forum (ARF), Asian disaster Reduction Centre (ADRC), SAARC

UNIT-V: Disaster Risk Management in India **(8 Hours)**

Hazard and Vulnerability Profile India, Disaster Management Indian scenario, India's vulnerability profile, Disaster Management Act 2005 and Policy guidelines, National Institute of Disaster Management, , National Disaster Response Force (NDRF)National Disaster Management Authority, States Disaster Management Authority, District Disaster Management Authority Cases Studies : Bhopal Gas Disaster, Gujarat Earth Quake, Orissa Super-cyclone, south India Tsunami, Bihar floods, Plague- Surat, Landslide in North East, Heat waves of AP& Orissa, Cold waves in UP. Bengal famine, best practices in disaster management, Local Knowledge Appropriate Technology and local Responses, Indigenous Knowledge, Development projects in India (dams, SEZ) and their impacts, Logistics management in specific emergency situation. Rajiv Gandhi Rehabilitation package, Integrated Coastal Zone Management, National Flood Risk Mitigation Project (NFRMP), Mines Safety in India, Indian Meteorological Department, National Crisis Management Committee, Indian NATIONAL Centre for Oceanic Information System (INCOIS)

Reference Books:

1. Disaster Management Guidelines. GOI-UNDP Disaster Risk Reduction Programme (2009-2012.
2. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003
3. Guerisse P. 2005 Basic Principles of Disaster Medical Management. Act Anaesth. Belg;56:395-401
4. Aim and Scope of Disaster Management. Study Guide prepared by Sharman and Hansen. UW-DMC, University of Washington.
5. Sphere Project (2011). Humanitarian Charter and Minimum Standards in Disaster Response.
6. Geneva: Sphere Project. http://www.sphereproject.org/ handbook/
7. Satapathy S. (2009) Psychosocial care in Disaster management, A training of trainers manual (ToT), NIDM publication.
8. Prewitt Diaz, J.O (2004). The cycle of disasters: from Disaster Mental Health to Psychosocial Care. Disaster Mental Health in India, Eds: Prewitt Diaz, Murthy, Lakshmi Narayanan, Indian Red Cross Society Publication.
9. Sekar, K (2006). Psychosocial Support in Tsunami Disaster: NIMHANS responses. Disaster and Development, 1.1, pgs 141-154.
10. Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC.
11. Alexander David, 2000 Introduction in 'Confronting Catastrophe', Oxford University Press.
12. Andharia J. 2008 Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper no. 8,
13. Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disasters, Routledge.
14. Coppola P Damon, 2007. Introduction to International Disaster Management, Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manil

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning by doing numericals
2. Learning through discussion among the peer group
3. Learning through Case Studies
4. Group Projects
5. Through Field Studies
6. Experiential Learning

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 501 **Title of the Course: Electromagnetic Waves**

L-T-P : 3-1-0 **Credits**: 04

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to -

CO1: Understand the basic mathematical concepts related to electromagnetic vector fields. (Cognitive Level: Understand)

CO2: Apply the principles of electrostatics to the solutions of problems relating to electric field

and electric potential, boundary conditions and electric energy density. (Cognitive Level: Apply)

CO3: Apply the principles of magneto statics to the solutions of problems relating to magnetic

field and magnetic potential, boundary conditions and magnetic energy density. (Cognitive Level: Evaluate)

CO4: Remember the concepts related to Faraday‘s law, induced emf and Maxwell‘s equations. (Cognitive Level: Remember)

CO5: Apply Maxwell‘s equations to solutions of problems relating to transmission lines and

uniform plane wave propagation. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	3	2	2	1	-	-	-	1	-	1	-	1	1	2	1
CO2	3	3	2	2	-	1	-	1	1	-	1	-	-	1	-
CO3	3	3	3	2	1	-	1	1	1	1	1	1	1	2	1
CO4	3	3	3	3	-	1	1	-	1	-	1	-	-	-	1
CO5	3	3	2	3	2	-	1	-	-	1	-	1	1	2	2

Detailed Syllabus:

Unit I: Transmission Lines **(10 Hours)**

Transmission Lines: Equations of Voltage and Current on TX line, Propagation constant and characteristic impedance, and reflection coefficient and VSWR, Impedance Transformation on Loss-less and Low loss Transmission line, Power transfer on TX line, Smith Chart, Admittance Smith Chart, Applications of transmission lines: Impedance Matching, use transmission line sections as circuit elements.

Unit II: Maxwell's Equations and Uniform Plane Wave **(10 Hours)**

Maxwell's Equations: Basics of Vectors, Vector calculus, Basic laws of Electromagnetics, Maxwell's Equations, Boundary conditions at Media Interface.

Uniform Plane Wave: Uniform plane wave, Propagation of wave, Wave polarization, Poincare's Sphere, Wave propagation in conducting medium, phase and group velocity, Power flow and Poynting vector, Surface current and power loss in a conductor.

Unit III: Plane Waves at a Media Interface **(10 Hours)**

Plane Waves at a Media Interface: Plane wave in arbitrary direction, Reflection and refraction at dielectric interface, Total internal reflection, wave polarization at media interface, Reflection from a conducting boundary.

Unit IV: Waveguides **(10 Hours)**

Wave propagation in parallel plane waveguide, Analysis of waveguide general approach, Rectangular waveguide, Modal propagation in rectangular waveguide, Surface currents on the waveguide walls, Field visualization, Attenuation in waveguide.

Unit V: Antennas **(10 Hours)**

Radiation: Solution for potential function, Radiation from the Hertz dipole, Power radiated by hertz dipole, Radiation Parameters of antenna, receiving antenna, Monopole and Dipole antenna.

Reference Books:

1. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill India, 2005
2. E.C. Jordan & K.G. Balmain, Electromagnetic waves & Radiating Systems, Prentice Hall, India
3. NarayanaRao, N: Engineering Electromagnetics, 3rd ed., Prentice Hall, 1997.
4. David Cheng, Electromagnetics, Prentice Hall.

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning by doing numerical
2. Learning through discussion among the peer group
3. Group Projects

4. Through Field Studies
5. Experiential Learning

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 502 **Title of the Course: Computer Architecture**

L-T-P : 3-1-0 **Credits**: 04

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Identify various components of computer and their interconnection

CO2: Identify basic components and design of the CPU: the ALU and control unit.

CO3: Compare and select various Memory devices as per requirement.

CO4: Compare various types of IO mapping techniques

CO5: Critique the performance issues of cache memory and virtual memory

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	2	2	2	2	-	1	-	-	-	1	1	-
CO2	3	2	-	-	2	-	2	2	-	-	1	1	2	2	1
CO3	-	-	1	3	3	1	-	2	1	1	-	1	3	3	-
CO4	2	2	2	-	1	-	2	1	-	1	1	-	3	3	1
CO5	1	2	2	3	2	1	2	-	1	-	-	1	3	2	1

Detailed Syllabus:

Unit I : Basic Structure of Computers **(10 Hours)**

Basic Structure of Computers, Functional units, software, performance issues software, machine instructions and programs, Types of instructions, Instruction sets: Instruction formats, Assembly language, Stacks, Ques, Subroutines.

Unit II: Processor Organization **(10 Hours)**

Processor organization, Information representation, number formats, Multiplication & division,

ALU design, Floating Point arithmetic, IEEE 604 floating point formats.

Unit III: Control Design and Micro Programmed Control **(10 Hours)**

Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control unit.

Micro programmed Control: Basic concepts, minimizing microinstruction size, multiplier control unit. Micro programmed computers - CPU control unit.

Unit IV: Memory organization **(10 Hours)**

Memory organization, device characteristics, RAM, ROM, Memory management, Concept of Cache & associative memories, Virtual memory.

Unit V: System organization and Parallel processing (10 Hours)

System organization, Input - Output systems, Interrupt, DMA, Standard I/O interfaces Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network

Reference Books:

1. V.Carl Hammacher, “Computer Organization”, Fifth Edition.
2. A.S.Tanenbum, “Structured Computer Organisation”, PHI, Third edition
3. Y.Chu, "Computer Organization and Microprogramming” , II, Englewood Chiffs, N.J., Prentice HallEdition
4. M.M.Mano, “Computer System Architecture”, Edition
5. C.W.Gear, “ Computer Organization and Programming”, McGraw Hill, N.V.Edition
6. Hayes J.P,“ Computer Architecture and Organization”, PHI, Second edition

Teaching-Learning Strategies in brief

1. Learning by doing numerical
2. Learning through discussion among the peer group
3. Group Projects
4. Through Field Studies
5. Experiential Learning

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 503 Title of the Course: Probability and Stochastic Processes

L-T-P : 3-1-0 Credits: 04

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Prerequisite: Basic probability

COURSE OUTCOME (CO)

At the end of this course students will demonstrate the ability to**:**

CO1: Understand the axiomatic formulation of modern Probability Theory and think of random variables as an intrinsic need for the analysis of random phenomena. (Cognitive Level: Analyze)

CO2: Characterize probability models and function of random variables based on single & multiple variables. (Cognitive Level: Analyze)

CO3: Evaluate and apply moments & characteristic functions and understand the concept of inequalities. (Cognitive Level: Evaluate)

CO4: Analyze the concept of random processes and determine covariance and spectral density of stationary random processes. (Cognitive Level: Analyze)

CO5: Demonstrate the specific applications to Poisson and Gaussian processes, and understand Ergodic theorem. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	2	2	-	1	-	-	1	1	3	3	1
CO2	3	2	-	1	2	-	2	2	1	2	-	1	2	2	-
CO3	1	-	-	3	3	1	2	1	2	1	1	-	3	3	1
CO4	2	2	2	-	1	2	3	2	1	1	-	1	3	2	1
CO5	3	2	1	3	2	3	1	1	-	-	1	-	3	2	2

Detailed Syllabus:

Unit I: Sets and set operations **(10 Hours)**

Sets and set operations: Probability space; Conditional probability and Bayes theorem; Combinatorial probability and sampling models.

Unit II: Random Variables **(10 Hours)**

Discrete random variables, probability mass function, probability distribution function, example random variables and distributions; Continuous random variables, probability density function, probability distribution function, example distributions.

Unit III: Joint Distributions **(10 Hours)**

Joint distributions, functions of one and two random variables, moments of random variables; Conditional distribution, densities and moments; Characteristic functions of a random variable; Markov, Chebyshev and Chernoff bounds.

Unit IV: Random Sequence **(10 Hours)**

Random sequences and modes of convergence (everywhere, almost everywhere, probability, distribution and mean square); Limit theorems; Strong and weak laws of large numbers, central limit theorem.

Unit V: Random Process **(10 Hours)**

Random process. Stationary processes. Mean and covariance functions. Ergodicity. Transmission of random process through LTI. Power spectral density.

Reference 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. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill.
3. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International.
4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers.
5. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Stochastic Processes, UBS Publishers.
6. S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 504 **Title of the Course: Digital Signal Processing**

L-T-P : 3-1-0 **Credits**: 04

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After successfully completing the course students will be able to

CO1: Apply different transforms and analyze the discrete time signals and systems. (Cognitive Level: Analyze)
CO2: Realize the use of LTI filters for filtering different real-world signals. (Cognitive Level: Apply)
CO3: Capable of calibrating and resolving different frequencies existing in any signal. (Cognitive Level: Evaluate)
CO4: Design and implement multistage sampling rate converter. (Cognitive Level: Create)
CO5: Design of different types of digital filters for various applications. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO 1	2	3	1	2	2	2	-	1	-	1	-	-	3	3	1
CO 2	1	2	3	-	2	-	2	1	-	-	1	1	2	2	1
CO 3	2	3	2	2	-	2	-	-	1	-	-	1	2	1	-
CO 4	1	1	2	2	3	1	2	2	-	1	1	-	3	1	1
CO 5	1	2	2	-	2	2	1	-	1	1	1	1	3	2	1

Detailed Syllabus:

Unit I: Discrete Time Signal **(10 Hours)**

Discrete time signals: representation of signals on orthogonal basis; Sampling and reconstruction of signals; Discrete systems attributes, Discrete Time Shift Invariant System.

Unit II: Z Transform **(10 Hours)**

Z-Transform, Analysis of LSI systems, frequency Analysis, Inverse Systems, Discrete Fourier Transform (DFT), Properties of DFT, Circular Convolution, Fast Fourier Transform Algorithm; Decimation in time and Decimation in frequency,

Unit III: FIR (Finite Impulse Response) Digital Filters **(10 Hours)**

Design of FIR Digital filters: Window method, Park-McClellan's method.

Unit IV: IIR (Infinite Impulse Response) Filters (10 Hours)

Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations; Low pass, Band pass, Band stop and High pass filters.

Unit V: Spectral Estimation (10 Hours)

Effect of finite register length in FIR filter design. Parametric and non-parametric spectral estimation. Introduction to multi-rate signal processing. Application of DSP.

Reference Books:

1. S.K.Mitra, "Digital Signal Processing: A computer based approach". TMH
2. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall,1989.
3. John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms And Applications, Prentice Hall,1997.
4. L.R. Rabiner and B. Gold, Theory and Application of Digital Signal Processing, Prentice Hall,1992.
5. J.R. Johnson, Introduction to Digital Signal Processing, Prentice Hall,1992.
6. D.J.De Fatta,, J. G. Lucas and W.S.Hodgkiss, Digital Signal Processing, John Wiley& Sons,1988.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests and quizzes.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech (Electronics and Communication Engineering)

Course Code: BTECE 505 Title of the Course: Electromagnetic Waves Lab
L-T-P: 0-0-2

Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Understand the basic mathematical concepts related to electromagnetic vector fields. (Cognitive level: Understand)
CO2: Able to find various parameters of transmission lines (Cognitive level: create).

CO3: Remember the concepts related to Faraday‘s law, induced emf and Maxwell‘s equations. (Cognitive level: Remember)

CO4: Apply Maxwell‘s equations to solutions of problems relating to transmission lines and Uniform plane wave propagation. (Cognitive level: Apply)
CO5: Able to design smith chart for various antennas. (Cognitive level: create).

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	3	-	-	-	-	1	1	2	1		1	1	1	
CO2	3	1		-	1	-		1	-	1	2	1	2		
CO3	1	2		1	-	1	-	2	1		-	1		2	
CO4	-	1	-	-	1	-	1	-	-	-	1	-	1	1	
CO5	1	-		-	-	1	1	1	1		-	1	1		3

List of Experiments

1) Write a MATLAB code to find ‘Length and Breadth’ of Waveguide.
2) Write a MATLAB code to find ‘Attenuation constant’ of an EM wave.
3) Write a MATLAB code to find’ VSWR and Reflection Coefficient’ of an EM wave.
4) Write a MATLAB code to find ‘Phase and Group velocity’ of an EM wave.
5) Write a MATLAB code to find ‘Characteristics and Terminating Impedance’ of a Transmission line.
6) Write a MATLAB code to find Transmission Coefficient at Normal Incidence.
7) Write a MATLAB code to find Reflection coefficient at Normal Incidence.
8) Write a MATLAB code to find Transmission Coefficient at Oblique Incidence.
9) Write a MATLAB code to find Reflection coefficient at Oblique Incidence.
10) Write a MATLAB code to draw the smith chart for dipole antenna.

Teaching-Learning Strategies in brief

1. **Build positive environment in the Lab.**
2. **Provide concrete basic and advanced knowledge of the subject.**
3. **Encourage to the students to ask more & more questions.**
4. **Motivate to the students to develop critical & strategic thinking.**

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech (Electronics and Communication Engineering)

Course Code: BTECE 506 Title of the Course: Digital Signal Processing Lab
L-T-P: 0-0-2

Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to implement FIR Filter. (Cognitive level: Apply)
CO2: Able to implement IIR Filter. (Cognitive level: Apply)

CO3: Able to create HP and LP filters. (Cognitive level: Create)

CO4: Able to analyze discrete time signals and systems in frequency domain. (Cognitive level: create)
CO5: Able to design Filters for removal of noise from audio signals. (Cognitive level: create).

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	3	-	-	-	-	-	1	1	2	1	-	1	1	1	1
CO2	3	1		-	1	-		1	-	1	2	1	2	1	1
CO3	1	-	3	1	2	1	-	-	1		-	1	3	2	2
CO4	-	1	3	-	1	-	1	-	-	-	1	-	2	1	1
CO5	1	-	3	-	2	1	1	1	1		-	1	2	2	3

List of Experiments

1) Write a MATLAB code to generate different types of basic discrete time signals used in IIR and FIR filters.
2) Write a MATLAB code to carry out addition, subtraction, multiplication and convolution of given discrete time signals.
3) Write a MATLAB code to find FFT of the given signals with different radix.
4) Write a MATLAB code to analyze transfer function of a given system.
5) Write a MATLAB code to determination of Power Spectrum of a given signal.
6) Write a MATLAB code to implement LP FIR filter for a given sequence.
7) Write a MATLAB code to implement HP FIR filter for a given sequence.
8) Write a MATLAB code to implement LP IIR filter for a given sequence.
9) Write a MATLAB code to implement HP IIR filter for a given sequence.
10) Write a MATLAB code to implement audio filter for a given noisy audio signal.

Teaching-Learning Strategies in brief

1. **Build positive environment in the Lab.**
2. **Provide concrete basic and advanced knowledge of the subject.**
3. **Encourage to the students to ask more & more questions.**
4. **Motivate to the students to develop critical & strategic thinking.**

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 509 **Title of the Course: Constitution of India**

L-T-P: 1-0-0 **Credits**: 0

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOME (CO)

CO1: It would be able to understand the emergence and evolution of Indian Constitution. (Cognitive Level: Understand)

CO2: It will enable to understand the structuctural framework and composition of Indian Constitution. (Cognitive Level: Understand)

CO3: It will equip with the knowledge of Understanding and analyzing federalism in the context of India. (Cognitive Level: Analyze)

CO4: It will analyze the significance and benefit of Panchayathi Raj institutions as a medium of decentralization. (Cognitive Level: Analyze)

CO5: It will help Understand and analyze the three organs of the state in the contemporary scenario. (Cognitive Level: Analyze)

CO6: It will develop capability to understand and evaluate the Indian Political scenario. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	-	-	-	1	-	1	2	3	2	1	1	1
CO2	1	-	-	1	-	1	-	-	1	1	1	-	-	2	3
CO3	-	-	1	-	-	-	-	1	2	-	2	2	1		2
CO4	-	1	-	-	1	-	1	-	1	3	2	2	1	1	2
CO5	-	-	1	-	-	-	-	-	1	-	1	-	-	-	3
CO6	-	1	-	1	-	1	-	1	2	3	1	3	1	1	3

Detailed Syllabus:

UNIT I: History of Making of the Indian Constitution: **(6 Hours)**

History, Drafting Committee, (Composition & Working), Philosophy of the Indian Constitution: Preamble, Salient Features

UNIT II: Contours of Constitutional Rights & Duties: **(6 Hours)**

Fundamental Rights: Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT III: Organs of Governance: **(6 Hours)**

Parliament: Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT IV: Local Administration: **(6 Hours)**

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT V: Election Commission: **(6 Hours)**

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested reading

1. The Constitution of India, 1950 (Bare Act), Government Publication.

2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 602 Title of the Course: Control System

L-T-P : 3-1-0 Credits: 4

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to …….

CO1: To interpret different physical and mechanical systems in terms of electrical system to construct equivalent electrical models for analysis. (Cognitive Level: Analyze)
CO2: To apply time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions. (Cognitive Level: Apply)
CO3: To evaluate different types of analysis in frequency domain to explain the nature of stability of the system. (Cognitive Level: Evaluate)
CO4: To analyze controllability and observability of control systems. (Cognitive Level: Analyze)
CO5: Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system. (Cognitive Level: Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	-	2	2	1	-	-	1		1	**2**	**1**	**1**	-
CO2	**2**	**3**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**2**	**3**	**2**	**2**
CO3	**2**	**2**	**1**	**2**	**2**	**1**	**1**	-	-	**1**	-	**1**	-	**1**	-
CO4	**3**	**3**	**2**	**2**	**2**	**1**	**1**	-	**1**	-	**1**	**2**	**1**	**2**	**2**
CO5	**2**	**3**	**2**	**2**	**1**	**1**	**1**	**1**	-	**1**	**1**	**1**	**2**	-	-

Detailed Syllabus:

Unit I: Introduction to Control System (10 Hours)

Introduction to control problem- Industrial Control examples. Transfer function. System with dead-time. System response. Control hardware and their models: potentiometers, synchronous, LVDT, dc and ac servomotors, tacho-generators, electro hydraulic valves, hydraulic servomotors, electro pneumatic valves, and pneumatic actuators. Closed-loop systems. Block diagram and signal flow graph analysis.

Unit II: Time Response (10 Hours)

Feedback control systems- Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness. Proportional, integral and derivative systems. Feed- forward and multi-loop control configurations, stability concept, relative stability, Routh stability criterion. Time response of second-order systems, steady-state errors and error constants. Performance specifications in time-domain. Root locus method of design. Lead and lag compensation.

Unit III: Frequency Response (10 Hours)

Frequency-response analysis- Polar plots, Bode plot, stability in frequency domain, Nyquist plots. Nyquist stability criterion. Performance specifications in frequency-domain. Frequency- domain methods of design, Compensation & their realization in time & frequency domain. Lead and Lag compensation. Op-amp based and digital implementation of compensators. Tuning of process controllers. State variable formulation and solution.

Unit IV: State Space Variables (10 Hours)

State variable Analysis- Concepts of state, state variable, state model, state models for linear continuous time functions, diagonalization of transfer function, solution of state equations, concept of controllability &observability.

Unit V: Optimal & Nonlinear Control System (10 Hours)

Introduction to Optimal control & nonlinear control, Optimal Control problem, Regulator problem, Output regulator, trekking problem. Nonlinear system – Basic concept & analysis.

Reference Books:

1. Gopal. M., " Control Systems: Principles and Design", Tata McGraw-Hill,1997.
2. Kuo, B.C., " Automatic Control System", Prentice Hall, sixth edition,1993.
3. Ogata, K.,"ModernControlEngineering",PrenticeHall,secondedition,1991.
4. Nagrath & Gopal, " Modern Control Engineering", New Age International, New Delhi

Teaching-Learning Strategies

1. Learning by doing
2. Learning through discussion among the peer group
3. Open ended questions by teacher
4. Open ended questions from students
5. Reflective Learning

Assessment methods and weightages

Progress towards achievement of learning outcomes will be assessed using the following:

1. time-constrained examinations
2. closed-book tests

3. problem based assignments
4. practical assignments and
5. viva voce interviews
6. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 603 **Title of the Course: Computer Network**

L-T-P : 3-1-0 **Credits**: 4

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to …….

CO1: Understand the basic concept of networking, types, networking topologies and layered architecture. (Cognitive Level: Understand)
CO2: Analyze the data link layer and MAC sub-layer. (Cognitive Level: Analyze)
CO3: Demonstrate the network Layer functioning. (Cognitive Level: Apply)
CO4: Identify the different types of network devices and their functions within a network. (Cognitive Level: Analyze)
CO5: Analyze the transport layer and application layer operation. (Cognitive Level: Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO1	3	1	-	1	-	1	1	1	-	1	-	-	1	2	1
CO2	1	3	-	-	1		1	1	1	-	1	-	2	1	-
CO3	1	2	3	2	-	1	1	-	-	1	-	1	2	3	-
CO4	1	3	2	-	1	-	-	-	1	-	-	1	2	1	1
CO5	1	2	2	3	2	-	-	-	1	-	1	-	2	2	1

Detailed Syllabus:

Unit I: Introduction to computer networks and the Internet (10 Hours)

Introduction to computer networks and the Internet: Application layer: Principles of network applications, The Web and Hyper Text Transfer Protocol, File transfer, Electronic mail, Domain name system, Peer-to-Peer file sharing, Socket programming, Layering concepts.

Unit II: Switching in Networks and Multiplexing (10 Hours)

Switching in networks: Classification and requirements of switches, a generic switch, Circuit Switching, Time-division switching, Space-division switching, Crossbar switch and evaluation of blocking probability, 2-stage, 3-stage and n-stage networks, Packet

switching, Blocking in packet switches, Three generations of packet switches, switch fabric, Buffering, Multicasting, Statistical

Multiplexing. Transport layer: Connectionless transport - User Datagram Protocol, Connection- oriented transport – Transmission Control Protocol, Remote Procedure Call.

Unit III: Transport Layer **(10 Hours)**

Transport layer: Connectionless transport - User Datagram Protocol, Connection-oriented transport – Transmission Control Protocol, Remote Procedure Call. Congestion Control and Resource Allocation: Issues in Resource Allocation, Queuing Disciplines, TCP congestion Control, Congestion Avoidance Mechanisms and Quality of Service.

Unit IV: Network Layer **(10 Hours)**

Network layer: Virtual circuit and Datagram networks, Router, Internet Protocol, Routing algorithms, Broadcast and Multicast routing

Unit V: Link Layer **(10 Hours)**

Link layer: ALOHA, Multiple access protocols, IEEE 802 standards, Local Area Networks, addressing, Ethernet, Hubs, Switches.

Reference books:

1. J.F. Kurose and K. W. Ross, " Computer Networking – A top down approach featuring the Internet", Pearson Education, 5thEdition
2. L. Peterson and B. Davie, "Computer Networks – A Systems Approach" Elsevier Morgan Kaufmann Publisher, 5th Edition.
3. T. Viswanathan, "Telecommunication Switching System and Networks", PrenticeHall
4. S. Keshav, " An Engineering Approach to Computer Networking" , PearsonEducation
5. B. A. Forouzan, " Data Communications and Networking", Tata McGraw Hill, 4th Edition

Teaching-Learning Strategies

1. Learning by doing
2. Learning through discussion among the peer group
3. Open ended questions by teacher
4. Open ended questions from students
5. Reflective Learning

Assessment methods and weightages

Progress towards achievement of learning outcomes will be assessed using the following:

1. time-constrained examinations
2. closed-book tests
3. problem based assignments
4. practical assignments and

5. viva voce interviews
6. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 604 Title of the Course: Humanities II (Professional Practice, Law & Ethics)

L-T-P : 3-0-0 Credits: 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Students will remember to create an awareness on Engineering Ethics and Human Values. (Cognitive Level: Remember)
CO2: To understand instill Moral and Social Values and Loyalty and to appreciate the rights of others. (Cognitive Level: Understand)
CO3: To apply knowledge on global development on governance. (Cognitive Level: Apply)
CO4: To analyze knowledge on risk management, compliances, ethics and sustainability aspects. (Cognitive Level: Analyze)
CO5: To evaluate and create best governance practices followed worldwide. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	-	2	2	1	1	1	3	3	1
CO2	3	3	3	3	3	3	2	2	2	2	1	1	3	3	2
CO3	3	3	3	3	3	3	-	-	2	1	-	1	-	3	3
CO4	3	3	3	3	3	3	2	2	-	-	1	1	3	-	2
CO5	3	3	3	3	3	3	2	2	1	-	-	2	3	3	3

Detailed Syllabus

UNIT I (8 Hours)

HUMAN VALUES Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II (8 Hours)

ENGINEERING ETHICS Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories, Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV **(8 Hours)**

SAFETY, RESPONSIBILITIES AND RIGHTS Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT IV **(8 Hours)**

GLOBAL ISSUES Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

UNIT V **(8 Hours)**

Ethics & Business: Ethics, Business Ethics, Organization Structure and Ethics, Addressing Ethical Dilemmas, Code of Ethics, Indian Ethos, Designing Code of Conduct, Policies, Fair practices and frameworks. Sustainability: Corporate Social Responsibility, Corporate Sustainability Reporting Framework, Legal Framework, Conventions, Treaties on Environmental and Social Aspects, Triple Bottom Line, Principle of Absolute Liability - Case Studies, Indian and contemporary Laws relating to Anti-bribery, Case Studies & Practical Aspects

REFERENCES:

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.
3.https://www.icsi.edu/media/webmodules/Module_1_Paper_1_GRMCE_Book_29102021.pdf

TEACHING - LEARNING STRATEGIES

1. Learning by doing
2. Learning through discussion among the peer group
3. Open ended questions by teacher
4. Open ended questions from students
5. Reflective Learning

Assessment methods and weightages

Progress towards achievement of learning outcomes will be assessed using the following:

1. time-constrained examinations
2. closed-book tests
3. problem based assignments
4. practical assignments and
5. viva voce interviews
6. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Name of Academic Program: Bachelor of Technology (ECE)

Course Code: BTECE 605 **Title of the Course:** Electronic Measurement Lab
L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this course, the students should be able to.
CO1: Apply basic physics to understand the measuring methods and instruments of electrical quantities. (Cognitive Level: Apply)
CO2: To analyse the design aspects and performance criterion of measuring instruments. (Cognitive Level: Analyse)
CO3: To create and synthesis different types of AC bridges used for measurement of electrical parameters. (Cognitive Level: Create)
CO4: To analyse and evaluate different parameters of Cro and DSO (Cognitive Level: Evaluate)
CO5: To understand the basic principle of function generators and data recorders. (Cognitive Level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	3	2	3	2	1	-	2	-	1	-	1	-	3	1	1
CO2	3	3	3	2	2	1	-	2	-	1	-	1	3	2	1
CO3	3	2	3	2	1	2	2	1	1	1	-	1	3	1	1
CO4	3	3	3	2	1	-	2	1	-	-	1	-	3	2	1
CO5	3	3	2	2	2	1	-	-	1	-	-	1	3	2	-

List of Experiments:

1. Measurement of Self Inductance of High Quality Factor Coil by Hay's Bridge
2. To study the Kelvin Double Bridge for Low resistance measurement
3. Measurement of Self Inductance by Maxwell's Bridge
4. Measurement of Quality Factor of an unknown coil.
5. Measurement of Capacitance by Wien Series Bridge
6. Measurement of Capacitance by De Sauty's (Modified) bridge
7. Mesurement of Self Inductance by Owen Bridge
8. Measurement of Self-Inductance by Maxwell Bridge
9. Measurement of Capacitance by Schering Bridge
10. Measurement of Capacitance by Carey Foster Bridge

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.

3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Name of Academic Program: Bachelor of Technology (ECE)

Course Code: BTECE 606 Title of the Course: Computer Networks Lab
L-T-P: 0-0-4

Credits: 2

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to …….

CO1: Demonstrate the socket program using TCP & UDP.(Cognitive level: Apply)
CO2: Develop simple applications using TCP & UDP. (Cognitive level: Create)
CO3: Develop the code for Data link layer protocol simulation (Cognitive level: Create)
CO4: Examine the performances of Routing protocol. (Cognitive level: Evaluate)
CO5: Experiment with congestion control algorithm using network simulator. (Cognitive level: Evaluate)

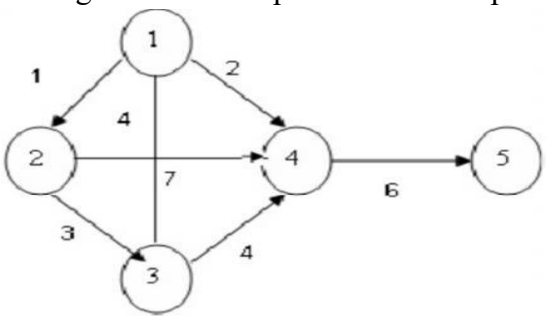
Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes(PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	1		3	2	2	3	3	2	2
CO2	3	3	3	2	3	3	2	3	3	2	2	3	3	2	2
CO3	3	3	3	2	2	1	2	1	3	2	2	3	3	2	2
CO4	3	3	3	1	2	2	1	3	3	2	2	3	3	2	2
CO5	3	3	3	2	2	2	1	2	3	2	2	3	3	2	2

List of experiments

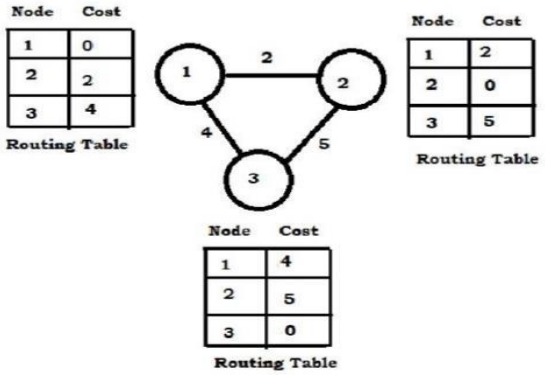
Software: Java /C/C++/ Network simulator

1. Implementation of distance vector routing.
2. Implement Dijkstra's algorithm to compute the shortest path through a given graph



3. Write a C program for FTP protocol.
4. Write a C program for UDP protocol.

5. Obtain a routing table at each node using distance vector algorithm for the given subnet.



6. Implementation of IP address configuration.
7. Implementation of stop and wait protocol.
8. Implementation of go back – N protocol.
9. To get the MAC or physical address of the system using address resolution protocol .
10. Configure or network topology using packet tracer software.

Teaching-Learning Strategies

1. Build positive and peaceful environment in the laboratory.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students to implement, perform and analyse different type of circuits.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages

1. By taking Internal viva-voce.
2. By taking External viva-voce semester examination.
3. Internal assessments (50 Marks), Semester Examination (50 Marks) and Total Marks =100

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 607 Title of the Course: Sensors and Instrumentation

L-T-P : 3-1-0 Credits: **4**

COURSE OUTCOMES (CO)

At the end of this course students will demonstrate

CO1: Good understanding of basic concepts and working of sensors and transducers. Evaluate the working of resistive transducers. (Cognitive Level: Understand)

CO2: Apply basic concepts of Laws of Induction and analyze the working of Inductive sensors and develop an understanding of properties of LVDT. (Cognitive Level: Analyze)

CO3: Design capacitive sensors by varying its parameters and analyze the properties of piezoelectric transducers. (Cognitive Level: Create)

CO4: Analyze and Evaluate resistive thermal transducers and their types and be able to design a large scale of sensors. (Cognitive Level: Evaluate)

CO5: Evaluate the working of Magnetic sensors based on the understanding developed during entire course. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O1	PS O2	PS O3
CO1	1	2	3	2	1	3	1	1	-	-	1	-	3	3	1
CO2	2	2	3	2	1	3	-	1	-	1	-	1	3	1	1
CO3	3	3	-	1	2	3	1	-	1	1	1	1	3	2	1
CO4	2	3	-	1	2	3	-	1	1	-	-	1	3	3	2
CO5	2	3	-	1	1	3	1	-	1	-	1	1	3	2	1

Detailed Syllabus:

UNIT-I **(10 Hours)**

Definition, principles of sensing and transduction, classification, Mechanical and Electromechanical sensors Resistive (potentiometric) type: Forms, materials, resolution, accuracy, sensitivity, Strain Gauges: theory, types, materials, design consideration, sensitivity, gauge factor, variation with temperature, adhesives, rosettes, applications force, velocity and torque measurements,

UNIT-II **(10 Hours)**

Inductive sensors: common types- reluctance change type, mutual inductance change type, transformer action type, - brief discussion with respect to materials, construction and input output variables, Ferromagnetic plunger type-short analysis; proximity measurement LVDT: Construction, materials, output-input relationship, I/O curve, discussion

UNIT-III **(10 Hours)**

Capacitive sensors: Variable distance- parallel plate type, Variable area- parallel plate, serrated plate/teeth type and cylindrical type, variable dielectric constant type: calculation of sensitivities; proximity measurement Stretched Diaphragm type: microphones, response characteristics Piezoelectric elements: piezoelectric effects, charge and voltage coefficients, crystal model, materials, natural and synthetic types – their comparison, force and stress sensing, piezoelectric accelerometer Tachometers -Stroboscopes, Encoders, seismic accelerometer, Measurement of vibration.

UNIT-IV **(10 Hours)**

Thermal sensors: Resistance change type: RTD - materials, construction, types, working principle Thermister - materials, construction, types, working principle Thermoemf sensors: Thermocouple - types, working principle Thermopile - types, working principle.

UNIT-V **(10 Hours)**

Magnetic sensors: Sensors based on Villari effect for assessment of force, torque, rpm meters, proximity measurement Hall effect and Hall drive, performance characteristics Geiger counters, Scintillation detectors. Introduction to Smart sensors.

REFERENCE BOOKS

1. D Patranabis, Sensors and Transducers, PHI, 2nd ed.
2. E. A. Doebelin, Measurement Systems: Application and Design Mc Graw Hill, New York
3. H. K. P. Neubert, Instrument Transducers, Oxford University Press, London and Calcutta
4. A.K. Sawhney, A Course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai & Co. (P) Limited, 2015**.**

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 702 Title of the Course: Biology

L-T-P : 2-1-0 Credits: **3**

COURSE OUTCOMES (CO)

CO1: Familiarize with Different Fields of Biology. (Cognitive Level: Understand)

CO2: Understand about Life and Evolution. (Cognitive Level: Understand)

CO3: Familiarization about Ecosystem, Food Chain, And Pollution. (Cognitive Level: Understand)

CO4: Understand the role of eukaryotic and prokaryotic cells. (Cognitive Level: Understand)

CO5: Learn about Biological System. (Cognitive Level: Remember)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	-	1	-	-	1	-	1	-	1	1	2	-	-	1	1
CO2	-	-	1	-	1	-	1	-	-	-	2	-	1	-	-
CO3	1	-	-	1	-	1	-	-	2	2	-	2	-	2	1
CO4	-	1	-	1	-	-	-	1	3	-	-	3	1	3	-
CO5	1	-	1	-	-	1	-	1	-	3	3	-	-	1	1

Detailed Syllabus

UNIT I: (8 Hours)

Introduction: Introduction, Different Fields of Biology.

UNIT II: (8 Hours)

Origin of Life and Evolution: Different theories of origin of life, Experimental evidences supporting different theories. Lamarck, Darwinism and other theories of evolution, Documentary evidences supporting different evolution theories.

UNIT III: (8 Hours)

Ecology: Ecosystem, Food Chain, And Pollution.

Physiology: Process of Food intake and Digestion, Nerves conduction and electrophysiology, Muscle contraction and locomotion, Different Methods of Reproduction in prokaryotic and eukaryotic system

UNIT IV: (8 Hours)

Structure and function of eukaryotic and prokaryotic cells

UNIT V: (8 Hours)

Biological System: Structure-function of biological macromolecules, Central Dogma of Life, Replication, Transcription, Translation.

Reference Books:

1. J. L. Tymoczko, J. M.Berg and L.Stryer,Biochemistry, 5th Ed, W. H. Freeman & Co, 2002.

2. D. L. Nelson and M. M. Cox, Lehninger Principles of Biochemistry, Macmillan Worth, 2000.

3. N. Hopkins, J. W. Roberts, J.A.Steitz, J. Watson and A. M. Weiner, Molecular Biology of the Gene, 4th Ed, Benjamin Cummings, 1987.

4. C. R. Cantor and P. R.Schimmel, Biophysical Chemistry (Parts I, II and III), W.H. Freeman & Co., 1980. 5. C. C. Chatterjee, Human Physiology, Vol 1 & 2, 11th Ed, MedicalAllied Agency, 1987.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 703 Title of the Course: Information Theory and Coding

L-T-P : 3-0-0 Credits: 3

COURSE OUTCOMES (CO)

At the end of the course, students will demonstrate the ability to:

CO1: To analyze the definitions of various measures of information and have a working knowledge of their properties. (Cognitive Level: Analyze)
CO2: The student should be able to formalize compression, transmission, and estimation problem in an information theoretic setting. (Cognitive Level: Evaluate)
CO3: The course will also teach the student how to show the optimality of codes for compression and transmission. (Cognitive Level: Apply)
CO4: Advanced students will develop heuristics for identifying packing and covering problems in many standard information processing. (Cognitive Level: Create)
CO5: Apply coding techniques for Digital communications. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	2	2	3	2	1	-	1	1	-	-	1	3	2	1
CO2	2	3	1	-	-	-	3	-	-	1	1	-	3	3	-
CO3	1	1	2	1	-	-	1	1	1	-	1	1	3	2	1
CO4	3	2	1	-	1	-	-	-	1	1	-	-	3	3	1
CO5	2	1	2	-	3	2	1	1	-	-	1	1	3	3	-

Detailed Syllabus:

UNIT I: (8 Hours)
Basics of information theory, entropy for discrete ensembles; Shannon's noiseless coding theorem; Encoding of discrete sources.

UNIT II: (8 Hours)
Markov sources; Shannon's noisy coding theorem and converse for discrete channels.

UNIT III (8 Hours)
Calculation of channel capacity and bounds for discrete channels; Application to continuous channels.

UNIT IV: (8 Hours)
Techniques of coding and decoding; Huffman codes and uniquely detectable codes.

UNIT V: (8 Hours)
Cyclic codes, convolutional arithmetic codes.

Reference Books:

1. N. Abramson, Information and Coding, McGraw Hill,1963.
2. M. Mansurpur, Introduction to Information Theory, McGraw Hill,1987.
3. R.B. Ash, Information Theory, Prentice Hall,1970.
4. Shu Lin and D.J. Costello Jr., Error Control Coding, Prentice Hall,1983.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE 704 Title of the Course: Wireless Communication

L-T-P : 3-0-0 Credits: 3

COURSE OUTCOMES (CO)

At the end of the course, students will demonstrate the ability to:

CO1: Analyze the basics of propagation of radio signals. (Cognitive Level: Analyze)

CO2: Apply the basic concepts of basic Cellular System and the design requirements. (Cognitive Level: Apply)

CO3: Formulate the basic equation on the principles behind radio resource management techniques such as power control, channel allocation and handoffs. (Cognitive Level: Create)

CO4: Comparative analysis of various mobile radio propagation models and how the diversity can be exploited to improve performance. (Cognitive Level: Analyze)

CO5: Design consideration for different Wireless Systems like GSM, CDMA, GPRS etc. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	2	1	2	2	2	1	-	-	-	1	-	1	3	3	1
CO2	3	1	1	1	-	1	1	1	1	-	1	-	3	1	1
CO3	2	1	2	1	2	-	1	1	-	1	-	1	3	2	1
CO4	2	2	1	-	1	-	1	-	-	-	-	-	3	2	1
CO5	2	2	2	1	3	2	1	-	1	1	-	1	3	3	-

Detailed Syllabus:

UNIT I (8 Hours)

Introduction to Wireless communication. Path loss models, Link Budget design issues, fading-– Time dispersion parameters- Doppler spread, fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

UNIT II (8 Hours)

Comparative study of Multiple Access techniques – FDMA, TDMA, CDMA –Cellular concept- Frequency reuse – channel assignment- hand off- interference & system capacity-

UNIT III (8 Hours)

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading

channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV **(8 Hours)**

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver.

UNIT V **(8 Hours)**

Introduction to Wi-Fi, ZigBee Networks, Software Defined Radio, Wireless Adhoc Network and Mobile Portability, Security issues and challenges in a Wireless network.

Reference Book:

1. Wireless Communication, Theodore S. Rappaport, Prentice hall
2. Wireless digital communication, Kamilo Feher, PHI
3. Adhoc Mobile Wireless network, C.K.Toh Pearson.
4. Wireless Communications-T.L.Singh-TMH
5. Mobile Communications Engineering, William C. Y. Lee, Mc Graw Hill Publications

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Departmental Electives (DE)

DE-I

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI11 Title of the Course: Microwave Theory and Techniques

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to -

CO1: Understand different types of waveguides and their respective modes of propagation. (Cognitive Level: Understand)

CO2: Analyze typical microwave networks using impedance, admittance, transmission and scattering matrix representations. (Cognitive Level: Analyze)

CO3: Remember working of microwave passive circuits such as isolator, circulator, Directional couplers, attenuators etc. (Cognitive Level: Remember)

CO4: Understand working of microwave tubes and solid-state devices. (Cognitive Level: Understand)

CO5: Remember the operation of RADAR systems and recite their applications. (Cognitive Level: Remember)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	-	1	-	1	1	1	1	1	-	2
CO2	3	3	3	2	-	1	-	1	-	1	-	-	2	2	1
CO3	3	3	2	2	2	-	1	-	1	-	-	1	3	1	-
CO4	3	3	3	3	-	1	-	1	1	-	-	1	1	-	3
CO5	3	3	2	3	2	1	-	-	-	1	1	-	2	-2	1

Detailed Syllabus:

UNIT I: (8 Hours)

Introduction to Microwaves-History of Microwaves, Microwave Frequency bands; Applications of Microwaves: Civil and Military, Medical, EMI/EMC.

Mathematical Model of Microwave Transmission-Concept of Mode, Features of TEM, TE and TM Modes, Losses associated with microwave transmission, Concept of Impedance in Microwave transmission.

UNIT II: **(8 Hours)**

Analysis of RF and Microwave Transmission Lines- Coaxial line, Rectangular waveguide, Circular waveguide, Strip line, Micro stripline.

Microwave Network Analysis- Equivalent voltages and currents for non-TEM lines, Network parameters for microwave circuits, Scattering Parameters.

UNIT III: **(8 Hours)**

Passive and Active Microwave Devices- Microwave passive components: Directional Coupler, Power Divider, Magic Tee, Attenuator, And Resonator. Microwave active components: Diodes, Transistors, Oscillators, Mixers. Microwave Semiconductor Devices: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes. Microwave Tubes: Klystron, TWT, Magnetron.

UNIT IV: **(8 Hours)**

Microwave Design Principles- Impedance transformation, Impedance Matching, Microwave Filter Design, RF and Microwave Amplifier Design, Microwave Power Amplifier Design, Low Noise Amplifier Design, Microwave Mixer Design, Microwave Oscillator Design. Microwave Antennas- Antenna parameters, Antenna for ground based systems, Antennas for airborne and satellite borne systems, Planar Antennas.

Microwave Measurements- Power, Frequency and impedance measurement at microwave frequency, Network Analyzer and measurement of scattering parameters, Spectrum Analyzer and measurement of spectrum of a microwave signal, Noise at microwave frequency and measurement of noise figure. Measurement of Microwave antenna parameters.

UNIT V: **(8 Hours)**

Microwave Systems- Radar, Terrestrial and Satellite Communication, Radio Aids to Navigation, RFID, and GPS. Modern Trends in Microwaves Engineering- Effect of Microwaves on human body, Medical and Civil applications of microwaves, Electromagnetic interference and Electromagnetic Compatibility (EMI & EMC), Monolithic Microwave ICs, RFMEMS for microwave components, Microwave Imaging.

Reference Books:

1. R.E. Collins, Microwave Circuits, McGraw Hill
2. K.C. Gupta and I.J. Bahl, Microwave Circuits, Artechhouse

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI12 Title of the Course: Fiber Optic Communication

L-T-P: 3-0-0

Credits: 03

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After completing this Course, the students should be able to

CO1: Understand the principles fiber-optic communication, the components, and the bandwidth advantages. (Cognitive Level: Understand)
CO2: Analyze the properties of the optical fibers and apply it to create optical devices. (Cognitive Level: Analyze)
CO3: Evaluate the operation of lasers, LEDs, and detectors. (Cognitive Level: Evaluate)
CO4: Analyze system performance of optical communication systems. (Cognitive Level: Analyze)
CO5: Design optical networks and understand non-linear effects in optical fibers. (Cognitive Level:)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	2	3	2	1	3	1	-	-	-	-	1	3	2	1
CO2	2	2	3	2	1	3	-	1	-	1	-	1	3	2	-
CO3	3	3	2	1	2	3	1	-	1	1	-	1	3	3	1
CO4	2	3	2	1	2	3	1	-	1	-	1	-	3	3	-
CO5	2	3	3	1	1	3	1	-	1	-	1	1	3	3	1

Detailed Syllabus:

UNIT I: (8 Hours)
Introduction to vector nature of light, propagation of light, propagation of light in a cylindrical dielectric rod, Ray model, wave model.

UNIT II: (8 Hours)
Different types of optical fibers, Modal analysis of a step index fiber.
Signal degradation on optical fiber due to dispersion and attenuation. Fabrication of fibers and measurement techniques like OTDR.

UNIT III: (8 Hours)
Optical sources - LEDs and Lasers, Photo-detectors - pin-diodes, APDs, detector responsivity, noise, optical receivers. Optical link design - BER calculation, quantum limit, power penalties.

UNIT IV: **(8 Hours)**

Optical switches - coupled mode analysis of directional couplers, electro-optic switches.
Optical amplifiers - EDFA, Raman amplifier.
WDM and DWDM systems. Principles of WDM networks.

UNIT V: **(8 Hours)**

Nonlinear effects in fiber optic links. Concept of self-phase modulation, group velocity dispersion and soliton-based communication.

Reference Books

1. J. Keiser, Fibre Optic communication, McGraw-Hill, 5th Ed. 2013 (Indian Edition).
2. T. Tamir, Integrated optics, (Topics in Applied Physics Vol.7), Springer-Verlag, 1960.
3. J. Gowar, Optical communication systems, Prentice Hall India, 1987.
4. S.E. Miller and A.G. Chynoweth, eds., Optical fibres telecommunications, Academic Press, 1979.
5. G. Agrawal, Nonlinear fibre optics, Academic Press, 2nd Ed. 1994.
6. G. Agrawal, Fiber optic Communication Systems, John Wiley and sons, New York, 1997
7. F.C. Allard, Fiber Optics Handbook for engineers and scientists, McGraw Hill, New York (1990).

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI13 **Title of the Course: MOOCs-1**

Credits: 03

DE-II

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI21 **Title of the Course: MOOCs-2**

Credits: 03

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI22 Title of the Course: Introduction to MEMS

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

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

CO1: Analyze the Basic concept of MEMS Fabrication Technologies, Piezo-resistance Effect, Piezoelectricity, Piezoresistive Sensor. (Cognitive Level: Analyze)

CO2: Explain Mechanics of Beam and Diaphragm Structures. (Cognitive Level: Understand)

CO3: Understand the Basic concept of Air Damping and Basic Equations for Slide-film Air Damping, Couette-flow Model, Stokes-flow Model. (Cognitive Level: Understand)

CO4: Design masks and bulk micromachining. (Cognitive Level: Evaluate)

CO5: Develop and design the applications of MEMS in RF. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	2	3	2	2	1	1	-	-	1	-	1	-	3	3	1
CO2	1	1	-	1	-	1	-	1	-	-	-	1	3	3	-
CO3	--	-	-	1	-	-	1	-	1	-	1	-	3	3	1
CO4	2	3	2	1	2	3	1	2	-	1	-	-	3	3	1
CO5	2	3	3	1	1	3	2	1	1	-	1	1	3	3	1

Detailed Syllabus:

UNIT I: (8 Hours)

Introduction and Historical Background, Scaling Effects. Micro/Nano Sensors, Actuators and Systems overview: Case studies.

UNIT II: (8 Hours)

Review of Basic MEMS fabrication modules: Oxidation, Deposition Techniques, Lithography (LIGA), and Etching, Micromachining: Surface Micromachining, sacrificial layer processes, Stiction; Bulk Micromachining, Isotropic Etching and Anisotropic Etching, Wafer Bonding.

UNIT III: (8 Hours)

Mechanics of solids in MEMS/NEMS: Stresses, Strain, Hookes's law, Poisson effect.

UNIT IV: (8 Hours)

Linear Thermal Expansion, Bending; Energy methods.

UNIT V: **(8 Hours)**

Overview of Finite Element Method, Modeling of Coupled Electro0mechanical Systems.

Reference Book:

1. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalkrishnan K. N. Bhat, V. K. Aatre, Micro and Smart Systems, Wiley India,2012.
2. S.E.Lyshevski,Nano and Micro-Electromechanical systems: Fundamentals of Nano and Microengineering (Vol. 8). CRC press,(2005).
3. S. D. Senturia, Microsystem Design, Kluwer Academic Publishers,2001.
4. M. Madou, Fundamentals of Microfabrication, CRC Press,1997.
5. G. Kovacs, Micromachined Transducers Sourcebook, McGraw-Hill, Boston,1998.
6. M.H. Bao, Micromechanical Transducers: Pressure sensors, accelerometers, and Gyroscopes, Elsevier, New York,2000.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI 23 Title of the Course: Adaptive Signal Processing

L-T-P : 3-0-0 Credits: 3
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of the course, students will demonstrate the ability to:
CO1: Analyze the non-linear control and the need and significance of changing the control parameters w.r.t. real-time situation. (Cognitive Level: Analyze)
CO2: Mathematically represent the 'adaptability requirement'. (Cognitive Level: Apply)
CO3: Develop the mathematical treatment for the modelling and design of the signal processing systems. (Cognitive Level: Create)
CO4: Evaluate response of a system using Z-transform, convolution method, frequency transformation technique, DFT, DIF-FFT or DIF-FFT algorithm, window technique. (Cognitive Level: Evaluate)
CO5: Design FIR and IIR filters used as electronic filter, digital filter, mechanical filter, distributed element filter, waveguide filter, crystal filter, optical filter, acoustic filter etc. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	3	3	2	1	1	-	-	-	1	-	1	-	3	3	-
CO2	3	3	1	-	2	1	1	-	-	-	-	1	3	2	-
CO3	2	2	3	3	1	-	1	-	-	1	-	-	3	2	1
CO4	2	3	1	1	-	1	-	-	-	1	1	1	3	3	1
CO5	2	3	3	2	1	1	2	1	1	-	-	1	3	3	-

Detailed Syllabus

UNIT I: (8 Hours)
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: (8 Hours)
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: (8 Hours)
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: **(8 Hours)**

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 modelling, joint process estimator, gradient adaptive lattice.

UNIT V: **(8 Hours)**

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.

Reference Books:

1. S. Haykin, Adaptive filter theory, Prentice Hall,1986.
2. C.Widrow and S.D. Stearns, Adaptive signal processing, Prentice Hall,1984.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

DE-III

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI31 **Title of the Course: MOOCs-2**

Credits: 03

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI 32 Title of the Course: Bio-Medical Electronics

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of the course, students will demonstrate the ability to:

CO1: Understand the application of the electronic systems in biological and medical applications. (Cognitive Level: Understand)
CO2: Apply knowledge of engineering and science to interpret data. (Cognitive Level: Apply)
CO3: Develop the skills necessary to communicate findings and interpretations in an effective laboratory report. (Cognitive Level: Create)
CO4: Work in Multi-disciplinary teams: (Cognitive Level: Apply)
CO5: Learn to work and communicate effectively with peers on multi-disciplinary teams to attain a common goal. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	-	3	-	2	2	-	-	3	-	1	-	3	2	-
CO2	3	3	1	2	-	1	2	1	-	-	-	1	3	3	-
CO3	1	-	3	1	3	-	-	-	3	-	1	-	2	2	1
CO4	-	2	-	-	-	2	3	1	3	2	-	-	3	2	1
CO5	2	-	3	-	3	-	2	-	3	2	1	1	3	2	2

Detailed Syllabus:

UNIT I: (8 Hours)

Brief introduction to human physiology.

UNIT II: (8 Hours)
Biomedical transducers: displacement, velocity, force, acceleration, flow, temperature, potential, dissolved ions and gases.

UNIT III: (8 Hours)
Bio-electrodes and bio- potential amplifiers for ECG, EMG, EEG, etc.

UNIT V: (8 Hours)

Measurement of blood temperature, pressure and flow. Impedance plethysmography. Ultrasonic, X-ray and nuclear imaging.

UNIT V: (8 Hours)

Prostheses and aids: pacemakers, defibrillators, heart-lung machine, artificial kidney, aids for the handicapped. Safety aspects.

Reference Books:

1. W.F. Ganong, Review of Medical Physiology, 8th Asian Ed, Medical Publishers,1977.
2. J.G. Websster, ed., Medical Instrumentation, Houghton Mifflin,1978.
3. A.M. Cook and J.G. Webster, eds., Therapeutic Medical Devices, Prentice-Hall, 1982.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI 33 Title of the Course: Mobile Communication and Networks

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of the course, students will demonstrate the ability to:

CO1: Analyze the working principles of the mobile communication systems. (Cognitive Level: Analyze)

CO2: Model the relation between the user features and underlying technology. (Cognitive Level: Evaluate)

CO3: Analyze mobile communication systems for improved performance. (Cognitive Level: Analyze)

CO4: Compare and evaluate Co-Channel and Non-Co-Channel interferences. (Cognitive Level: Evaluate)

CO5: Know the difference between cellular and Adhoc Networks and design goals of MAC Layer protocol. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	2	2	3	2	-	-	1	1	-	1	-	3	2	1
CO2	3	3	1	2	1	-	-	-	1	-	1	-	3	3	-
CO3	3	2	3	1	-	1	-	1	-	1	-	1	3	1	1
CO4	2	3	1	1	2	-	1	-	1	-	1	-	3	3	-
CO5	1	2	2	1	2	-	1	1	-	1	-	1	3	2	1

Detailed Syllabus:

UNIT I: (8 Hours)

Cellular concepts- Cell structure, frequency reuse, cell splitting, channel assignment, handoff, interference, capacity, power control; Wireless Standards: Overview of 2G and 3G cellular standards.

UNIT II: (8 Hours)

Signal propagation-Propagation mechanism- reflection, refraction, diffraction and scattering, large scale signal propagation and lognormal shadowing. Fading channels-Multipath and small-scale fading- Doppler shift, statistical multipath channel models, narrowband and wideband fading models, power delay profile, average and rms delay

spread, coherence bandwidth and coherence time, flat and frequency selective fading, slow and fast fading, average fade duration and level crossing rate.

UNIT III: (8 Hours)

Capacity of flat and frequency selective channels. Antennas- Antennas for mobile terminal- monopole antennas, PIFA, base station antennas and arrays.

UNIT IV: (8 Hours)

Multiple access schemes-FDMA, TDMA, CDMA and SDMA. Modulation schemes-BPSK, QPSK and variants, QAM, MSK and GMSK, multicarrier modulation, OFDM.

UNIT V: (8 Hours)

Receiver structure- Diversity receivers- selection and MRC receivers, RAKE receiver, equalization: linear-ZFE and adaptive, DFE. Transmit diversity-Altamonte scheme MIMO and space time signal processing, spatial multiplexing, diversity/multiplexing tradeoff. Performance measures- Outage, average snr, average symbol/bit error rate. System examples- GSM, EDGE, GPRS, IS-95, CDMA 2000 and WCDMA.

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.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

DE-IV

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI41 Title of the Course: Digital Image & Video Processing

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of the course, students will demonstrate the ability to:

CO1: Mathematically represent the various types of images and analyze them. (Cognitive Level: Analyze)

CO2: Process these images for the enhancement of certain properties or for optimized use of their sources. (Cognitive Level: Apply)

CO3: Develop algorithms for image compression and coding. (Cognitive Level: Create)

CO4: Enhance digital image quality by spatial and frequency domain filtering and histogram equalization techniques. (Cognitive Level: Create)

CO5: Apply suitable image restoration technique to minimize effect of degradation and noise for digital image. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	3	2	1	1	2	-	1	-	-	1	-	-	3	3	1
CO2	3	3	1	1	-	1	-	-	1	-	1	-	3	3	-
CO3	1	2	-	1	-	-	1	-	-	1	-	1	3	2	1
CO4	2	3	1	1	2	1	-	1	-	1	1	-	3	3	1
CO5	1	2	2	1	2	-	-	-	1	-	-	1	3	3	1

Detailed Syllabus:

UNIT I: (8 Hours)

Digital Image Fundamentals-Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.

UNIT II: (8 Hours)

Image Enhancements and Filtering-Gray level transformations, histogram equalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain.

Sharpening filters – first and second derivative, two-dimensional DFT and its inverse, frequency domain filters – low-pass and high-pass.

UNIT III: **(8 Hours)**

Color Image Processing-Color models–RGB, YUV, HSI; Color transformations–formulation, color complements, color slicing, tone and color corrections; Color image smoothing and sharpening; Color Segmentation.

Image Segmentation- Detection of discontinuities, edge linking and boundary detection, thresholding – global and adaptive, region-based segmentation.

UNIT IV: **(8 Hours)**

Wavelets and Multi-resolution image processing- Uncertainty principles of Fourier Transform, Time-frequency localization, continuous wavelet transforms, wavelet bases and multi-resolution analysis, wavelets and Sub band filter banks, wavelet packets.

Image Compression-Redundancy–inter-pixel and psycho-visual; Lossless compression – predictive, entropy; Lossy compression- predictive and transform coding; Discrete Cosine Transform; Still image compression standards – JPEG andJPEG-2000.

UNIT V: **(8 Hours)**

Fundamentals of Video Coding- Inter-frame redundancy, motion estimation techniques – full- search, fast search strategies, forward and backward motion prediction, frame classification – I, P and B; Video sequence hierarchy – Group of pictures, frames, slices, macro-blocks and blocks; Elements of a video encoder and decoder; Video coding standards – MPEG and H.26X.

Video Segmentation- Temporal segmentation–shot boundary detection, hard-cuts and soft-cuts; spatial segmentation – motion-based; Video object detection and tracking.

Reference Books:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition2008.
2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2nd edition2004.
3. Murat Tekalp , “Digital Video Processing” Prentice Hall, 2nd edition2015

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI42 Title of the Course: Mixed Signal Design

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of the course, students will demonstrate the ability to:

CO1: Analyze the practical situations where mixed signal analysis is required. (Cognitive Level: Analyze)

CO2: Analyze and handle the inter-conversions between signals. (Cognitive Level: Analyze)

CO3: Design systems involving mixed signals. (Cognitive Level: Create)

CO4: Understand the concepts of Switched capacitor circuits. (Cognitive Level: Understand)

CO5: Design and analysis of Nyquist Rate A/D Convertors. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	2	2	1	2	2	-	-	-	1	-	1	1	3	2	-
CO2	3	3	2	1	2	1	-	-	-	-	-	-	3	3	-
CO3	2	2	2	1	1	-	1	-	-	1	-	1	3	2	1
CO4	-	-	1	1	-	-	-	1	1	-	-	-	3	3	-
CO5	1	2	2	1	2	2	-	1	-	-	1	-	3	2	1

Detailed Syllabus

UNIT I: (8 Hours)

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: (8 Hours)

Switched-capacitor filters- Non idealities in switched-capacitor filters; Switched-capacitor filter architectures; Switched-capacitor filter applications.

UNIT III: (8 Hours)

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

UNIT IV: (8 Hours)

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

UNIT V: (8 Hours)

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

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

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI43 Title of the Course: Wireless Sensor Networks

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOME (CO)

CO1: Design wireless sensor networks for a given application. (Cognitive Level: Create)
CO2: After studying all the protocols, the student will be able to decide which routing protocol is best suited for which type of application. (Cognitive Level: Analyze)
CO3: The student will be able to determine the importance of data dissemination techniques. (Cognitive Level: Evaluate)
CO4: The student will be able to analyze communication process in the WSN. (Cognitive Level: Analyze)
CO5: The student will be able to design a wholesome WSN with all the aspects ranging from routing protocols, MAC protocols, types of sensors, types of sensor network etc. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	2	2	2	1	2	1	1	1	-	-	1	-	3	3	1
CO2	1	1	2	2	2	-	-	-	1	-	-	1	3	3	-
CO3	-	2	3	2	3	1	1	-	-	1	-	-	3	2	-
CO4	2	2	-	1	2	-	-	-	1	1	-	1	3	2	1
CO5	1	2	3	1	2	1	1	-	-	1	-	-	3	2	-

Detailed Syllabus:

Unit-1: **(8 Hours)**
Introduction to Sensor Networks, unique constraints and challenges, advantage of Sensor Networks, Applicants of Sensor Networks, Types of wireless sensor networks, deployment of Sensor Nodes

Unit-2: **(8 Hours)**
Mobile Ad-Hoc Networks (MANETS) and Wireless Sensor Networks, Enabling technologies for wireless Sensor Networks. Issues and challenges in Wireless sensor networks, Routing Protocols, MAC Protocols: Classification of MAC protocols, S-MAC protocols, B-MAC protocol, IEEE 802-15.4 Standard and ZigBee

Unit-III: **(8 Hours)**
Dissemination protocol for large sensor network. Data dissemination, data gathering and data fission, Quality of a sensor network; real-time traffic support and security protocols.

Unit-IV: Design Principles for WSNs, gateway concepts, need for gateway, WSN to Internet Communication and Internet to Wireless Communication

Unit-V: **(8 Hours)**
single node architecture, Hardware components & design constraints, Operating systems and execution environments, Case study for Disaster Management, Forest Fire, and Flood Control

Reference Books:

1. Waltengus Dargie, Chrisitian Poelabauer, "Fundamentals of Wireless sensor Network Theory and Practice", by John Wiley & Sons Publications, 2011
2. Sabrie soloman, "Sensors Handbook" by McGraw Hill Publications, 2009
3. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks", Elsevier Publications, 2004
4. Kazem Shorby, Daniel Minoli, "Wireless Sensor Networks Technology Protocols and Applications", by Wiley-Interscience
5. Philip Levis and David Gay, "TinyOS Programming" by Cambridge

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

DE-V

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI51 **Title of the Course: CMOS Design**

L-T-P : 3-0-0 **Credits**: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

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

CO1: To design logic circuit layouts for both static CMOS and dynamic clocked CMOS circuits. (Cognitive Level: Create)

CO2: To extract the analog parasitic elements from the layout and analyze the circuit timing using a logic simulator and an analog simulator. (Cognitive Level: Analyze)

CO3: To build a cell library to be used by other chip designers. (Cognitive Level: Create)

CO4: To insert elementary testing hardware into the VLSI chip. (Cognitive Level: Create)

CO5: To analyze VLSI circuit timing using Logical Effort analysis. (Cognitive Level: Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	1	3	2	2	2	1	1	1	1	-	1	3	3	-
CO2	3	3	2	1	1	-	1	-	-	-	1	-	3	3	1
CO3	2	2	3	1	3	1	-	-	1	-	1	-	3	3	-
CO4	1	2	1	1	2	-	1	-	-	1	-	-	3	3	1
CO5	3	2	1	1	2	1	-	-	1	1	-	1	3	3	-

Detailed Syllabus:

UNIT I: **(8 Hours)**

Review of MOS transistor models, Non-ideal behavior of the MOS Transistor.

UNIT II: **(8 Hours)**

Transistor as a switch. Inverter characteristics, Integrated Circuit Layout: Design Rules, Parasitic.

UNIT III: **(8 Hours)**

Delay: RC Delay model, linear delay model, logical path efforts.

UNIT IV: **(8 Hours)**

Power, interconnect and Robustness in CMOS circuit layout. Combinational Circuit Design:

UNIT V: **(8 Hours)**

CMOS logic families including static, dynamic and dual rail logic. Sequential Circuit Design: Static circuits. Design of latches and Flip-flops.

Reference Books:

1. N.H.E. Weste and D.M. Harris, CMOS VLSI design: A Circuits and Systems Perspective, 4thEdition, Pearson Education India,2011.
2. C.Mead and L. Conway, Introduction to VLSI Systems, Addison Wesley,1979.
3. J. Rabaey, Digital Integrated Circuits: A Design Perspective, Prentice Hall India,1997.
4. P. Douglas, VHDL: programming by example, McGraw Hill,2013.
5. L. Glaser and D. Dobberpuhl, The Design and Analysis of VLSI Circuits, Addison Wesley,1985.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI52 **Title of the Course: Power Electronics**

L-T-P : 3-0-0 **Credits**: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of this course students will demonstrate the ability to
CO1: Build and test circuits using power devices such as SCR. (Cognitive Level: Create)
CO2: Analyze and design-controlled rectifier. (Cognitive Level: Create)
CO3: To design DC to DC converters, DC to AC inverters. (Cognitive Level: Create)
CO4: Learn how to analyze these inverters and some basic applications. (Cognitive Level: Analyze)
CO5: Design SMPS. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	2	3	1	1	1	-	-	1	-	-	1	-	3	3	1
CO2	2	2	1	2	3	1	1	-	1	1	1	1	3	3	1
CO3	2	2	3	2	1	1	-	1	1	-	1	-	3	2	1
CO4	1	-	2	1	1	2	1	-	1	-	1	1	3	3	-
CO5	-	1	2	3	2	2	-	1	-	1	-	-	3	3	1

Detailed Syllabus:

UNIT I: **(8 Hours)**

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: **(8 Hours)**

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: **(8 Hours)**

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. Multi-phase Chopper

UNIT IV: (8 Hours)

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: (8 Hours)

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.

Reference Books:

1. Muhammad H. Rashid, " Power electronics" Prentice Hall ofIndia.
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, McGrawHill.
6. G K Dubey, S R Doradla,: Thyristorised Power Controllers", New Age International Publishers. SCR manual from GE,USA

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI53 Title of the Course: Satellite Communication

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of this course students will demonstrate the ability to

CO1: Visualize the architecture of satellite systems as a means of high speed, high range communication system. (Cognitive Level: Analyze)

CO2: State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes. (Cognitive Level: Analyze)

CO3: Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions. (Cognitive Level: Create)

CO4: Design various satellite applications. (Cognitive Level: Create)

CO5: Analyze the earth segment and space segment. (Cognitive Level: Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	2	2	1	1	1	1	-	1	-	-	1	3	3	-
CO2	2	1	2	2	3	-	1	-	-	1	-	1	3	3	-
CO3	3	2	1	2	1	1	-	1	-	-	1	-	3	2	1
CO4	2	2	2	2	1	-	-	-	-	-	-	-	3	2	-
CO5	1	1	3	2	1	1	-	1	1	-	1	-	3	3	1

Detailed Syllabus

UNIT I: (8 Hours)

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: (8 Hours)

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: (8 Hours)

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.
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

UNIT IV: (8 Hours)

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 (8 Hours)
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.

Reference Books:

1. Timothy Pratt Charles W. Bostian, Jeremy E. Allnutt: Satellite Communications: Wiley India. 2nd edition2002
2. Tri T. Ha: Digital Satellite Communications: Tata McGraw Hill,2009
3. Dennis Roddy: Satellite Communication: 4th Edition, McGraw Hill,2009

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

DE-VI

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI61 **Title of the Course: Switching System**

L-T-P : 3-0-0 **Credits**: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of the course, students will demonstrate the ability to:
CO1: Describe and apply fundamentals of telecommunication systems and associated technologies. (Cognitive Level: Apply)
CO2: Apply the principles of queuing theory in evaluating the performance of congested telecommunication networks. (Cognitive Level: Apply)
CO3: Solve problems and design simple systems related to tele-traffic and trunking efficiency. (Cognitive Level: Evaluate)
CO4: Analyze the reasons for switching, and the relative merits of the possible switching modes, e.g. packet and circuit switching. (Cognitive Level: Analyze)
CO5: Design and operation of telecommunication switches, and the essence of the key signaling systems that are used in telecommunication networks. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	2	2	3	1	1	-	1	-	1	-	1	-	3	3	-
CO2	1	2	1	2	1	1	-	1	-	1	1	-	3	2	1
CO3	2	2	2	1	1	-	1	-	1	-	-	1	3	3	1
CO4	2	1	2	1	1	1	-	-	-	-	-	-	3	2	1
CO5	3	2	3	2	1	-	1	1	-	-	1	1	3	2	-

Detailed Syllabus:

Unit I **(8 Hours)**

Introduction to telephone communication, manual switching system, Automatic strowger switching system, crossbar switching system, Signaling in Automatic Strowger Switching System, Elements of a Switching System, Design parameters of Switching System.

Unit II **(8 Hours)**

Network traffic Load and parameters, grade of service, Trunking Efficiency and blocking probability, modeling switching systems, incoming traffic and service time characterization, blocking models and loss estimates, delay systems.

Unit III **(8 Hours)**

Electronic space division switching: Stored program control; centralized and distributed, software architecture, application software, enhanced services, single and multistage networks. Time division switching; Basic time division space switching, basic time division time switching, time multiplexed space switching, time multiplexed space switching, combination switching, multistage combination switching

Unit IV **(8 Hours)**

Analog termination requirements, BORSCHT configuration, digital termination requirements, signaling tones, touch tone dial generation, design consideration, touch tone detection, switching hierarchy and routing, transmission plan, numbering plan- CCITT No. 7 Signaling systems.

Unit V **(8 Hours)**

Data transmission in PSTN's switching, techniques for data transmission, data communication architecture, link to link layers, end to end layers, PABX, data network standards, Metropolitan Area Network (MAN), Satellite based data networks, fibre optic networks.

Reference

1. Thiagarajan Vishwanathan, "Telecommunication Switching Systems and Networks", PHI, Second edition.
2. Joseph Y. Hui/Switching and Traffic Theory for Integrated Broad Band Networks/Kleewer Academic publishers, 1990
3. V.E. Benes/Mathematical Theory of connecting Networks & Telephone Traffic/Academic Press, 1965.
4. G. Hebuterve / Traffic Flow in Switching Systems / Artech House, 1987.
5. J.C. Bellamy/Digital Telephony/John Wiley 2nd Ed., 1992
6. Anders Hellman & Gudrun Bager/ Understanding Telecommunication 1/Printed in Sweden, Student literature, Lund Ericcson Telecom AB, Competence Development centre

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.

5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI 62 Title of the Course: Speech and Audio Processing

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of the course, students will demonstrate the ability to:

CO1: Mathematically modeling of speech signal. (Cognitive Level: Create)

CO2: Analyze the quality and properties of speech signal. (Cognitive Level: Analyze)

CO3: Modify and enhance the speech and audio signals. (Cognitive Level: Create)

CO4: Develop systems for various applications of speech processing. (Cognitive Level: Create)

CO5: Learn Signal processing models of sound perception and application of perception models in audio signal processing. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3
CO1	3	3	1	-	1	-	1	-	1	1	-	-	3	3	-
CO2	1	2	2	2	1	-	-	1	1	-	1	1	3	3	-
CO3	2	2	2	3	2	2	1	-	1	-	-	1	3	2	1
CO4	2	1	3	2	2	-	-	-	-	-	-	-	3	3	1
CO5	1	1	1	1	2	1	-	1	-	1	1	-	2	2	1

Detailed Syllabus:

UNIT I: (8 Hours)

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.

Speech Signal Processing- Pitch-period estimation, all-pole and all-zero filters, convolution; Power spectral density, periodogram, autoregressive model, auto correlation estimation.

UNIT II: (8 Hours)

Linear Prediction of Speech- Basic concepts of linear prediction; 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 III: **(8 Hours)**

Scalar Quantization of LPC- Spectral distortion measures, Quantization based on reflection coefficient and log area ratio, bit allocation; Line spectral frequency – LPC to LSF conversions, quantization based on LSF.

UNIT IV: **(8 Hours)**

Linear Prediction Coding- LPC model of speech production; Structures of LPC encoders and decoders; Voicing detection; Limitations of the LPC model.

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.

UNIT V: **(8 Hours)**

Speech Coding Standards-An overview of ITU-T G.726, G.728 and G.729standards

Reference Books:

1. "Digital Speech: Coding for low bit rate Communication Systems", by A.M.Kondoz, Second Edition (Wiley Students *Edition),2004.*
2. "Speech Coding Algorithms: Foundation and Evolution of Standardized Coders", W.C. Chu, Wiley Inter science,2003.

Teaching-Learning Strategies in brief

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4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE DEI 63 Title of the Course: Embedded Systems

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of the course, students will demonstrate the ability to:
CO1: Design and development of Embedded Systems. (Cognitive Level: Create)
CO2: Create and implement interfacing of IO devices and other peripherals. (Cognitive Level: Create)
CO3: Device driver programming & interrupt service mechanisms. (Cognitive Level: Apply)
CO4: To design Inter-process Communication and Synchronization of processes, Threads and Tasks. (Cognitive Level: Create)
CO5: To implement OS functions and Real Time Operating System. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	1	1	1	-	1	-	-	1	1	3	3	2
CO2	1	-	1	-	3	-	-	-	1	-	1	-	3	2	1
CO3	1	2	3	2	-	1	-	1	-	1	-	1	2	3	1
CO4	1	1	2	2	2	-	1	-	1	-	3	-	2	3	-
CO5	2	-	2	3	1	-	1	-	1	1	-	-	2	3	1

Detailed Syllabus:

UNIT I: (8 Hours)
The concept of embedded systems design, embedded microcontroller cores, embedded memories, Examples of embedded systems.

UNIT II: (8 Hours)
Technological aspects of embedded systems: Interfacing between analog and digital blocks, signal conditioning, digital signal processing.

UNIT III: (8 Hours)
Sub-system interfacing, interfacing with external systems, user interfacing.

UNIT IV: (8 Hours)
Design tradeoffs due to process compatibility, thermal considerations, etc.,

UNIT V: (8 Hours)

Software aspects of embedded systems: real time programming languages and operating systems for embedded systems.

Reference Books:

1. J.W. Valvano, "Embedded Microcomputer System: Real Time Interfacing", Brooks/Cole, 2000.
2. Jack Ganssle, "The Art of Designing Embedded Systems", Newness,1999.
3. V.K. Madisetti, "VLSI Digital Signal Processing", IEEE Press (NY, USA),1995.
4. David Simon, "An Embedded Software Primer", Addison Wesley,2000.
5. K.J. Ayala, "The 8051 Microcontroller: Architecture, Programming, and Applications", Penram Intl,1996.

Teaching-Learning Strategies in brief

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3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

OPEN ELECTIVES

Open Elective –I (Semester-V)

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE11 Title of the Course: ICT for Development

L-T-P : 3-0-0 Credits: 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Skills to analyze, design, implement, test and evaluate ICT systems. (Cognitive Level: Create)
CO2: Skills to consider the impact of current and new technologies on methods of working in the outside world and on social, economic, ethical and moral issues. (Cognitive Level: Analyze)
CO3: ICT-based solutions to solve problems. (Cognitive Level: Evaluate)
CO4: The ability to recognize potential risks when using ICT, and use safe, secure and responsible practice. (Cognitive Level: Understand)
CO5: To analyze ICT tools for the development. (Cognitive Level: Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	1	1	1	-	1	-	-	1	1	1	1	1
CO2	1	1	1	-	1	-	2	2	1	-	1	-	2	2	-
CO3	1	1	-	1	2	1	-	1	-	1	-	1	1	1	1
CO4	1	-	1	1	2	-	1	2	1	-	3	-	2	2	1
CO5	1	1	-	2	3	1	-	1	-	1	1	1	1	1	2

Detailed Syllabus:

Unit I Types and components of computer systems: **(8 Hours)**
Hardware consists of the physical components of a computer system Internal components including Central Processing Unit (CPU), processor, motherboard Internal memory including random access memory (RAM), read-only memory (ROM) Hardware components including graphics card, sound card, Network Interface Card (NIC), camera, internal/ external storage devices, System software provides the services that the computer requires to operate Examples of system software including compilers, linkers, device drivers, operating systems and utilities, Analogue and digital data Characteristics of analogue and digital data Differences between analogue and digital data The need to convert: analogue to digital data so it can be processed by a computer , digital data to analogue data so it can be used to control devices

Unit II Input and Output devices **(8 Hours)**

Input and output devices Characteristics, uses, advantages and disadvantages of input devices including: keyboard, numeric keypad, pointing devices, remote control, joystick/driving wheel, touch screen (as an input device), scanners, camera, microphone, sensors, light pen, Direct data entry: Characteristics, uses, advantages and disadvantages of direct data entry devices including: magnetic stripe reader, chip and PIN reader, Radio Frequency Identification (RFID) reader, Optical Mark Recognition/Reader (OMR), Optical Character Recognition/Reader (OCR), bar code reader, QR scanner, Characteristics, uses, advantages and disadvantages of output devices including: monitors, touch screen (as an output device), multimedia projector, laser printer, inkjet printer, dot matrix printer, plotter, 3D printers, speaker, actuator

Unit III The effects of using IT **(8 Hours)**

Microprocessor-controlled devices, Potential health problems related to the prolonged use of IT equipment, Including: repetitive strain injury (RSI), back problems, eye problems, headaches The causes of these health issues and strategies for preventing them

Unit IV ICT applications: **(8 Hours)**

Communication media, Mobile communication, Computer modelling; Including: personal finance, bridge and building design, flood water management, traffic management, weather forecasting Advantages and disadvantages of using computer modelling rather than humans, Characteristics, uses, advantages and disadvantages of satellite systems including Global Positioning Systems (GPS), satellite navigation, Geographic Information Systems (GIS), media communication systems (satellite television, satellite phone)

Unit V- The systems life cycle: **(8 Hours)**

Characteristics, uses, advantages and disadvantages of the research methods of observation, interviews, questionnaires and examination of existing documents The need to identify the inputs, outputs and processing of the current system, problems with the current system, the user and information requirements for the new system, Identify and justify suitable hardware and software for the new system Design file/data structures, input formats, output formats and validation routines File/data structures including field length, field name, data type, coding of data for example M for male, F for female Validation routines including range check, character check, length check, type check, format check, presence check, check digit Input formats including data capture forms Output formats including screen layouts and report layouts

Text books:

1. Castells, Manuel, “Networks of Outrage and Hope: Social Movements in the Internet Age”, 2nd Edition, John Wiley & Sons, 2015

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
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3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE12 Title of the Course: Soft Skills and Interpersonal Communication

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Students can gain potential knowledge towards Grammatical and Communicative competence through the useful inputs and task-based activities. (Cognitive Level: Understand)
CO2: This enables them to build their confidence in using English language. (Cognitive Level: Apply)
CO3: To be able to compete with the globalized world and become successful in all the challenges that they face. (Cognitive Level: Apply)
CO4: To develop Linguistic competence and Communicative competence which helps them to develop "thinking" skill in English. (Cognitive Level: Create)
CO5: The students can hone their interpersonal and employability skills draw upon real-life situations and examples. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12	PS O1	PSO2	PS O3
CO1	-	1	-	1	1	1	-	1	-	2	3	2	2	1	3
CO2	1	-	1	-	3	-	-	-	1	-	1	2	2	2	3
CO3	1	-	-	2	-	1	-	1	-	3	1	2	1	1	3
CO4	1	1	2	1	1	-	1	-	1	3	3	1	-	-	3
CO5	-	-	-	-	1	-	1	-	1	1	2	2	1	1	3

Detailed Syllabus:

UNIT I - Self Analysis: **(8 Hours)**

SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem.

UNIT II - Creativity: **(8 Hours)**
Out of box thinking, Lateral Thinking, OBJECTIVE THINKING, perception.

UNIT III - Attitude: **(8 Hours)**
Factors influencing Attitude, Challenges and lessons from Attitude, Etiquette.

UNIT IV – Motivation: **(8 Hours)**
Factors of motivation, Self-talk, Intrinsic & Extrinsic Motivators.

UNIT V: Goal Setting : **(8 Hours)**

Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals. Time Management Value of time, Diagnosing Time Management, Weekly Planner To do list, Prioritizing work. Extempore

TEXT BOOK:

1. SOFT SKILLS, 2015, Career Development Centre, Green Pearl Publications.

REFERENCE BOOK:

1. Covey Sean, Seven Habits of Highly Effective Teens, New York, Fireside Publishers, 1998.
2. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.
3. Thomas A Harris, I am ok, You are ok , New York-Harper and Row, 1972 4. Daniel Coleman, Emotional Intelligence, Bantam Book, 2006

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE13 Title of the Course: Cyber Law and Ethics

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. (Cognitive Level: Understand)
CO2: The students will learn the rights and responsibilities as an employee, team member and a global citizen. (Cognitive Level: Apply)
CO3: Describe Information Technology act and Related Legislation. (Cognitive Level: Evaluate)
CO4: Demonstrate Electronic business and legal issues. (Cognitive Level: Apply)
CO5: Interpret Cyber Ethics. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	1	1	1	-	3	2	-	2	3	1	1	3
CO2	1	-	1	-	-	-	-	3	-	2	-	2	1	1	3
CO3	1	2	-	2	1	1	-	3	3	-	3	2	2	2	3
CO4	1	1	-	-	2	-	1	3	-	3	2	-	2	1	3
CO5	1	-	1	-	1	-	1	3	2	3	-	2	1	1	3

Detailed Syllabus:

UNIT I: Applied Ethics **(8 Hours)**
What ethics is and is not, Explore differences between laws and ethics, Ethical viewpoints, Virtue, Natural Rights, Fairness (Justice), Ethical decision making process, Laws and ethics of employee monitoring, Review ethical codes of IT professional organizations

UNIT II: Cyber Law: Legal Issues and Challenges in India, USA and EU **(8 Hours)**
A) Data Protection, Cyber Security,
B) Legal recognition of Digital Evidence
C) Recognition of liability in the digital world
D) Jurisdiction Issues in Transnational Crimes

UNIT III: HIPAA: Health Insurance Portability and Accountability Act **(8 Hours)**
Basics of HIPAA, Implications of HIPAA for IT professionals, Administrative procedures, Physical safeguards, Technical security services, Technical security mechanisms

UNIT IV Cyberspace Intellectual Property Laws and Issues **(8 Hours)**

Copyright law: Fair use, DRM (Digital Rights Management) and the DMCA (Digital Millennium Copyright Act), Copyright Web issues; Patent Law: Software patents issues, Trademarks; Cybersquatting, Using trademarks in meta-tags, Software License agreements

UNIT V: Cyber Crime and Related Laws **(8 Hours)**

Review of cybercrime statistics and trends, Cybercrime categories, Computer fraud, Gray Hat Hacking, Crimes and penalties under the Computer Fraud and Abuse Act (CFAA)

Reference Book:

1. Yatindra Singh, "Cyber Laws", Universal Law Publishing, Sixth edition.
2. Ajit Narayanan and Bennum,"Law, Computer Science and Artificial Intelligence". Intellect Books, 1998.
3. Linda Brennan and Victoria Johnson : Social, ethical and policy implication of Information Technology, IGI Global, 2003.
4. Kamath Nandan : Law relating to Computer, Internet and E-Commerce, Universal Law Publishing, 2016
5. Arvind Singhal and Everett Rogers : India's Communication Revolution : From Bullock Carts to Cyber Marts. SAGE India; First edition (20 November 2000)
6. Lawrence Lessing : Code and other Laws of cyberspace. Basic Books (30 November 1999)
7. Mike Godwin : Cyber Rights Defencing free speech in the Digital Age. MIT Press; Updated edition (15 July 2003); CBS PUBLISHERS & DISTRIBUTORS PVT. LTD 01149348098
8. Sunit Belapure and Nina Godbole, Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives, Wiley India Pvt. Ltd, 2011.
9. Mark F Grady, Fransesco Parisi, "The Law and Economics of Cyber Security", Cambridge University Press, 2006
10. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer-Verlag, 1997.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Open Elective –II (Semester-VI)

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE21 Title of the Course: History of Science and Engineering

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

Upon successful completion of this course, students will be able to
CO1: Understand Astronomy, Mathematics, Engineering and Medicine of ancient India. (Cognitive Level: Understand)
CO2: Analyze Scientific and Technological Developments in Medieval India. (Cognitive Level: Analyze)
CO3: Will be aware of Surveyors, Botanists, Doctors, under the EI Company‘s Service. (Cognitive Level: Apply)
CO4: Will be aware of various scientists of India. (Cognitive Level: Apply)
CO5: Familiar with ISRO, DRDO, etc. (Cognitive Level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	1	1	1	-	1	1	1	3	2	2	1	3
CO2	1	-	1	-	2	-	1	-	1	-	1	2	2	2	3
CO3	1	-	-	-	-	1	-	1	-	1	1	2	1	1	3
CO4	1	1	2	1	1	-	1	-	1	-	3	1	-	-	3
CO5	-	-	-	-	1	-	1	1	1	1	2	2	1	1	3

Detailed Syllabus:

Unit-I: Science and Technology-The beginning (8 Hours)
Development in different branches of Science in Ancient India: Astronomy, Mathematics, Engineering and Medicine. Developments in metallurgy: Use of Copper, Bronze and Iron in Ancient India. Development of Geography: Geography in Ancient Indian Literature.

Unit-II: Developments in Science and Technology in Medieval India (8 Hours)
Scientific and Technological Developments in Medieval India; Influence of the Islamic world and Europe; The role of *maktabs, madrasas* and *karkhanas* set up. Developments in the fields of Mathematics, Chemistry, Astronomy and Medicine. Innovations in the field of agriculture - new crops introduced new techniques of irrigation etc.

Unit-III: Developments in Science and Technology in Colonial India (8 Hours)

Early European Scientists in Colonial India- Surveyors, Botanists, Doctors, under the Company‘s Service. Indian Response to new Scientific Knowledge, Science and Technology in Modern India: Development of research organizations like CSIR and DRDO; Establishment of Atomic Energy Commission; Launching of the space satellites.

Unit-IV: Prominent scientist of India since beginning and their achievement (8 Hours)
Mathematics and Astronomy: Baudhayan, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira, Nagarjuna. Medical Science of Ancient India (Ayurveda & Yoga): Susruta, Charak, Yoga & Patanjali. Scientists of Modern India: Srinivas Ramanujan, C.V. Raman, Jagdish Chandra Bose, Homi Jehangir Bhabha Dr. APJ Abul Kalam Azad and Dr. Vikram Sarabhai.

Textbook:

1. HISTORY OF SCIENCE AND TECHNOLOGY IN INDIA Dr. Binod Bihari Satpathy

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE22 Title of the Course: Sustainable Development

L-T-P : 3-0-0 Credits: 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

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

CO1: Understand the basic concept of Sustainable Development (SD), the environmental, social and economic dimensions. (Cognitive Level: Understand)
CO2: Understand the embedment of sustainability issues in environmental, societal, and economic systems, and the relevance of the conditions, interrelations, and dynamics of these systems. (Cognitive Level: Understand)
CO3: Demonstrate knowledge and understanding of the current sustainable development policies followed by selected countries. (Cognitive Level: Apply)
CO4: To identify different stakeholders in a challenge to sustainability, and analyze the political and economic structures that connect them. (Cognitive Level: Analyze)
CO5: Assess the sustainable practices of any community based on metrics. (Cognitive Level: Apply)
CO6: Demonstrate judging capability of the impact of any decision on the sustainable development metric of a community. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	1	1	-	1	1	1	-	1	1	1	3	2	-	1	3
CO 2	1	-	1	-	2	-	1	-	1	-	1	2	-	2	3
CO 3	1	2	-	-	-	1	-	1	-	1	1	2	1	1	3
CO 4	1	1	2	1	1	-	1	-	1	-	3	1	2	2	3
CO 5	-	-	1	-	1	-	1	1	1	1	2	2	1	1	3
CO 6	2	2	-	-	2	-	-	-	-	-	2	3	2	1	3

Detailoed Syllabus:

UNIT-I (8 Hours)

Introduction to Sustainable Development: Glimpse into History and Current practices - Broad introduction to SD - its importance, need, impact and implications; definition coined; evolution of SD perspectives (MDGs AND SDGs) over the years; recent debates; 1987 Brundtland Commission and outcome; later UN summits (Rio summit, etc.) and outcome.

Unit-II **(8 Hours)**

Dimensions to Sustainable Development - society, environment, culture and economy; current challenges - natural, political, socio-economic imbalance; sustainable development initiatives and policies of various countries : global, regional, national, local; needs of present and future generation - political, economic, environmental.

Unit-III **(8 Hours)**

Frameworks of Sustainability - Analytical frameworks in sustainability studies, sustainability metrics: criteria and indicators; the significance of quantitative and qualitative assessments of sustainability; current metrics and limitations; metrics for mapping and measuring sustainable development; application of the metrics in real scenarios.

Unit-IV **(8 Hours)**

Critical Perspectives on Sustainable Development: Resource management and implications on sustainable development - implications for valuation, risk assessment; integrated decision-making processes: requirements of information, information flow, data analytics, learning from historical data, multicriteria decisions, multi level decisions, participatory decisions ; translating impact chains to information flows - impact of governance and policies

Unit-V **(8 Hours)**

Case Studies & Projects on Rural Sustainable Development (Indian village perspectives) - Village resources (broad perspectives); current challenges and thematic areas; village social hierarchy; village economy; needs of present and future generation; conflicts - sustainability and rural culture & tradition; road to achieving sustainable development goals - bridging conflicts and way forward.

Reference Book:

1. M.H. Fulekar (Editor), Bhawana Pathak (Editor), R K Kale (Editor).“Environment and Sustainable Development“, Springer Nature; 2014th edition (16 October 2013).
2. Introduction to Sustainable Development – 15 April 2018, by Martin J. Ossewaarde (Author), SAGE Publications Pvt. Ltd; First edition (15 April 2018)

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE23 **Title of the Course: Ethical Hacking**

L-T-P : 3-0-0

Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

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

CO1: Summarize the core concepts related to malware, hardware and software vulnerabilities and their causes. (Cognitive Level: Create)

CO2: Choose state-of-the-art tools to exploit the vulnerabilities related to computer system and networks. (Cognitive Level: Evaluate)

CO3: Experiment with various tools to exploit web applications. (Cognitive Level: Apply)

CO4: Solve the security issues in web applications. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	2	1	-	2	2	2	2	1	1	-	-	1	3	3	1
CO 2	1	1	1	-	3	-	1	-	1	1	1	-	2	2	1
CO 3	1	2	2	3	2	2	-	1	-	1	1	-	3	2	-
CO 4	2	1	2	2	2	3	2	-	1	1	-	1	2	2	1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write ‘3’ in the box for ‘High-level’ mapping, 2 for ‘Medium-level’ mapping, 1 for ‘Low’-level’ mapping.

Detailed Syllabus:

UNIT I **(8 Hours)**

Introduction to Ethical Hacking- Internet Crime Current Report-Essential Terminology-Elements of Information Security -Motives, Goals, and Objectives of Information Security Attacks- Internet Crime Current Report-Essential Terminology-Elements of Information Security -Motives, Goals, and Objectives of Information Security Attacks

UNIT II **(8 Hours)**

Hacking Concepts- Why Ethical Hacking is Necessary -Scope and Limitations of Ethical Hacking -Skills of an Ethical Hacker -Why Ethical Hacking is Necessary -Scope and Limitations of Ethical Hacking -Skills of an Ethical Hacker

UNIT III **(8 Hours)**

Footprinting Concepts- Footprinting Terminology -What is Footprinting?-Why Footprinting?-Objectives of Footprinting-Email Footprinting- System Hacking- Cracking Passwords -Password Cracking-Password Complexity-Password Cracking Techniques - Types of Password Attacks.

UNIT IV **(8 Hours)**

Trojan Concepts- What is a Trojan?-Purpose of Trojans -Indications of a Trojan Attack-Anti-Trojan Software - Anti-Trojan Software: Trojan Hunter - Anti-Trojan Software: Emsisoft Anti-Malware. Types of Viruses -System or Boot Sector Viruses -File and Multipartite Viruses - Macro Viruses -Cluster Viruses -Stealth/Tunneling Viruses-Encryption Viruses.

UNIT V **(8 Hours)**

An introduction to the particular legal, professional and ethical issues likely to face the domain of ethical hacking, ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking – Social Engineering, Host Reconnaissance, Session Hijacking, Hacking - Web Server, Database, Password Cracking, Network and Wireless, Trojan, Backdoor, UNIX, LINUX, Microsoft, NOVEL Server, Buffer Overflow, Denial of Service Attack, Methodical Penetration Testing.

REFERENCE BOOKS:

1. Hacking for Dummies, Book by Kevin Beaver
2. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration ... Book by Patrick Engebretson.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Open Elective –III (Semester-VII)

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE31 **Title of the Course: Data Mining**

L-T-P : 3-0-0 **Credits**: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After learning the course the students should be able to:

CO1: Perform the preprocessing of data and apply mining techniques on it. (Cognitive Level: Apply)
CO2: Identify the association rules, classification, and clusters in large data sets. (Cognitive Level: Analyze)
CO3: Solve real world problems in business and scientific information using data mining. (Cognitive Level: Evaluate)
CO4: Use data analysis tools for scientific applications. (Cognitive Level: Analyze)
CO5: Implement various supervised machine learning algorithms. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	2	2	-	2	1	2	-	1	-	1	1	2	2	1
CO 2	2	3	2	3	3	2	1	-	-	1	1	1	1	1	1
CO 3	2	2	-	2	3	3	2	1	-	1	-	1	2	1	-
CO 4	3	2	2	3	2	2	1	-	1	-	-	1	1	1	1
CO 5	2	2	3	3	3	2	-	1	-	1	-	1	1	1	1

Detailed Syllabus:

Unit-I **(8 Hours)**

Introduction to data mining (DM): Motivation for Data Mining - Data Mining-Definition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process

Unit-II **(8 Hours)**

Data Pre-processing: Data summarization, data cleaning, data integration and transformation, data reduction, data discretization and concept hierarchy generation, feature extraction ,

feature transformation, feature selection, introduction to Dimensionality Reduction, CUR decomposition

Unit-III **(8 Hours)**

Concept Description, Mining Frequent Patterns, Associations and Correlations:

What is concept description? - Data Generalization and summarization-based characterization - Attribute relevance - class comparisons, Basic concept, efficient and scalable frequent item-set mining methods, mining various kind of association rules, from association mining to correlation analysis, Advanced Association Rule Techniques, Measuring the Quality of Rules.

Unit-IV **(8 Hours)**

Classification and Prediction

Classification vs. prediction, Issues regarding classification and prediction, Statistical-Based Algorithms, Distance-Based Algorithms, Decision Tree-Based Algorithms, Neural Network-Based Algorithms, Rule-Based Algorithms, Combining Techniques, accuracy and error measures, evaluation of the accuracy of a classifier or predictor. Neural Network Prediction methods: Linear and nonlinear regression, Logistic Regression Introduction of tools such as DB Miner / WEKA / DTREG DM Tools

Unit-V: **(8 Hours)**

Cluster Analysis and Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering -K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering – Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering, Strengths and Weakness; Outlier Detection, Clustering high dimensional data, clustering Graph and Network data.

Reference Book:

1. Data Mining: Concepts and Techniques, 3/e– January 2007 by Han (Author), Elsevier; Third edition, January 2007.
2. Data Mining and Data Warehousing: Principles and Practical Techniques–June 2019, Cambridge University Press

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.

2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE32 Title of the Course: Enterprise Resource and planning

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

After studying this Paper, Students will be able to;

CO1: Demonstrate a good understanding of the basic issues in ERP systems. (Cognitive Level: Apply)

CO2: Analyse the strategic options for ERP identification and adoption. (Cognitive Level: Analyze)

CO3: Design the ERP implementation strategies. (Cognitive Level: Create)

CO4: Understand the need of Business Systems and Processes through strategic analysis of ERP systems. (Cognitive Level: Understand)

CO5: Develop and design the modules used in ERP systems, and can customize the existing modules of ERP systems. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	2	2	2	-	1	-	1	1	1	-	-
CO2	3	2	2	2	2	2	1	-	1	1	1	1	1	1	1
CO3	3	2	-	2	3	3	2	1	-	1	-	1	2	1	1
CO4	1	-	1	1	-	-	1	1	1	-	1	1	1	1	-
CO5	3	3	3	3	3	2	-	-	1	-	1	1	1	1	1

Detailed Syllabus:

Unit-I (8 Hours)

Introduction to ERP: ERP Overview, Benefits, Business process reengineering, ERP implementation life cycle, Options of various paradigms, Supply chain Management, Critical factors guiding selection and evaluation, Strategies for successful implementation, impediments and initiatives to achieve success, Critical success and failure factors, Integrating ERP into organizational culture.

Unit-II (8 Hours)

SAP and ABAP: Architecture of SAP, Data types in ABAP, ABAP programming Language, ABAP User Dialogs, Function groups and function modules, Accessing Database Access, open SQL, Native SQL, ABAP Object Orientation, Classes and objects in ABAP, Inheritance, Interfaces, Triggering and Handling Events, ABAP data dictionary, Declarations, selection screens, Formatting and Displaying Data, Program Events, , Dynpros, BSP applications.

Unit-III **(8 Hours)**

SD: Basic functions and master data in SD, Sales orders, Deliveries, Pricing, Billing, Transportation, Credit Management. MM: Basic functions and master data, Consumption based planning, Purchasing, Inventory management, Evaluation of materials, Invoice verification, Balance sheet evaluation,Material ledger.

Unit-IV **(8 Hours)**

Introduction, SAP AG, Baan Company, Oracle Corporation, People Soft, JD Edwards World Solutions Co, System Software Associates, Inc. (SSA); QAD; A Comparative Assessment and Selection of ERP Packages and Modules.

Unit-V **(8 Hours)**

Issues in Implementing ERP Packages; Pre-evaluation Screening; Package Evaluatio; Project Planning Phase; Gap Analysis; Reengineering; Configuration; Implementation; Team Training; Testing; Going Live; End-User Training; Post Implementation (Maintenance Mode). Selection of ERPVendors, Future Direction in ERP.

Reference Books:

1. Manufacturing Resource Planning (MRP II) with Introduction to ERP; SCM; an CRM by Khalid Sheikh, Publisher: McGraw-Hill

2. The Impact of Enterprise Systems on Corporate Performance: A study of ERP, SCM, and CRM System Implementations [An article from: Journal of Operations Management] by K.B. Hendricks; V.R. Singhal; and J.K. Stratman, Publisher: Elsevier

3. ERP and Supply Chain Management by Christian N. Madu, Publisher: CHI

4. Implementing SAP ERP Sales & Distribution by Glynn C. Williams, Publisher McGraw-Hill

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE33

Title of the Course: Rural Technology & Community development

L-T-P : 3-0-0 Credits: 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

By the end of the course, students should be able to

CO1: Understand rural development model. (Cognitive Level: Understand)

CO2: Learn different measures in rural development and its impact on overall economy. (Cognitive Level: Analyze)

CO3: Understand and learn importance of technologies in rural and community development. (Cognitive Level: Understand)

CO4: Understand challenges and opportunities in rural development. (Cognitive Level: Understand)

CO5: Analyze the cases of model villages. (Cognitive Level: Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	1	-	2	1	1	-	1	-	-	1	-	1	1	-	1
CO 2	-	1	1	-	-	1	2	-	1	-	1	1	-	1	2
CO 3	1	-	1	1	-	1	-	2	2	2	2	2	1	-	2
CO 4	1	-	1	-	1	1	3	3	2	3	2	2	-	1	1
CO 5	1	1	-	-	1	-	2	2	-	2	2	-	2	2	3

Detailed Syllabus:

Unit-I (8 Hours)

RURAL DEVELOPMENT - Concepts and connotations, Basic Elements, Growth Vs. Development, Why rural development, Rising expectations and development, Development and Change, Human beings as cause and consequences of development. RURAL ECONOMY OF INDIA - Introduction, size and structure, The characteristics of rural sector,

The role of agricultural sub-sector, The role of non-agricultural sub-sector, Challenges and opportunities.

Unit-II **(8 Hours)**

MEASURES OF DEVELOPMENT - Introduction, Measures of level of rural development, Measures of income distribution, Measures of development simplified, Concepts and measures of rural poverty.

PARADIGMS OF RURAL DEVELOPMENT - Introduction, The modernization theory, The dependency theory of Marxist School, Rosenstein- Rodan's theory of 'Big Push', Lewis' model of economic development, The human capital model of development, The Gandhian Concept of Rural Development theories from other social sciences.

Unit-III **(8 Hours)**

Using Water Resources - The water cycle, Drinking Water, Water quality testing, Water filtering ,Extraction from Groundwater ,Pumps Rope and washer pump ,Manuel pumps, Treadle pump, Irrigation for agriculture, Channel systems, Sprinkler systems, Drip systems Water diversion ,Water storage Building Infrastructures and Creating Energy - Basic energy uses , Energy Sources - Firewood, Solar Energy, Hydroelectricity, Hydromechanical, Wind Energy, Energy Storage, Connecting to the Electrical Network, Environmental Considerations.

Use of ICT in Rural and agricultural development - Education, Healthcare, Agriculture, Business, Resource Mapping, Digital and Social Media Marketing Decision Support Systems for soil conservation and farm management Waste Management and Sanitation.

Unit-IV **(8 Hours)**

DEVELOPING COMMUNITIES - Introduction, Service Learning and community development, Theory and practice of community development, Community development issues. The diverse meaning of community development, The knowledge base of community development, International community development.

Different forms of Rural Entrepreneurship, Significance , Business planning for a new venture: the concept of planning paradigm, Forms of business enterprises-Sole proprietorship, partnership and corporations, Product and Process development, Marketing analysis and competitive analysis, strategies; Financial resources; debt financing, banks and financial institutions and other non-bank financial sources; Government programmes : direct loan assistance and subsidies; Industrial and legal issues for rural enterprises.

Unit-V **(8 Hours)**

Role of Micro-Finance institutions in rural development, Use of ICT in Rural development, Watershed Management - Water-Cup Competition by Paani Foundation, Community Safe Water Solutions, Visit to a 'Woman Self help group' nearby and study of its functioning and its role in development. Visit to model villages in nearby region - Ralegan-Siddhi, Dist -

Ahemadnagar, Hiware Bazar Dist - Ahemadnagar, Tikekarwadi - Dist. - Pune, Buchekarwadi Dist- Pune etc.

Text Books:

1. “Rural Development: Principles, Policies and Management” - Katar Singh , Sage Publications.

2. “Introduction to Community Development - Theory, Practice and Service Learning”, Edited by J W Robinson, Sage Publications.

3. G. N. Tiwari, Solar Energy: Fundamentals, Design, Modeling and Applications, Narosa, 2002.

4. “Fundamentals of Entrepreneurship”, H. Nandan, Third Edition, PHL Learning Pvt. Ltd.,

5. “Monetary Economics-Institutions, Theory and Policy”, First Edition, S B Gupta, S Chand Publications, ISBN – 9788121904346.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Open Elective –IV (Semester-VIII)

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE41 **Title of the Course: Green Computing**

L-T-P : 3-0-0 **Credits**: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

CO1: To understand the concepts of technologies that conform to low-power computation. (Cognitive Level: Understand)

CO2: To understand green (power-efficient) technologies for components of one single computer, such as CPU, memory and disk, and appreciate cutting edge designs for these components. (Cognitive Level: Understand)

CO3: To have a basic understanding of a variety of technologies applied in building a green system and to identify the various key sustainability and green IT trends. (Cognitive Level: Understand)

CO4: To discuss the various laws, standards and protocols for regulating green IT. (Cognitive Level: Analyze)

CO5: Be able to use a range of tools to help monitor and design green systems. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	1	-	1	-	1	-	-	1	-	1	-	1	1	1	2
CO 2	1	-	-	1	1	1	-	-	-	1	-	1	1	1	1
CO 3	1	2	-	2	1	-	2	2	-	1	1	1	1	-	1
CO 4	1	-	1	-	1	-	1	1	1	-	-	1	-	-	1
CO 5	-	1	1	-	-	1	2	-	1	-	1	-	2	2	1

Detailed Syllabus:

Unit-I **(8 Hours)**

Green IT Fundamentals: Business, IT, and the Environment –Green computing: carbon foot print, scoop on power –Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

Unit-II **(8 Hours)**

Green Assets: Buildings, Data Centers, Networks, and Devices - Green Business Process Management: Modeling, Optimization, and Collaboration –Green Enterprise Architecture –Environmental Intelligence Green Supply Chains –Green Information Systems: Design and Development Models.

Unit-III **(8 Hours)**

Virtualizing of IT systems –Role of electric utilities, Telecommuting, teleconferencing and teleporting –Materials recycling –Best ways for Green PC –Green Data center –Green Grid framework.

Unit-IV **(8 Hours)**

Socio-cultural aspects of Green IT –Green Enterprise Transformation Roadmap –Green Compliance: Protocols, Standards, and Audits –Emergent Carbon Issues: Technologies and Future.

Unit-V **(8 Hours)**

The Environmentally Responsible Business Strategies (ERBS) –Case Study Scenarios for Trial Runs – calculating the carbon footprint – greening mobile devices - CASE STUDIES –Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

Text Books

1. Bhuvan Unhelkar, Green IT Strategies andApplications-Using Environmental Intelligence, CRC Press, June 2011

2. Woody Leonhard, Katherrine Murray, Green Home computing for dummies, August 2009.

Reference Books:

1. Alin Gales, Michael Schaefer, Mike Ebbers, Green Data Center: steps for the Journey, Shoff/IBM rebook, 2011.

2. John Lamb, The Greening of IT, Pearson Education, 2009.

3. Jason Harris, Green Computing and Green IT-Best Practices on regulations & industry, Lulu.com, 2008.

4. Carl Speshocky, Empowering Green Initiatives with IT, John Wiley & Sons, 2010.

5. Wu Chun Feng (editor), Green computing: Large Scale energy efficiency, CRC Press, 2012

Teaching-Learning Strategies in brief

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Assessment methods and weightages in brief

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3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE42 Title of the Course: Customer Relationship Management

L-T-P : 3-0-0 Credits: 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

By the end of the course, you should be able to:

CO1: Analyze relationship theory and relationship economics from the point of view of the customer and the organization. (Cognitive Level: Analyze)

CO2: Critically analyze an organization's relational strategies with stakeholder groups that affect how well it meets customer needs. (Cognitive Level: Analyze)

CO3: Evaluate CRM implementation strategies. (Cognitive Level: Evaluate)

CO4: Formulate and assess strategic, operational and tactical CRM decisions. (Cognitive Level: Create)

CO5: Plan and conduct an investigation on an aspect of CRM, and communicate findings in an appropriate format. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	1	-	-	-	2	1	2	3	2	2	1	2	2
CO2	1	-	-	1	1	1	-	2	-	2	-	2	1	2	2
CO3	-	1	-	1	-	1	2	-	3	1	2	3	1	1	1
CO4	1	1	-	1	-	1	3	-	3	2	1	3	2	2	2
CO5	1	-	1	-	-	1	2	1	-	2	3	3	1	1	3

Detailed Syllabus:

Unit-I: (8 Hours)

CRM Concepts: Acquiring Customers, Customer Loyalty, and Optimizing Customer Relationships. CRM Defined: Success Factors, the Three Levels of Service/ Sales Profiling, Service Level Agreements (SLAs), Creating and Managing Effective SLAs.

Unit-II: (8 Hours)

CRM in Marketing: One-to-one Relationship Marketing, Cross Selling & Up Selling, Customer Retention, Behavior Prediction, Customer Profitability & Value Modeling, Channel Optimization, Event-Based marketing. CRM and Customer Service: The Call Centre, Call Scripting, Customer Satisfaction Measurement.

Unit-III: (8 Hours)

Sales Force Automation: Sales Process, Activity, Contact, Lead and Knowledge Management. Field Force Automation. CRM Links in E-Business: E-Commerce and Customer Relationships on the Internet, Enterprise Resource Planning (ERP), Supply Chain Management (SCM), Supplier Relationship Management (SRM), Partner Relationship Management (PRM).

Unit-IV: (8 Hours)

Analytical CRM: Managing and Sharing Customer Data - Customer Information Databases, Ethics and Legalities of Data Use. Data Warehousing and Data Mining Concepts. Data Analysis: Market Basket Analysis (MBA), Click Stream Analysis, Personalization and Collaborative Filtering.

Unit-V: (8 Hours)

CRM Implementation: Defining Success Factors, Preparing a Business Plan- Requirements, Justification, Processes. Choosing CRM Tools: Defining Functionalities, Homegrown Versus Outsourced Approaches. Managing Customer Relationships: Conflict, Complacency, Resetting the CRM Strategy. Selling CRM, Internally: CRM Development Team, Scoping and Prioritizing, Development and Delivery, Measurement.

Reference Books:

1. Stanley A. Brown, Customer relationship Management, John Wiley & Sons, Canada, Ltd.

2. Jagdish Seth, et al: Customer Relationship Management

3. Kristin L. Anderson & Carol J Kerr: Customer Relationship Management

4. H. Schmitt, Customer Experience Management: A revolutionary approach to connecting with your customers.

5. Ken Bernett, 2005, The Hand Book of Key Customer Relationship Management, Pearson Education

6. Jagdish N Sheth, Parvatiyar Atul, G Shainesh, Customer Relationship Management: Emerging Concepts, Tools and Applications, 1st Edition, Tata McGraw Hill, June 2008

7. Judith W .Kincaid , Customer Relationship Management Getting it Right, Pearson Education

8. H. Peeru Mohamed , A Sagadevan, Custmer Relationship Management, A Step by Step Approach, Vikas Publishing House

9. Customer Centricity –Focus on right customer for strategic advantage, by Peter Fader, Wharton Digital Press, 2012

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2. By giving assignments.
3. By conducting class tests.
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5. Internal assessment (40 Marks) & Semester Examination (60 Marks) &Total Marks-100.

Program: B.Tech. (Electronics and Communication Engineering)

Course Code: BTECE OE43 Title of the Course: Infrastructure Systems planning

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Explain the basic concepts related to Infrastructure Projects. (Cognitive Level: Understand)
CO2: Explain the role of private sector in infrastructure growth. (Cognitive Level: Understand)
CO3: Describe the strategies for successful Infrastructure Project implementation. (Cognitive Level: Understand)
CO4: Develop Infrastructure modelling and Life Cycle Analysis Techniques. (Cognitive Level: Create)
CO5: Explain Sustainable development of Infrastructure. (Cognitive Level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	-	1	-	2	-	1	-	1	2	1	3	2	2	1	1
CO 2	-	1	2	-	2	1	2	-	-	2	-	2	2	2	-
CO 3	1	-	1	-	-	-	-	-	2	2	3	3	1	1	1
CO 4	-	1	-	1	-	1	-	1	1	1	2	-	1	1	1
CO 5	1	-	1	-	1	-	2	3	-	2	-	2	2	2	1

Detailed Syllabus:

Unit-I (8 Hours)

AN OVERVIEW OF BASIC CONCEPTS RELATED TO INFRASTRUCTURE: Introduction to Infrastructure, an overview of the Power Sector in India., An Overview of the Water Supply and Sanitation Sector in India., an overview of the Road, Rail, Air and Port Transportation Sectors in India. , an overview of the Telecommunications Sector in India., an overview of the Urban Infrastructure in India, an over view of the Rural Infrastructure in India, an Introduction to Special Economic Zones, Organizations

and layers in the field of Infrastructure, The Stages of an Infrastructure Project Lifecycle., an overview of Infrastructure Project Finance.

Unit-II **(8 Hours)**

PRIVATE INVOLVEMENT IN INFRASTRUCTURE: A Historical Overview of Infrastructure Privatization. The Benefits of Infrastructure Privatization, Problems with Infrastructure Privatization, Challenges in Privatization of water Supply: A Case Study, Challenges in Privatization of Power: Case Study, Privatization of Infrastructure in India: Case Study, Privatization of Road Transportation Infrastructure in India.

Unit-III **(8 Hours)**

CHALLENGES TO SUCCESSFUL IMPLEMENTATION: INFRASTRUCTURE PLANNING AND Mapping Facing the Landscape of Risks in Infrastructure Projects, Economic and Demand Risks: The Case study for Political Risks, Socius Maintenance of Infrastructure. Environmental Risks, Cultural Risks in International Infrastructure Projects, Legal and Contractual Issues in Infrastructure, Challenges in Construction and Maintenance of Infrastructure.

Unit-IV **(8 Hours)**

STRATEGIES FOR SUCCESSFUL INFRASTRUCTURE PROJECT IMPLEMENTATION: Risk Management Framework for Infrastructure Projects, Shaping the Planning Phase of Infrastructure Projects to mitigate risks, Designing Sustainable Contracts, Introduction to Fair Process and Negotiation, Negotiating with multiple Stakeholders on Infrastructure Projects.

Unit-V **(8 Hours)**

SUSTAINABLE DEVELOPMENT OF INFRASTRUCTURE: Information Technology and Systems for Successful Infrastructure Management, and Maintenance of Infrastructure Facilities, Infrastructure Innovative Design Modeling and Life Cycle Analysis Techniques, Capacity Building and Improving the Governments Role in Infrastructure Implementation, An Integrated Framework for Successful Infrastructure Planning and Management Infrastructure Management Systems and Future Directions.

Reference Book

1. France, Robert L. Wetland Design: Principles and Practices for Landscape Architects and Land Use Planners. New York, NY: W.W. Norton & Company, 2002. ISBN: 9780393730739.

2. Lyle, John T. Regenerative Design for Sustainable Development. New York City, NY: John Wiley & Sons, 2008. ISBN: 9780471178439.

3. Buy at MIT Press Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, MA: MIT Press, 1984. ISBN: 9780262121064.

4. Marsh, William M. Landscape Planning: Environmental Applications. New York, NY: John Wiley & Sons, 2005. ISBN: 9780471485834.

5. Randolph, John. Environmental Land Use Planning Management. Washington, DC: Island Press, 2004. ISBN: 9781559639484.

6. Steiner, Frederick R. The Living Landscape: an Ecological Approach to Landscape Planning. New York, NY: McGraw-Hill, 2000. ISBN: 9780070793989.

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