ADMISSION & EXAMINATION
BYE-LAWS

FOR

BACHELOR OF TECHNOLOGY
(ELECTRONICS &COMMUNICATION ENGINEERING)
B. TECH. (ECE)

&

BACHELOR OF TECHNOLOGY
(ELECTRONICS &COMMUNICATION ENGINEERING)
B. TECH. (ECE) (Lateral Entry)

CHOICE BASED CREDIT SYSTEM (CBCS)
(with effect from 2019-20)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
School of Engineering Sciences& Technology
JAMIA HAMDARD
(DEEMED TO BE UNIVERSITY)
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ADMISSION & EXAMINATION RULES
For
BACHELOR OF TECHNOLOGY
(ELECTRONICS & COMMUNICATION ENGINEERING)
B. TECH. (ECE)

1. OBJECTIVE

To prepare highly skilled professionals, with a strong conceptual and theoretical background in the fields of Electronics & Communication.

2. THE PROGRAMME

Highlights of the course are described in the following table:

2.1 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	194
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 atleast 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 the every academic session

2.2. 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	150
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 Technologyexamination from a recognized institution /university 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	Jamia Hamdard will admit candidates on the basis of merit of qualifying examination.
i.	Period of Completion	Maximum of 10% of “Approved Intake”, plus the unfilled vacancies of First year.
j.	Commencement of the Programme	Not more than 06 years (12 Semesters)

3. PROGRAMME STRUCTURE

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	31	59
	Professional Core (PC) courses, relevant to the chosen specialization/ branch; (May be split into Hard (no choice) and Soft(with choice), if required)	66	
	Project Work, Seminar and/or Internship in Industry or elsewhere.	18	
Departmental Electives (DE)	Departmental Electives, relevant to the chosen specialization/ branch	15	8
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
MOOC*	Online Courses	9	5
Total		**194**	**100**

*** The list of online courses to be cleared through MOOCs shall be floated inthe respective semester after approval from the Board of Studies.**

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 Under Graduate degree in Engineering. A student will be eligible to get Under Graduate 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	25	75	100	3-1-0	4
BTECE 102	Mathematics – I	BS	25	75	100	3-1-0	4
BTECE 103	Basic Electrical Engineering	ES	25	75	100	3-1-0	4
BTECE 104	Engineering Graphics & Design	ES	25	75	100	1-0-0	1
BTECE 105	Applied Physics – I Lab	BS	25	75	100	0-0-4	2
BTECE 106	Basic Electrical Engineering Lab	ES	25	75	100	0-0-2	1
BTECE 107	Engineering Graphics & Design Lab	ES	25	75	100	0-0-4	2

BTECE 108	Essence of Indian Traditional knowledge	MC	25	75	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	25	75	100	3-1-0	4
BTECE 202	Mathematics-II	BS	25	75	100	3-1-0	4
BTECE 203	Programming for Problem Solving	ES	25	75	100	3-1-0	4
BTECE 204	Workshop /Manufacturing Practices	ES	25	75	100	1-0-0	1
BTECE 205	English Language	HS	25	75	100	2-0-0	2
BTECE 206	Applied Physics – II Lab	BS	25	75	100	0-0-4	2
BTECE 207	Programming for Problem Solving Lab	ES	25	75	100	0-0-4	2
BTECE 208	Workshop /Manufacturing Practices Lab	ES	25	75	100	0-0-4	2
BTECE 209	English Language Lab	HS	25	75	100	0-0-2	1
BTECE 210	Basic Engineering Mechanics	BS	25	75	100	3-1-0	4
*BTECE 211	Environmental Sciences	MC	25	75	100	2-0-0	0
					Total	**17-4-12**	**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	25	75	100	3-1-0	4
BTECE 302	Chemistry	BS	25	75	100	3-1-0	4
BTECE 303	Signals and Systems	PC	25	75	100	3-1-0	4
BTECE 304	Network Theory	PC	25	75	100	3-1-0	4
BTECE 305	Digital System Design	ES	25	75	100	3-1-0	4
BTECE 306	Humanities-I (Effective Technical Communication)	HS	25	75	100	3-0-0	3
BTECE 307	Electronic Devices Lab	ES	25	75	100	0-0-2	1
BTECE 308	Digital System Design Lab	ES	25	75	100	0-0-2	1
BTECE 309	Introduction to IoT	ES	25	75	100	3-1-0	4
					Total	**21-6-4**	**29**

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	25	75	100	3-1-0	4
BTECE 402	Analog Circuits	PC	25	75	100	3-1-0	4
BTECE 403	Microcontrollers	PC	25	75	100	3-1-0	4
BTECE 404	Electronics Instrumentation & Measurement	PC	25	75	100	3-1-0	4
BTECE 405	Organizational Behaviour	HS	25	75	100	3-0-0	3
BTECE 406	Antennas and Propagation	PC	25	75	100	3-1-0	4
BTECE 407	Analog and Digital Communication Lab	PC	25	75	100	0-0-2	1
BTECE 408	Analog Circuits Lab	PC	25	75	100	0-0-2	1
BTECE 409	Microcontrollers Lab	PC	25	75	100	0-0-2	1
BTCSE 410	Disaster Management	PC	25	75	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	25	75	100	3-1-0	4
BTECE 502	Computer Architecture	PC	25	75	100	3-1-0	4
BTECE 503	Probability Theory and Stochastic Processes	PC	25	75	100	3-1-0	4
BTECE 504	Digital Signal Processing	PC	25	75	100	3-1-0	4
BTECE 505	Electromagnetic Waves Lab	PC	25	75	100	0-0-2	1
BTECE 506	Digital Signal Processing Lab	PC	25	75	100	0-0-2	1
BTECE 507	Constitution of India	MC	25	75	100	0-0-0	0
	Departmental Elective –I	DE	25	75	100	3-0-0	3
	Open Elective –I	OE	25	75	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		
BTECE601	Project – I	PROJ	25	75	100	0-0-6	3
BTECE 602	Control Systems	PC	25	75	100	3-1-0	4
BTECE603	Computer Networks	PC	25	75	100	3-1-0	4
BTECE604	Humanities II (Professional Practice, Law & Ethics)	HS	25	75	100	3-0-0	3
BTECE605	Electronic Measurement Lab	PC	25	75	100	0-0-2	1
BTECE606	Computer Networks Lab	PC	25	75	100	0-0-4	2
BTECE 507	Sensors and Instrumentation	PC	25	75	100	3-0-0	3
	Departmental Elective – II	DE	25	75	100	3-0-0	3
	Open Elective – II	OE	25	75	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	25	75	100	2-1-0	3
	Departmental Elective – III	DE	25	75	100	3-0-0	3
	Departmental Elective – IV	DE	25	75	100	3-0-0	3
	Departmental Elective – V	DE	25	75	100	3-0-0	3
	Open Elective – III	OE	25	75	100	3-0-0	3
	Open Elective - IV	OE	25	75	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
BTECE MOOC1	MOOC 1	MOOC					3
BTECE MOOC2	MOOC 2	MOOC					3
BTECE MOOC3	MOOC 3	MOOC					3
					Total	**0-0-18**	**18**

Total Credits – 194

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	25	75	100	3-0-0	3
BTECE DEI12	Fibre Optic Communication	25	75	100	3-0-0	3
BTECE DEI13	Information Theory and Coding	25	75	100	3-0-0	3
Departmental Elective –II						
BTECE DEI21	Speech and Audio Processing	25	75	100	3-0-0	3
BTECE DEI22	Introduction to MEMS	25	75	100	3-0-0	3
BTECE DEI23	Adaptive Signal Processing	25	75	100	3-0-0	3
Departmental Elective –III						
BTECE DEI31	Antennas and Propagation	25	75	100	3-0-0	3
BTECE DEI32	Bio-Medical Electronics	25	75	100	3-0-0	3
BTECE DEI33	Mobile Communication and Networks	25	75	100	3-0-0	3
Departmental Elective –IV						
BTECE DEI41	Digital Image and Video Processing	25	75	100	3-0-0	3

BTECE DEI42	Mixed Signal Design	25	75	100	3-0-0	3
BTECE DEI43	Wireless Sensor Networks	25	75	100	3-0-0	3
Departmental Elective –V						
BTECE DEI51	CMOS Design	25	75	100	3-0-0	3
BTECE DEI52	Power Electronics	25	75	100	3-0-0	3
BTECE DEI53	Satellite Communication	25	75	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	Soft Skills and Interpersonal Communication	25	75	100	3-0-0	3
BTECE OE12	Human Resource Development and Organizational Behaviour	25	75	100	3-0-0	3
BTECE OE13	Cyber Law and Ethics	25	75	100	3-0-0	3
Open Elective –II						
BTECE OE21	History of Science	25	75	100	3-0-0	3
BTECE OE22	Principles of Management	25	75	100	3-0-0	3
BTECE OE23	Operational Research	25	75	100	3-0-0	3
Open Elective –III						
BTECEOE31	Infrastructure Systems Planning	25	75	100	3-0-0	3
BTECE OE32	Rural Technology & Community Development	25	75	100	3-0-0	3
BTECE OE33	Supply Chain Management-Planning	25	75	100	3-0-0	3

Open Elective –IV						
BTECE OE41	Enterprise Resource and Planning	25	75	100	3-0-0	3
BTECE OE42	Customer Relationship Management	25	75	100	3-0-0	3
BTECE OE43	Planning for Sustainable Development	25	75	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) 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 75% 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 effected on payments of prescribed readmission fees.

i. A student with less than 75% 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 (03) internal assessment (Unit Test) with a total of 20 marks, and the best Two (02) performances out of the three unit tests of internal assessments will be counted. Other modes of assessment shall account for remaining 5 mark.

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	03 Hours	04 Hours
3.	Total Marks	75 (Seventy Five Only)	75 (Seventy Five 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 40%.

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 students 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

SEMESTER I

BTECE101-Applied Physics – I

Course Objective

- This is an established fact that a sound understanding of concepts of Physics is an essential part of the training of a prospective engineer.
- In the present era the spectacular progress of technology bears witness to the fact that the attractive edifice of technology can only be built on the solid foundation of Physics.
- In the past hundred years or so Physics has seen major upheavals where conventional frameworks have underwent revolutionary changes.
- From technological perspective these changes and development of new concepts are very crucial. This makes it incumbent that the students are equipped with proper skills and understanding of Physics.
- In this spirit, this course aims to train the student in logical and analytical thinking through understanding and applications of the principles of Physics to actual problems.
- The emphasis of this course is on the development of conceptual skills and their application to actual problems rather than rigorous theoretical treatments.

UNIT 1: Semiconductor Physics

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

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

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

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

UNIT 5: Superconductivity

Introduction, Variation of resistivity with temperature, Difference between a metal and a superconductor, Meissner effect, Type I and Type II superconductors, Examples of superconductors, BCS Theory (Qualitative only), London's equations, applications of superconductors.

Course Outcome:

After studying this course the student is expected to:

- Develop good understanding of basic concepts related to semiconductors.
- Familiarize themselves with ideas related with LASER and develop an understanding of amazing properties of LASER heralding new pathways in technology.
- Get introduced to the working of optical fibers and their huge potential.
- Refresh and further develop their understanding of the two remarkable phenomena exhibited by light- interference and diffraction and related concepts.
- Get a feel of yet another mysterious phenomenon of nature-superconductivity and explore its technological potential.

Books Recommended:

- B.G. Streetman, "Solid State Electronic Devices", Prentice Hall of India, 1995.
- D.A. Neamen, "Semiconductor Physics and Devices," Times Mirror High Education Group, Chicago, 1997.
- O. Svelto, "Principles of Lasers", Springer Science & Business Media, 2010.
- Ghatak, "Optics", McGraw Hill Education, 2012.
- D. Neamen, D. Biswas, "Semiconductor Physics and Devices," McGraw Hill Education

BTECE102 MATHEMATICS - 1

Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. More precisely, the objectives are:

- To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.
- To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
- To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.
- To familiarize the student with functions of several variables that is essential in most branches of engineering.
- To develop the essential tool of matrices and linear algebra in a comprehensive manner.

UNIT 1 Calculus:

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 2: Calculus:

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

UNIT 3: 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 4: Multivariable Calculus (Differentiation):

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 5: Matrices

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.

Textbooks/References:

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

BTECE103-Basic Electrical Engineering

UNIT 1: DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff 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

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

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

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

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.

Suggested Text / Reference Books

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

Course Outcomes

- To understand and analyze basic electric and magnetic circuits
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations

BTECE104-Engineering Graphics & Design

UNIT 1: 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: 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: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: 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: 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:

- Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
- Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
- (iii)Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
- Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
- (Corresponding set of) CAD Software Theory and User Manuals

Course Outcomes

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

- to prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- to prepare you to communicate effectively
- to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice

The student will learn:

- Introduction to engineering design and its place in society Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards Exposure to solid modeling
- Exposure to computer-aided geometric design Exposure to creating working drawings
- Exposure to engineering communication

BTECE105-Applied Physics -I Laboratory

Laboratory based upon Applied Physics -1 BTECE 101

BTECE106-Basic Electrical Engineering Laboratory

Laboratory based upon Basic Electrical Engineering BTECE 103

BTECE107-Engineering Graphics & Design Laboratory

Laboratory based upon Engineering Graphics & Design BTECE 104

BTECE108-Essence of Indian Traditional knowledge

COURSE OBJECTIVE:

The objective of this course is to familiarize the prospective engineers with elements of Indian history and sociological concepts and theories by which they could understand contemporary issues and problems in Indian society. The course would enable them to analyze critically the social processes of globalization, modernization and social change. All of this is a part of the quest to help the students imbibe such skills that will enhance them to be better citizens and human beings at their work place or in the family or in other social institutions.

UNIT 1 Introduction to Elements of Indian History: What is history? ; History Sources-Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History;

History & historiography; Introduction to sociological concepts-structure, system, organization, social institutions, Culture social stratification (caste, class, gender, power).State & civil society; (7 Lectures)

UNIT 2: Indian history & periodization; evolution of urbanization process: first, second &third phase of urbanization; Evolution of polity; early states to empires; Understanding social structures- feudalism debate; Understanding social structure and social processes: Perspectives of Marx, Weber & Durkheim;

UNIT 3: From Feudalism to colonialism-the coming of British; Modernity & struggle for independence; Political economy of Indian society. Industrial, Urban, Agrarian and Tribal society; Caste, Class, Ethnicity and Gender; Ecology and Environment;

UNIT 4: Issues & concerns in post-colonial India (up to 1991); Issues & concerns in postcolonial India 2nd phase (LPG decade post 1991)

UNIT 5: Social change in contemporary India: Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing nature of work and organization

Reference Books:

- History
  - Desai, A.R. (2005), Social Background of Indian Nationalism, Popular Prakashan
  - Guha, Ramachandra (2007), India After Gandhi, Pan Macmillan
  - Thapar, Romila (2002), Early India, Penguin
  - Sharma R.S.(1965), Indian Feudalism, Macmillan
  - Deshpande, Satish (2002), Contemporary India: A Sociological View, Viking
  - Gadgil, Madhav & Ramachandra Guha(1993), This Fissured Land: An Ecological History of India, OU Press
- (b) Sociology:
  - Giddens, A (2009), Sociology, Polity, 6th edn.
  - Haralambos M, RM Heald, M Holborn (2000), Sociology, Collins
  - Xaxa, V (2008), State, Society and Tribes Pearson
  - Chandoke, Neera & Praveen Priyadarshi (2009), Contemporary India: Economy, Society and Politics, Pearson
  - Oommen,T.K.(ed.) (1997), Citizenship and National Identity: From Colonialism to Globalization, Sage.
  - Mohanty, M (ed.) (2004), Class, Caste & Gender- Volume 5, Sage
  - Dhanagare, D.N. , Themes and Perspectives in Indian Sociology, Rawat
  - Ramaswamy, E.A. and Ramaswamy,U.(1981), Industry and Labour, OU Press
  - Bhowmik, S (ed.) (2010), Street Vendors in the Global Urban Economy, Routledge

- Rao, M.S.A. (ed.) (1974), Urban Sociology, Orient Longmans

SEMESTER II

BTECE 201 Applied Physics – II

BTECE 202 Mathematics –II

UNIT 1: Basic Probability:

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 2: Continuous Probability Distributions:

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

UNIT 3: Bivariate Distributions

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

UNIT 4: Basic Statistics

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 5: Applied Statistics

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:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
- Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

BTECE203-Programming for Problem Solving

Unit 1:

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:

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

Unit 3

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

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

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

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

Suggested Reference Books

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

Course Outcomes

The student will learn:

- To formulate simple algorithms for arithmetic and logical problems. To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

BTECE204-Workshop/Manufacturing Practices

Unit l: Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods

Unit 2: CNC machining, Additive manufacturing

Unit 3: Fitting operations & power tools , Electrical &Electronics

Unit 4: Carpentry, Plastic molding, glass cutting

Unit 5 : Metal casting , Welding (arc welding & gas welding), brazing

Suggested Text/Reference Books:

- 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.
- Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology",
- 4th edition, Pearson Education India Edition, 2002.
- Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.
- Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
- Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

Course Outcomes

Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

BTECE205-English Language

UNIT 1: Vocabulary Building

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

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

UNIT3: Identifying Common Errors in Writing

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

UNIT 4: Nature and Style of sensible Writing

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

UNIT 5 Writing Practices AND ORAL COMMUNICATION

Comprehension, Précis Writing, Essay Writing,

Oral Communication

(This Module 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:

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

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

BTECE 206 Applied Physics – II Lab

BTECE207- Programming for Problem Solving Laboratory

BTECE208-Workshop/Manufacturing Practices laboratory

1. Machine shop
2. Fitting shop
3. Carpentry
4. Electrical &Electronics
5. Welding shop **(Arc welding + Gas welding)**
6. Casting
7. Smithy
8. Plastic molding& Glass Cutting

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

BTECE209-English Language Laboratory

(This course involves interactive practice sessions in Language Laboratory)

Laboratory 1: Familiarization with the lab & purpose

Laboratory 2: Writing Practices-Comprehension

Laboratory 3: Writing Practices-Précis Writing

Laboratory 4: Writing Practices-Essay Writing

Laboratory 5: Oral Communication-Listening Comprehension

Laboratory 6: Oral Communication-Pronunciation, Intonation, Stress and Rhythm

Laboratory 7: Oral Communication-Common Everyday Situations: Conversations and
Laboratory 8: Oral Communication-Dialogues Communication at Workplace

Laboratory 9: Oral Communication-Interviews

Laboratory 10: Oral Communication-Formal Presentations

If time permits, group discussions may be added.

BTECE210- Basic Engineering Mechanics

Prerequisites: (i) Physics 1, both modules

(ii) Mathematics course with ordinary differential equations

Prerequisites: (i) Physics 1, both modules

(ii) Mathematics course with ordinary differential equations

UNIT 1: Statics: Free body diagrams with examples on modeling of typical supports and joints; Condition for equilibrium in three- and two- dimensions; Friction: limiting and non-limiting cases; Force displacement relationship; Geometric compatibility for small deformations; Illustrations through simple problems on axially loaded members like trusses.

UNIT 2: Introduction to Mechanics of solids: Concept of stress at a point; Planet stress: transformation of stresses at a point, principal stresses and Mohr's circle; Displacement field;

UNIT 3: Concept of strain at a point; Plane strain: transformation of strain at a point, principal strains and Mohr's circle; Strain Rose; Discussion of experimental results on one-dimensional material behavior; Concepts of elasticity, plasticity, strain hardening, failure (fracture / yielding); Idealization of one-dimensional stress-strain curve; Generalized Hooke's law with and without thermal strains for isotropic materials; Complete equations of elasticity;

UNIT 4: Force analysis — axial force, shear force, bending moment and twisting moment diagrams of slender members (without using singularity functions); Torsion of circular shafts and thin-walled tubes (plastic analysis and rectangular shafts not to be discussed); Moment curvature relationship for pure bending of beams with symmetric cross-section; Bending stress; Shear stress; Cases of combined stresses; Concept of strain energy; Yield criteria;

UNIT 5: Deflection due to bending; Integration of the moment-curvature relationship for simple boundary conditions; Method of superposition (without using singularity functions); Strain energy and complementary strain energy for simple structural elements (i.e. those under axial load, shear force, bending moment and torsion); Castigliano's theorems for deflection analysis and indeterminate problems.

Reference books:

- An Introduction to the Mechanics of Solids, 2nd ed. with SI Units — SH Crandall, NC
- Dahl & TJ Lardner
- Engineering Mechanics: Statics, 7th ed. — JL Meriam

- (iii)Engineering Mechanics of Solids — EP Popov

BTECE211-Environmental Sciences

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

UNIT 1: 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: 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: 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: Environmental Biotechnology covering, Biotechnology for environmental protection- Biological indicators, bio-sensors; Remedial measures- Bio-remediation, phyto remediation, bio-pesticides, bio-fertilizers; Bio-reactors- Design and application. 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; Legal issues-Environmental legislation (Acts and issues involved),Environmental ethics;

UNIT 5 Environmental Monitoring covering, Monitoring- Identification of environmental problem, tools for monitoring (remote sensing, GIS); Sampling strategies- Air, water, soil sampling techniques, Laboratory Work including Practical and Field Work covering, Plotting of bio-geographical zones and expanse of territorial waters on the map of India; Identification ofbiological resources (plants, animals, birds) at a specific location; Determination of (i) pH

value, (ii) water holding capacity and (iii) electrical conductivity of different types of soils; Determination of energy content of plants by bomb calorimeter; Measurement and classification of noise pollution; Determination of particulate matter from an industrial area by high volume sampler; Determination of ico-chemical parameters (pH, alkalinity, acidity, salinity, COD, BOD) of tap water, well water, rural water supply industrial effluent and seawater & potability issues; Demonstration of Remote Sensing and GIS methods; Industrial visit for environmental biotechnology processes (e.g., any one of the fermentation, tissue culture, pharmaceutical industries);

SEMESTER III

BTECE 301 Electronic Devices

Course Objective:

1. To learn concepts of semiconductor Physics
2. To Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.

Unit – I: Introduction to Semiconductor Physics

Introduction to Semiconductor Physics: Review of Quantum Mechanics, Electrons in periodic Lattices, E-k diagrams. Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; sheet resistance, design ofresistors

Unit – II: PN Junction Diode

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

Unit – III: Bipolar Junction Transistor

Bipolar Junction Transistor, I-V characteristics, Ebers-Moll Model, MOS capacitor, C-V characteristics

Unit – IV: Metal Oxide Semiconductor Field Effect Transistor (MOSFET)

MOSFET, I-V characteristics, and small signal models of MOS transistor, LED, photodiode and solar cell.

Unit – V: IntegratedCircuit Fabrication

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

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

1. G. Streetman, and S. K. Banerjee, " SolidState Electronic Devices," 7th edition, Pearson,2014.
2. S. M. Sze and K. N. Kwok, " Physics of Semiconductor Devices," 3rd edition, John Wiley &Sons,2006.

Reference book:(in IEEE format; not more than 3 books)

1. D. Neamen , D. Biswas "Semiconductor Physics and Devices," McGraw-HillEducation
2. C.T. Sah, " Fundamentalsof solid state electronics," World Scientific Publishing Co. Inc, 1991.
3. Y. Tsividis and M. Colin, " Operation and Modeling of the MOS Transistor," Oxford Univ.Press,2011.

Learning Outcomes:

3. Understand the principles of semiconductorPhysics
4. Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits andsystems.

BTECE 302 Chemistry

Unit I: Atomic and molecular structure

Schrodinger equation, Particle in a box solutions and their applications for conjugated molecules and nano-particles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals, Equations for atomic and molecular orbitals, Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity, Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties, Band structure of solids and the role of doping on band structures

UNIT 2: Spectroscopic techniques and applications

Principles of spectroscopy and selection rules, Electronic spectroscopy, Fluorescence and its applications in medicine, Vibrational and rotational spectroscopy of diatomic molecules, Applications, Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques, Diffraction and scattering

UNIT 3: Intermolecular forces and potential energy surfaces

Ionic, dipolar and van Der Waals interactions, Equations of state of real gases and critical phenomena, Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces. **Organic reactions and synthesis of a drug molecule :** Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings, Synthesis of a commonly used drug molecule

UNIT 4: Use of free energy in chemical equilibria and Periodic properties

Thermodynamic functions: energy, entropy and free energy, Estimations of entropy and free energies. Free energy and emf, Cell potentials, the Nernst equation and applications, Acid base, oxidation reduction and solubility equilibria, Water chemistry. Corrosion, Use of free energy considerations in metallurgy through Ellingham diagrams

UNIT 5:

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries **Stereochemistry :** Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds

Reference Books:

- University chemistry, by B. H. Mahan
- Chemistry: Principles and Applications, byM. J. Sienko andR. A. Plane
- Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
- Physical Chemistry, by P. W. Atkins
- Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Course Outcomes

- The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.
- Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:
- Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalize bulk properties and processes using thermodynamic considerations.

- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

BTECE 303 Signals and Systems

Course Objective:

1. To Learn different types of signals
2. To Represent continuous and discrete systems in time and frequency domain using different transforms
3. How to check system stability.
4. To get knowledge about Sampling and reconstruction of asignal.

Unit – I: Signals and its Classifications

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,realizability.

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

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

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

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

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:(in IEEE format; not more than 2 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:(in IEEE format; not more than 3 books)

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.

Learning Outcomes:

1. Analyze different types of signals
2. Represent continuous and discrete systems in time and frequency domain using different transforms
3. Investigate whether the system is stable
4. Sampling and reconstruction of a signal

BTECE 304 Network Theory

Course Objective:

1. To Learn electrical circuits analysis with nodal and meshanalysis.
2. To solve electrical network using network theorems.
3. To understand the use of Laplace Transform for steady state and transientanalysis.
4. To know the idea about networkfunctions.
5. To get the idea of the frequency domaintechniques.

Unit – I: Electrical Circuits and Network Theorems

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

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 powercalculation.

Unit – III: Laplace Transform

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

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

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 ofIndia, 2000
2. A William Hayt, " Engineering Circuit Analysis" 8th Edition, McGraw-HillEducation

Reference book:(in IEEE format; not more than 3 books)

1. Sudhakar, A., Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi,1994

Course Outcomes:

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

1. Understand basics electrical circuits with nodal and mesh analysis.

2. Appreciate electrical network theorems.

3. Apply Laplace Transform for steady state and transient analysis.

4. Determine different network functions.

5. Appreciate the frequency domain techniques.

BTECE 305 Digital System Design

Course Objective:

1. To learn Design and analysis of combinational logiccircuits
2. To get Design & analyze modular combinational circuits MUX/DEMUX Decoder, Encoder
3. Design & analyze synchronous sequential logiccircuits
4. Use HDL & appropriate EDA tools for digital logic design andsimulation

Unit – I: Logic Simplification and Combinational Logic

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

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

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

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

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.

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

1. R.P. Jain, " Modern digital Electronics", Tata McGraw Hill, 4th edition,2009.
2. Douglas Perry, "VHDL",TataMcGraw Hill,4thedition,2002.

Reference book:(in IEEE format; not more than 3 books)

1. W.H. Gothmann, " Digital Electronics- An introduction to theory and practice", PHI, 2nd edition,2006.
2. D.V. Hall, "Digital Circuits and Systems" , Tata McGraw Hill, 1989
3. Charles Roth, " Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.

Course outcomes:

4. At the end of this course students will demonstrate the ability to
5. 1. Design and analyze combinational logic circuits
6. 2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder
7. 3. Design & analyze synchronous sequential logic circuits
8. 4. Use HDL & appropriate EDA tools for digital logic design and simulation

BTECE 306 Humanities-I (Effective Technical Communication)

Course Objective:

1. To learn Design and Development of different kinds of technical documents.
2. To learn Technical Writing, Grammar and Editing.
3. To learn how to develop and assessment oneself
4. To learn about Communication and Technical Writing.

Unit – I: Information Design and Development

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

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

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

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

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.

Text/Reference Books:

1. David F. Beer and David McMurrey, 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)

Course Outcome: At the end of this course students will be able to

1. Design and Develop different kinds of technical documents.
2. Do Technical Writing, Grammar and Editing.
3. Self-assess themselves
4. Do Communication and Technical Writing.

BTECE 307 Electronic Devices Lab

Lab based on Electronic Devices

BTECE 308 Digital System Design Lab

Lab based on Digital System Design

SEMESTER IV

BTECE 401 Analog and Digital Communication

Unit – I: 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: 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: Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, DigitalMultiplexers.

Unit – IV: 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: 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.

TextBooks: Haykin S., "Communications Systems", John Wiley and Sons,2001.

1. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
2. 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.

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

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence ofnoise
3. Investigate pulsed modulation system and analyze their systemperformance
4. Analyze different digital modulation schemes and can compute the bit errorperformance

BTECE-402 Analog Circuits

Course Objective:

1. This course is designed to understand low frequency and high frequency signal analysis from analog circuits
2. Also to understand how we can generate frequency from an Oscillator.
3. From Op-Amp circuits we can differentiate our frequency signals output in terms of voltage or we can integrate our signal.
4. After that we can understand how we can change our signals from analog to digital or digital to analog by various converters

Unit – I: Low Frequency Signal Analysis:

Diode Circuits, Amplifiermodels: 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:

High frequency transistor models, frequency response of single stage andmultistage 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 phasemargin.

Unit – III: Oscillators: 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: 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: 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.

TextBooks:

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

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

1. Understand the characteristics of diodes andtransistors
2. Design and analyze various rectifier and amplifiercircuits
3. Design sinusoidal and non-sinusoidaloscillators
4. Understand the functioning of OP-AMP and design OP-AMP basedcircuits
5. Design ADC andDAC

BTECE 403 Microcontrollers

Course Objective:

1. Objective of this course to understand various processor IC's and their architecture.
2. After understanding the concept and functioning of 8051/ARM students will be able to understand hardware design with controller IC's

Unit – I:8085 Microprocessor

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

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:

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

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

Unit – V: Introduction to RISC Processor:

Introduction to RISC processors; ARM microcontrollers interface designs

TextBooks:

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 KaufmanPublishers.
2. Douglas Hall, Microprocessors Interfacing, Tata McGraw Hill,1991

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

1. Do assembly languageprogramming
2. Do interfacing design of peripherals like, I/O, A/D, D/A, timeretc.
3. Develop systems using differentmicrocontrollers
4. Understand RSIC processors and design ARM microcontroller basedsystems

BTECE 404 Electronics Instrumentation & Measurement

Unit-I

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

Operation and construction of Galvanometer (DC and AC) Ammeter and Voltmeter, Multirange Ammeter and Voltmeter, Digital Voltmeter, Digital Multimeter, Digital frequency meter.

Unit-III

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

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

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

TEXT BOOKS

- David A. Bell ‘’Electronic instrumentation and measurement”, PHI publication.
- H.S.Kalsi “Electronic instrumentation”, TMH publication.

REFERENCE BOOKS

- Reissland, M.U. “Electrical measurement: fundamentals, concept, application”, new age international (P) ltd. Publishers.
- W.D.Cooper, “Mmodern electronics instrumentation and measurement technique”, PHI publishers.
- A.K.Shawney,” Electrical and electronics measurement and instruments” Dhanpatrai &sons publication.

BTECE 405 Organizational Behaviour

Objectives

- OB deals with the field of study relating to 3 determinants of behaviour namelybehaviour of individuals, organizations, groups.
- At the individual level, the course will focus to understand the motive ofmanagement theory and the psychology of individual in an organization.
- At the group level, the course will focus on group dynamics and processes,norms, roles, team building, power and politics, leadership.
- At the organizational level, the focus will be on organizational culture andchange management.

UNIT 1: Contemporary Issues in Organizational Behaviour, Organizational Behavior Modification

UNIT II: Individual and Interpersonal Behavior, Values, Attitude, Job satisfaction

UNIT III: Learning Organization Structure & Design, Group and Group Behavior

UNIT IV: Power and Politics, Conflict and Negotiation

UNIT V: Organizational Climate & Culture, Organizational Change, Development and Effectiveness

Text/Reference Books

1. Organization Behaviour – 13th Edition by Stephen P. Robbins, Timothy A.Judge & Seema Sanghi, Pearson Publication, New Delhi.
2. Understanding Organizational Behaviour by Udai Pareek, Second Edition, Oxford University Press.
3. Organizational Behaviour, Margie Parikh and Rajan Gupta, Tata McGraw HillEducation Private Limited, New Delhi.
4. Organizational Behaviour, Steven L McShane, Mary Ann Von Glinow, Radha RSharma, Tata McGraw-Hill Education Private Limited, New Delhi.
5. Organizational Behaviour: Concepts and Applications, Dipak KumarBhattacharyya, Oxford University Press.
6. Organizational Behaviour: Concepts, Realities, Applications and Challenges, P GAquinas, Excel Books.
7. Organizational Behaviour: Text and Cases, Kavita Singh, Pearson Publication,New Delhi.
8. Organizational Behaviour: A Modern Approach by Arun Kumar and NMeenakshi, Vikas Publishing House Pvt. Ltd.
9. Organizational Theory, Design and Change, Gareth R. Jones and MaryMathew, sixth edition, Pearson, New Delhi.
10. Organizational Behaviour: Text, Cases and Games, K. Aswathappa, EighthRevised Edition 2008, Himalaya Publishing House, New Delhi.

BTECE 406 Antennas and Propagation

UNIT I: **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 potentialfunctions.

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

UNIT III: 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 cassegrainantennas.

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: 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: Basic Concepts of Smart Antennas- Concept and benefits of smart antennas, fixedweight beam forming basics, Adaptive beam forming.
Different modes of Radio Wave propagation used in current practice.

Text/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

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the properties and various types ofantennas.
2. Analyze the properties of different types of antennas and theirdesign.
3. Operate antenna design software tools and come up with the design of the antenna of requiredspecifications.

BTECE 407 Analog and Digital Communication Lab

Lab based on Analog and Digital Communication

BTECE 408 Analog Circuits Lab

Lab based on Analog Circuits

BTECE 409 Microcontrollers Lab

Lab based on Microcontrollers

SEMESTER V

BTECE 501: Electromagnetic Waves

Unit I: Transmission Lines

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

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

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

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

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.

Text/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. Narayana Rao, N: Engineering Electromagnetics, 3rd ed., Prentice Hall, 1997.
4. David Cheng, Electromagnetics, Prentice Hall.

Learning Outcomes:

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

1. Understand characteristics and wave propagation on high frequency transmission lines.
2. Carryout impedance transformation on TL.
3. Use sections of transmission line sections for realizing circuit elements.
4. Characterize uniform plane wave.
5. Calculate reflection and transmission of waves at media interface.
6. Analyse wave propagation on metallic waveguides in modal form.
7. Understand principle of radiation and radiation characteristics of an antenna.

BTECE 502: Computer Architecture

Unit I : Basic Structure of Computers

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

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

ALU design, Floating Point arithmetic, IEEE 754 floating point formats.

Unit III: Control Design and Micro Programmed Control

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

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

Unit V: System organization and Parallel processing

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

Text/Reference Books:

1. V.CarlHammacher,“ComputerOrganisation”,FifthEdition.
2. A.S.Tanenbum,“StructuredComputerOrganisation”,PHI,Thirdedition

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,"ComputerArchitectureandOrganization",PHI,Secondedition

Learning Outcomes:

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

1. Learn how computerswork.
2. Know basic principles of computer'sworking.
3. Analyse the performance ofcomputers.
4. Know how computers are designed andbuilt.
5. Understand issues affecting modern processors (caches, pipelinesetc.).

BTECE 503 Probability and Stochastic Processes

Unit I: Sets and set operations

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

Unit II: Random Variables

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

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

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

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

Text/Reference Books:

1. H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," Third Edition, PearsonEducation
2. A.Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGrawHill.
3. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International.
4. P. G. Hoel, S. C. Port and C. J. Stone, Introductionto 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, AcademicPress.

Learning Outcomes:

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

1. Understand representation of randomsignals.
2. Investigate characteristics of randomprocesses.
3. Make use of theorems related to randomsignals.
4. To understand propagation of random signals in LTIsystems.

BTECE 504: Digital Signal Processing

Unit I: Discrete Time Signal

Discrete time signals: Sequences; representation of signals on orthogonal basis; Sampling and reconstruction of signals; Discretesystemsattributes,

Unit II:Z Transform

Z-Transform, Analysis of LSI systems, frequency Analysis, Inverse Systems, Discrete Fourier Transform (DFT),Fast Fourier Transform Algorithm, Implementation of Discrete TimeSystems

Unit III:FIR Digital Filters

Design of FIR Digital filters: Window method, Park-McClellan's method.

Unit IV:IIR Filters

Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations; Low pass, Band pass, Band stop and High pass filters.

Unit V:Spectral Estimation

Effect of finite register length in FIR filter design. Parametric and non-parametric spectral estimation. Introduction to multi-rate signal processing. Application of DSP.

Text/Reference Books:

1. S.K.Mitra, Digital Signal Processing: A computer basedapproach.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.

Learning Outcomes:

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

1. Represent signals mathematically in continuous and discrete time and frequencydomain.
2. Get the response of an LSI system to differentsignals.
3. Design of different types of digital filters for variousapplications.

BTECE 505: Electromagnetic Waves Lab

1. Hands-on experiments related to the course contents.

BTECE 506: Digital Signal Processing Lab

Hands-on experiments related to the course contents

BTECE 509 Constitution of India

Course Objectives: Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.

2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.

3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT I: History of Making of the Indian Constitution:

History, Drafting Committee, (Composition & Working), Philosophy of the Indian Constitution: Preamble, Salient Features

UNIT II: Contours of Constitutional Rights & Duties:

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:

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:

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: 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:

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.

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.

2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

4. Discuss the passage of the Hindu Code Bill of 1956.

SEMESTER VI

BTECE 601- PROJECT-I

The object of Project Work I is to enable the student to take up investigative study in the broad field of Electronics and Communication Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiation for the student(s) in R&D work. The assignment to normally include:

1. Survey and study of published literature on the assigned topic;
2. Working out a preliminary Approach to the Problem relating to the assigned topic;
3. Conducting preliminary Analysis/ Modeling/ Simulation/ Experiment/ Design/ Feasibility;
4. Preparing a Written Report on the Study conducted for presentation to the Department;
5. Final Seminar, as oral Presentation before a departmental committee.

BTECE 602 Control Systems

Unit I: Introduction to Control System

Introduction to control problem- Industrial Control examples. Transfer function. System with dead-time. System response. Control hardware and their models: potentiometers, synchros, 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 graphanalysis.

Unit II: Time Response

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 stabilitycriterion. 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

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 ofprocess controllers. State variable formulation andsolution.

Unit IV: State Space Variables

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

Introduction to Optimal control & nonlinear control, Optimal Control problem, Regulator problem, Output regulator, trekking problem. Nonlinear system – Basic concept & analysis.

Text/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, NewDelhi

Learning Outcomes:

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

1. Characterize a system and find its study statebehaviour.
2. Investigate stability of a system using differenttests.
3. Design variouscontrollers.
4. Solve liner, non-liner and optimal controlproblem

BTECE 603: Computer Network

Unit I: Introduction to computer networks and the Internet

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, Layeringconcepts.

Unit II: Switching in Networks and Multiplexing

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

Transport layer: Connectionless transport - User Datagram Protocol, Connection-oriented transport – Transmission Control Protocol, Remote ProcedureCall.Congestion Control and Resource Allocation: Issues in ResourceAllocation, Queuing Disciplines,TCP congestion Control, Congestion Avoidance Mechanisms and Quality of Service.

Unit IV: Network Layer

Network layer: Virtual circuit and Datagram networks, Router, Internet Protocol, Routing algorithms, Broadcast and Multicast routing

Unit V:Link Layer

Link layer: ALOHA, Multiple access protocols, IEEE 802 standards, Local Area Networks, addressing, Ethernet, Hubs, Switches.

Text 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

Learning Outcomes:

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

1. Understand the concepts of networkingthoroughly.
2. Design a network for a particularapplication.
3. Analyse the performance of thenetwork.

BTECE604: Professional Practice, Law & Ethics

UNIT I: History of Legal Profession in India:

Ancient legal texts including Manusmriti, Arthashastra, Quran refers to the law, advocates, judges and courts. Law and lawyers existed and played an important role at all times, even in ancient period. The system underwent certain changes during medieval and the period of British rule. Our present legal system including the judicial is to a large extent based upon the British legal and judicial system. This module contains the study of legal profession in India in ancient, medieval and especially the changes which the profession underwent during British rule and other related aspects essential to understand the history of legal profession in India.

Legal Education in India: The system of legal education, as existed in India during various periods, the changes it underwent during British rule, the introduction of three and five year courses making the system more qualitative, the impact of globalization upon the legal system, particularly upon the legal education, etc will be the issues covered under this module. The role played by Bar Council, UGC and other bodies in regulating legal education in India, the suggestions made by Law Commission of India in its 184th Report will also be discussed.

UNIT II: Professional Ethics and Duties of Lawyers:

“Ethics is basis of a civilized and organized society. Ethics is a system, a philosophy of conduct of principles practiced by a person or group of persons. Every profession has its code

of conduct, pertaining to right and wrong in conduct based on the principles of morality." The need and necessity of ethics in the legal profession, relevant theories explaining its value and relevance in legal profession will be the core issue of discussion under this module. In addition, duties of lawyers towards his clients, court, public, his fellow attorneys, self, society, etc., will also be undertaken for discussion. Indian code of ethics will be discussed in comparison with that of American Code and other countries will be taken up for discussion. An advocate should practice law for the purpose of administering justice and making a living afterwards. The module will also include role played by a lawyer in the administration of justice. The discussion will also cover issues like an advocate's duty towards legal reform, duty to provide legal aid, etc.

UNIT III: Rights & Interests and Limitations of Such Rights:

The rights to practice, right to argue his case, right over his professional fees, etc will be the core contents of this module. Decisions of courts on, Advocate's right to strike" will be subject of deliberation. Conflicts of interests [lawyer –v- client's interests] and limitations of the rights of lawyers including restrictions on advertising, bar from carrying on other professions, etc will also be taken up for discussion.

UNIT IV: Regulation of Legal Profession:

"Nobody has a more sacred obligation to obey the law than those who make the law". A lawyer, being one involved with the process of law-making and interpretation is also bound by law. This module will cover issues relating to regulation of legal profession in India, focusing more on topics like - the nature, composition, constitution, power, responsibilities and other related topics relating to the Bar Councils, etc. The enrolment of advocates, disciplining of advocates, etc will also be covered.

UNIT V: Liability for Deficiency in Service andother Wrongs Committed by Lawyers:

This module includes the analysis of case laws and relevant laws like Consumer Protection Act, Contempt of Court proceedings, etc which imposes liability upon an advocate for the wrongs he commits in the course of his professional service.

Other Important Issues: The following topics of importance will be taken up for class discussion during the course: - Impact of Globalization on legal profession - Legal outsourcing in India. - Role of advocate in providing legal aid services. – Advocate's role in outside court / informal settlement of disputes. - Age bar and entry into practice

Suggested Readings:

1. Raju Ramachandran, Professional Ethics: Changing Profession and Changing Ethics (LexisNexis,Butterworths).

2. Dr. P. B. Mukharji, Professional Ethics of The Advocate(University of Burdwan)

3. P. RamanathaAiyer,Legal & Professional Ethics – Legal Ethics, Duties & Privileges of a Lawyer(Wadhwa Publications, Nagpur).

4. Justice V. R. Krishna Iyer,Law, Lawyers and Justice(b. R. Publishing Corpn, Delhi).

5. Stephen Gillers, Regulation of Lawyers: Problems of Law & Ethics(Little, Brown & Com Boston Toronto, London).

6. Ross Grauston (ed.), Legal Ethics & Professional Responsibility(Clarendon Press, Oxford).

7. Gary Bellow & Bea Moultan,The Lawyering Process: Ethics and Professional Responsibility, (The Foundation Press, Inc.).

8. D.V. SubbaRao, Sanjiva Row's The Advocates Act, 1961(LexisNexis, Butterworths).

9. Nicolson and Webb, Professional Legal Ethics(OUP).

10.S. C. Sarkar, Modern Advocacy and Professional Ethics…

BTECE 605 Electronics Measurement Lab

1. Designing DC bridge for Resistance Measurement (Quarter, Half and Fullbridge).
2. Designing AC bridge Circuit for capacitancemeasurement.
3. Designing signal Conditioning circuit for PressureMeasurement.
4. Designing signal Conditioning circuit for TemperatureMeasurement.
5. Designing signal Conditioning circuit for TorqueMeasurement.
6. Designing signal Conditioning circuit for StrainMeasurement.
7. Experimental study for the characteristics of ADC andDAC.
8. Error compensation study using Numerical analysis using MATLAB(regression).

Learning Outcomes:

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

1. Design and validate DC and ACbridges
2. Analyse the dynamic response and the calibration of fewinstruments
3. Learn about various measurement devices, their characteristics, their operation and their limitations
4. Understand statistical dataanalysis
5. Understand computerized dataacquisition.

BTECE 606: Computer Network Laboratory

Hands-on experiments related to the course contents.

SEMESTER VII

BTECE 701 Project-II

The object of Project Work I is to enable the student to take up investigative study in the broad field of Electronics and Communication Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiation for the student(s) in R&D work. The assignment to normally include:

6. Survey and study of published literature on the assigned topic;
7. Working out a preliminary Approach to the Problem relating to the assigned topic;
8. Conducting preliminary Analysis/ Modeling/ Simulation/ Experiment/ Design/ Feasibility;
9. Preparing a Written Report on the Study conducted for presentation to the Department;
10. Final Seminar, as oral Presentation before a departmental committee.

BTECE 702 Biology

UNIT I: Introduction: Introduction, Different Fields of Biology.

UNIT II: 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: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: Structure and function of eukaryotic and prokaryotic cells

UNIT V: 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.

BTECE 801-Dissertation

The object of Dissertation is to enable the student to extend further the investigative study taken up under Project-I/ II, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

1. In depth study of the topic assigned in the light of the Report prepared under Project-I/ II;
2. Review and finalization of the Approach to the Problem relating to the assigned topic;
3. Preparing an Action Plan for conducting the investigation, including team work;
4. Detailed Analysis/Modeling/Simulation/Design/Problem Solving/Experiment as needed;
5. Final development of product/process, testing, results, conclusions and future directions;
6. Preparing a paper for Conference presentation/Publication in Journals, if possible;
7. Preparing a Dissertation in the standard format for being evaluated by the Department.
8. Final Seminar Presentation before a Departmental Committee.

DEPARTMENTAL ELECTVIES

BTECE DEI11	**Microwave Theory and Techniques**	**3L:0T:0P**	**3 credits**

UNIT I: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 Microwavetransmission.

UNIT II: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: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: **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, PlanarAntennas.
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 antennaparameters.

UNIT V: **Microwave Systems**- Radar, Terrestrial and Satellite Communication, Radio Aidsto 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, MicrowaveImaging.

Text/Reference Books:

1. R.E. Collins, Microwave Circuits, McGrawHill
2. K.C. Gupta and I.J. Bahl, Microwave Circuits, Artechhouse

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand various microwave system components theirproperties.
2. Appreciate that during analysis/ synthesis of microwave systems, the different mathematical treatment is required compared to general circuitanalysis.
3. Design microwave systems for different practicalapplication.

BTECE DEI12	Fiber Optic Communication	3L:0T:0P	3 credits

UNIT I: Introduction to vector nature of light, propagation of light, propagation of light ina cylindrical dielectric rod, Ray model, wave model.

UNIT II: 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: 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: 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: Nonlinear effects in fiber optic links. Concept of self-phase modulation, group velocity dispersion and soliton based communication.

Text/Reference Books

1. J. Keiser, Fibre Optic communication, McGraw-Hill, 5th Ed. 2013 (IndianEdition).
2. T. Tamir, Integrated optics, (Topics in Applied Physics Vol.7), Springer-Verlag,1975.
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).

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the principles fiber-optic communication, the components and the bandwidth advantages.
2. Understand the properties of the optical fibers and opticalcomponents.
3. Understand operation of lasers, LEDs, anddetectors
4. Analyze system performance of optical communicationsystems

5. Design optical networks and understand non-linear effects in opticalfibers

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BTECE DEI13	Information Theory and Coding	3L:0T:0P	3 credits

UNIT I: Basics of information theory, entropy for discrete ensembles; Shannon's noiseless codingtheorem; Encoding of discretesources.

UNIT II: Markov sources; Shannon's noisy coding theorem and converse for discrete channels.
UNIT III Calculation of channel capacity and bounds for discrete channels; Application to continuouschannels.

UNIT IV: Techniques of coding and decoding; Huffman codes and uniquely detectable codes.
UNIT V: Cyclic codes, convolutional arithmetic codes.

Text/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.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the concept of information andentropy
2. Understand Shannon's theorem forcoding
3. Calculation of channelcapacity
4. Apply codingtechniques

BTECE DEI21	Speech and Audio Processing	3L:0T:0P	3 credits

UNIT I: Introduction- Speech production and modeling - Human Auditory System;General structure of speech coders; Classification of speech coding techniques – parametric, waveform and hybrid ; Requirements of speech codecs –quality, coding delays, robustness.
Speech Signal Processing- Pitch-period estimation, all-pole and all-zero filters,convolution; Power spectral density, periodogram, autoregressive model, autocorrelationestimation.

UNIT II: Linear Prediction of Speech- Basic concepts of linear prediction; LinearPrediction 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: Scalar Quantization of LPC- Spectral distortion measures, Quantization based onreflection coefficient and log area ratio, bit allocation; Line spectral frequency – LPC to LSF conversions, quantization based onLSF.

UNIT IV: Linear Prediction Coding- LPC model of speech production; Structures of LPCencoders 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: Speech Coding Standards-An overview of ITU-T G.726, G.728 and G.729standards

Text/Reference Books:

1. "Digital Speech" by A.M.Kondoz, Second Edition(WileyStudents *Edition),2004*

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2. "Speech Coding Algorithms: Foundation and Evolution of Standardized Coders", W.C. Chu, WileyInter science,2003.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Mathematically model the speechsignal
2. Analyze the quality and properties of speechsignal.
3. Modify and enhance the speech and audiosignals.

BTECE DEI22	Introduction to MEMS	3L:0T:0P	3 credits

UNIT I: Introduction and Historical Background, Scaling Effects. Micro/Nano Sensors, Actuators and Systems overview: Case studies.

UNIT II: Review of Basic MEMS fabrication modules: Oxidation, Deposition Techniques, Lithography (LIGA), and Etching, Micromachining:Surface Micromachining, sacrificial layer processes, Stiction; BulkMicromachining, Isotropic Etching and Anisotropic Etching, Wafer Bonding.

UNIT III: Mechanics of solids in MEMS/NEMS: Stresses, Strain, Hookes's law, Poisson effect.

UNIT IV: Linear Thermal Expansion, Bending; Energy methods.

UNIT V: Overview of Finite Element Method, Modeling of Coupled ElectromechanicalSystems.

Text/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.

Course Outcomes:

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

1. Appreciate the underlying working principles of MEMS and NEMSdevices.
2. Design and model MEMdevices.

BTECE DEI23	Adaptive Signal Processing	3L:0T:0P	3 credits

UNIT I: General concept of adaptive filtering and estimation, applications and motivation, Review of probability, random variables and stationary random processes, Correlation structures, properties of correlationmatrices.

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

UNIT III: Variants of the LMS algorithm: the sign LMS family, normalized LMSalgorithm, block LMS and FFT based realization, frequency domain adaptive filters, Sub-band adaptivefiltering.

Signal space concepts - introduction to finite dimensional vectorspace theory, subspace, basis, dimension, linear operators, rank and nullity, innerproduct space, orthogonality, Gram- Schmidt orthogonalization, concepts of orthogonal projection,orthogonal decomposition of vectorspaces.

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

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

Text/Reference Books:

1. S. Haykin, Adaptive filter theory, Prentice Hall,1986.
2. C.Widrow and S.D. Stearns, Adaptive signal processing, Prentice Hall,1984.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the non-linear control and the need and significance of changing the control parameters w.r.t. real-timesituation.
2. Mathematically represent the 'adaptabilityrequirement'.
3. Understand the mathematical treatment for the modeling and design of the signal processingsystems.

BTECE DEI31	**Antennas and Propagation**	**3L:0T:0P**	**3 credits**

UNIT I: **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 potentialfunctions.

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

UNIT III: 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 cassegrainantennas.

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

Different modes of Radio Wave propagation used in current practice.

Text/Reference Books:

8. J.D. Kraus, Antennas, McGraw Hill,1988.
9. C.A. Balanis, Antenna Theory - Analysis and Design, John Wiley,1982.
10. R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill,1985.
11. R.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw ill,1984.
12. I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House,1980.
13. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill,2005
14. R.E. Crompton, Adaptive Antennas, JohnWiley

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

4. Understand the properties and various types ofantennas.
5. Analyze the properties of different types of antennas and theirdesign.
6. Operate antenna design software tools and come up with the design of the antenna of requiredspecifications.

BTECE DEI32	Bio-Medical Electronics	3L:0T:0P	3 credits

UNIT I: Brief introduction to human physiology.
UNIT II: Biomedical transducers: displacement,velocity, force, acceleration, flow, temperature, potential, dissolved ions and gases.
UNIT III: Bio-electrodes and bio- potential amplifiers for ECG, EMG, EEG, etc.

UNIT V: Measurement of blood temperature, pressure and flow. Impedance plethysmography. Ultrasonic, X-ray and nuclear imaging.
UNIT V: Prostheses and aids: pacemakers, defibrillators, heart-lung machine, artificial kidney, aids for the handicapped. Safety aspects.

Text/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.

Course Outcomes:
At the end of the course, students will demonstrate the ability to:

1. Understand the application ofthe electronic systems in biological and medical applications.
2. Understand the practical limitations on the electronic components while handling bio- substances.
3. Understand and analyze the biological processes like other electronicprocesses.

BTECE DEI33	Mobile Communication and Networks	3L:0T:0P	3 credits

UNIT I: 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: 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 crossingrate.

UNIT III: Capacity of flat and frequency selective channels. Antennas- Antennas for mobile terminal- monopole antennas, PIFA, base station antennas and arrays.

UNIT IV: Multiple access schemes-FDMA, TDMA, CDMA and SDMA. Modulation schemes- BPSK, QPSK and variants, QAM, MSK and GMSK, multicarrier modulation,OFDM.

UNIT V: Receiver structure- Diversity receivers- selection and MRC receivers, RAKE receiver, equalization: linear-ZFE and adaptive, DFE. Transmit diversity-Altamontescheme 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.

Text/Reference Books:

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

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the working principles of the mobile communicationsystems.
2. Understand the relation between the user features and underlyingtechnology.
3. Analyze mobile communication systems for improvedperformance

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BTECE DEI41	Digital Image & Video Processing	3L:0T:0P	3 credits

UNIT I: Digital Image Fundamentals-Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.

UNIT II: Image Enhancements and Filtering-Gray level transformations, histogram equalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain.

Sharpening filters – first and second derivative, two-dimensional DFT and its inverse, frequency domain filters – low-pass and high-pass.

UNIT III: 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: 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: 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.

Text/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

Course Outcomes:
At the end of the course, students will demonstrate the ability to:

1. Mathematically represent the various types of images and analyzethem.
2. Process these images for the enhancement of certain properties or for optimized use oftheresources.
3. Develop algorithms for image compression andcoding

BTECE DEI42	Mixed Signal Design	3L:0T:0P	3 credits

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

UNIT II: Switched-capacitor filters- Non idealities in switched-capacitor filters; Switched-capacitor filter architectures; Switched-capacitor filter applications.

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

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

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

Text/Reference Books:

1. R. Jacob Baker, CMOS mixed-signal circuit design, Wiley India, IEEE press, reprint 2008.
2. Behzad Razavi , Design of analog CMOS integrated circuits, McGraw-Hill,2003.
3. R. Jacob Baker, CMOS circuit design, layout and simulation, Revised second edition, IEEE press,2008.
4. Rudy V. dePlassche, CMOS Integrated ADCs and DACs, Springer, Indian edition,2005.
5. Arthur B. Williams, Electronic Filter Design Handbook, McGraw-Hill,1981.
6. R. Schauman, Design of analog filters by, Prentice-Hall 1990 (or neweradditions).
7. M. Burns et al., An introduction to mixed-signal IC test and measurement by, Oxford university press, first Indian edition,2008.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the practical situations where mixed signal analysis isrequired.
2. Analyze and handle the inter-conversions betweensignals.
3. Design systems involving mixedsignals

BTECE DEI43	**Wireless Sensor Networks**	**3L:0T:0P**	**3 credits**

UNIT I: Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor networks

UNIT II: Mobile Ad-hocNetworks (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 Protocol, B-MAC protocol, IEEE 802.15.4 standard and ZigBee,

UNIT III: Dissemination protocol for large sensor network. Data dissemination, data gathering, and data fusion; 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 WSN Communication.

UNIT V: Single-node architecture, Hardware components & design constraints, Operating systems and execution environments, introduction to TinyOS and nesC.

Text/Reference Books:

1. Waltenegus Dargie , Christian Poellabauer, " Fundamentals Of Wireless Sensor Networks Theory And Practice" , By John Wiley & Sons Publications,2011
2. Sabrie Soloman, "Sensors Handbook" by McGraw Hill publication.2009
3. Feng Zhao, Leonidas Guibas, " Wireless Sensor Networks", ElsevierPublications,2004
4. Kazem Sohrby, Daniel Minoli, " Wireless Sensor Networks": Technology,

Protocols and Applications, Wiley-Interscience

5. Philip Levis, And David Gay "TinyOS Programming" by Cambridge University Press 2009

Course Outcomes:

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

1. Design wireless sensor networks for a givenapplication
2. Understand emerging research areas in the field of sensornetworks
3. Understand MAC protocols used for different communication standards used inWSN
4. Explore new protocols forWSN

BTECE DEI51	CMOS Design	3L:0T:0P	3 credits

UNIT I: Review of MOS transistor models, Non-ideal behavior of the MOS Transistor.

UNIT II: Transistor as a switch. Inverter characteristics, Integrated Circuit Layout: Design Rules, Parasitics.

UNIT III: Delay: RC Delay model, linear delay model, logical path efforts.

UNIT IV: Power, interconnect and Robustness in CMOS circuit layout. Combinational Circuit Design:

UNIT V: CMOS logic families including static, dynamic and dual rail logic. Sequential Circuit Design: Static circuits. Design of latches and Flip-flops.

Text/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.

Course Outcomes:

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

1. Design different CMOS circuits using various logic families along with their circuit layout.
2. Use tools for VLSI ICdesign.

BTECE DEI52	Power Electronics	3L:0T:0P	3 credits

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

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

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

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

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

Text /Reference Books:

1. Muhammad H. Rashid, " Power electronics" Prentice Hall 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.

Course Outcomes:

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

1. Build and test circuits using power devices such asSCR
2. Analyze and design controlled rectifier, DC to DC converters, DC to ACinverters,
3. Learn how to analyze these inverters and some basicapplications.
4. DesignSMPS.

BTECE DEI53	**Satellite Communication**	**3L:0T:0P**	**3 credits**

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

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

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

UNIT IV: Flux density and received signal power equations, Calculation of System noise temperature for satellite receiver, noise power calculation, Drafting of satellite link budget and C/N ratio calculations in clear air and rainy conditions.

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

Text /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, McGrawHill,2009

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

1. Visualize the architecture of satellite systems as a means of high speed, high range communicationsystem.
2. State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple accessschemes.
3. Solve numerical problems related to orbital motion and design of link budget for the given parameters andconditions.

BTECE DEI61	**High Speed Electronics**	**3L:0T:0P**	**3 credits**

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

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

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

UNIT IV:Mixers: Up conversionS, Down conversion, Conversion gain and spurious response. Oscillators Principles. PLL Transceiver architectures.

UNIT V: Printed Circuit Board Anatomy, CAD tools for PCB design, Standard fabrication, Microvia Boards. Board Assembly: Surface Mount Technology, Through Hole Technology, Process Control and Designchallenges.

Text/Reference Books:

1. Stephen H. Hall, Garrett W. Hall, James A. McCall " High-Speed Digital System Design: A Handbook of Interconnect Theory and Design Practices", August 2000, Wiley-IEEE Press
2. Thomas H. Lee, "The Design of CMOS Radio-Frequency Integrated Circuits", Cambridge University Press, 2004, ISBN0521835399.
3. Behzad Razavi, "RF Microelectronics", Prentice-Hall 1998, ISBN0-13-887571-5.
4. Guillermo Gonzalez, "Microwave Transistor Amplifiers", 2nd Edition, PrenticeHall.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand significance and the areas of application of high-speed electronicscircuits.
2. Understand the properties of various components used in high speedelectronics
3. Design High-speed electronic system using appropriatecomponents.

BTECE DEI62	**Wavelets**	**3L:0T:0P**	**3 credits**

UNIT I: Introduction to time frequency analysis; the how, what and why about wavelets.
UNIT II: Short-time Fourier transform, Wigner-Ville transform, Continuous time wavelet transform, Discrete wavelet transform.
UNIT III: Tiling of the time-frequency plane and wave packet analysis, Construction of wavelets. Multiresolution analysis.
UNIT IV: Introduction to frames andbiorthogonal wavelets, Multirate signal processing and filter bank theory, Application of wavelet theory to signal Denoising.
UNIT V: Image and video compression, multi-tone digital communication, transientdetection.

Text/Reference Books:

1. Y.T. Chan, Wavelet Basics, Kluwer Publishers, Boston,1993.
2. I. Daubechies, Ten Lectures on Wavelets, Society for Industrial and Applied Mathematics, Philadelphia, PA,1992.
3. C. K. Chui, An Introduction to Wavelets, Academic Press Inc., New York,1992.
4. Gerald Kaiser, A Friendly Guide to Wavelets, Birkhauser, New York,1995.
5. P. P. Vaidyanathan, Multirate Systems and Filter Banks,Prentice Hall, New Jersey, 1993.
6. A.N. Akansu and R.A. Haddad, Multiresolution signal Decomposition: Transforms, Subbands and Wavelets, Academic Press, Oranld, Florida,1992.
7. B.Boashash, Time-Frequency signal analysis, In S.Haykin, (editor), Advanced Spectral Analysis, pages 418--517. Prentice Hall, New Jersey,1991.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand time-frequency nature of thesignals.
2. Apply the concept of wavelets to practicalproblems.
3. Mathematically analyze the systems or process the signals using appropriate wavelet functions.

BTECE DEI63	**Embedded Systems**	**3L:0T:0P**	**3 credits**

UNIT I: The concept of embedded systems design, embedded microcontroller cores, embedded memories, Examples of embedded systems.

UNIT II: Technological aspects of embedded systems: Interfacing between analog and digital blocks, signal conditioning, digital signal processing.

UNIT III: Sub-system interfacing, interfacing with external systems, user interfacing.

UNIT V: Design tradeoffs due to process compatibility, thermal considerations, etc.,

UNIT V: Software aspects of embedded systems: real time programming languages and operating systems for embedded systems.

Text/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.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Suggest design approach using advanced controllers to real-lifesituations.
2. Design interfacing of the systems with other data handling / processingsystems.
3. Appreciate engineering constraints like energy dissipation, data exchange speedsetc.

BTECE DEI71	**Nano electronics**	**3L:0T:0P**	**3 credits**

UNIT I: Introduction to nanotechnology, meso structures, Basics of Quantum Mechanics: Schrodinger equation, Density of States.

UNIT II: Particle in a box Concepts, Degeneracy. Band Theory of Solids. Kronig-Penny Model. Brillouin Zones.

UNIT III: Shrink-down approaches: Introduction, CMOS Scaling, The nanoscale MOSFET, Finfets, Vertical MOSFETs, limits to scaling, system integration limits (interconnectissues etc.),

UNIT IV: Resonant Tunneling Diode, Coulomb dots, Quantum blockade, Single electron transistors, Carbon nanotube electronics,

UNIT V: Band structure and transport, devices, applications, 2D semiconductors and electronic devices, Graphene, atomisticsimulation

Text/ Reference Books:

1. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson,2009.
2. W. Ranier, Nanoelectronics and Information Technology (Advanced Electronic Materialand Novel Devices), Wiley-VCH,2003.
3. K.E. Drexler, Nanosystems, Wiley,1992.
4. J.H. Davies, The Physics of Low-Dimensional Semiconductors, Cambridge University Press,1998.
5. C.P. Poole, F. J. Owens, Introduction to Nanotechnology, Wiley,2003

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand various aspects of nano-technology and the processes involved in making nano components andmaterial.
2. Leverage advantages of the nano-materials and appropriate use in solving practical problems.
3. Understand various aspects of nano-technology and the processes involved in making nano components andmaterial.
4. Leverage advantages of the nano-materials and appropriate use in solving practical problems.

BTECE DEI72	**Error Correcting Codes**	**3L:0T:0P**	**3 credits**

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

UNIT II: Weight enumerators and theMcWilliams identities; Perfect codes, Introduction to finite fields and finite rings; factorization of (X^n-1) over a finite field; Cyclic Codes.

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

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

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

Text/Reference Books:

1. F.J. McWilliams and N.J.A. Slone, The theory of error correcting codes,1977.
2. R.E. Balahut, Theory and practice of error control codes, Addison Wesley,1983.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the errorsources
2. Understand error control coding applied in digitalcommunication

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BTECE DEI73	Scientific computing	3L:0T:0P	3 credits

UNIT I: Introduction: Sources of Approximations, Data Error and Computational, Truncation Error and Rounding Error, Absolute Error and Relative Error, Sensitivity and Conditioning, Backward Error Analysis, Stability andAccuracy

Computer Arithmetic: Floating Point Numbers, Normalization, Properties of Floating Point System, Rounding, Machine Precision, Subnormal and Gradual Underflow, Exceptional Values, Floating-Point Arithmetic, Cancellation

UNIT II: System of liner equations: Linear Systems, Solving Linear Systems, Gaussian elimination,Pivoting, Gauss-Jordan, Norms and Condition Numbers, Symmetric Positive Definite Systems and Indefinite System, Iterative Methods for LinearSystems

Linear least squares: Data Fitting, Linear Least Squares, Normal Equations Method, Orthogonalization Methods, QR factorization, Gram-Schmidt Orthogonalization, Rank Deficiency, and ColumnPivoting

UNIT III: Eigenvalues and singular values:Eigenvalues and Eigenvectors, Methods for Computing All Eigenvalues, Jacobi Method, Methods for Computing Selected Eigenvalues, Singular Values Decomposition, Application of SVD

Nonlinear equations: Fixed Point Iteration, Newton's Method, Inverse Interpolation Method Optimization: One-Dimensional Optimization, Multidimensional Unconstrained Optimization, Nonlinear Least Squares

UNIT IV: Interpolation: Purpose for Interpolation, Choice of Interpolating, Function, Polynomial Interpolation, Piecewise Polynomial Interpolation

Numerical Integration And Differentiation: Quadrature Rule, Newton-Cotes Rule, Gaussian Quadrature Rule, Finite Difference Approximation,

Initial Value Problems for ODES, Euler's Method, Taylor Series Method, Runga-Kutta Method, Extrapolation Methods, Boundary Value Problems For ODES, Finite Difference Methods, Finite Element Method, EigenvalueProblems

UNIT V: Partial Differential Equations,Time Dependent Problems, Time Independent Problems, Solution for Sparse Linear Systems, IterativeMethods

Fast Fourier Transform, FFT Algorithm, Limitations, DFT, Fast polynomial Multiplication, Wavelets,Random Numbers And Simulation, Stochastic Simulation, Random Number Generators, Quasi-RandomSequences

Text/ Reference Books:

1. Heath Michael T., " Scientific Computing: An Introductory Survey" , McGraw-Hill, 2nd Ed.,2002
2. Press William H., Saul A. Teukolsky, Vetterling William T and Brian P. Flannery, "Numerical Recipes: The Art of Scientific Computing", Cambridge University Press, 3rd Ed.,2007
3. Xin-she Yang (Ed.)., " Introduction To Computational Mathematics" , World Scientific Publishing Co., 2nd Ed.,2008
4. Kiryanov D. and Kiryanova E., " Computational Science", Infinity Science Press, 1st Ed.,2006
5. Quarteroni, Alfio, Saleri, Fausto, Gervasio and Paola, " Scientific Computing With MATLAB And Octave", Springer, 3rd Ed.,2010

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the significance of computing methods, their strengths and applicationareas.
2. Perform the computations on various data using appropriate computationtools.

OPEN ELECTIVES

BTECE OE11: SOFT SKILLS AND INTERPERSONAL COMMUNICATION

COURSE OBJECTIVES

UNIT I - Self Analysis:

SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem.

UNIT II - Creativity:
Out of box thinking, Lateral Thinking, OBJECTIVE THINKING, perception.

UNIT III - Attitude:
Factors influencing Attitude, Challenges and lessons from Attitude, Etiquette.

UNIT IV – Motivation:
Factors of motivation, Self-talk, Intrinsic & Extrinsic Motivators.

UNIT V: Goal Setting : 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:
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

BTECE OE12: Human Resource Development and Organizational Behaviour

COURSE OBJECTIVES

The objectives of the course are to familiarize the participants with the behavioural patterns of human beings at individual and group levels in the context of an Organization.

Unit I Organizational Behavior:
Definition, Need for studying Organizational Behavior, Disciplines involved in the study of Organizational Behavior, -Contributing disciplines and area like psychology, social psychology, economics, anthropology etc. Application of Organizational Behavior in Business.

Unit II Individual behaviour:
Personality, perception, learning, attitudes inter-personal behaviour – Group and inter-group behaviour.

Unit III Group Dynamics:
Formal and Informal Group, Group Norms, Group Cohesiveness, Group Behaviour and Group Decision – making.

Unit IV Introduction: Conceptual foundations; Human aspect of management, Human Relations; Human Resource Management- Concept, Scope and Importance; Competencies of HR Manager: Employer branding and Competency mapping; Changing role of HRM- Workforce diversity, Technological change, Restructuring and rightsizing, Empowerment; TQM, Managing ethical issues.

Unit V- Human Resource Planning, Job Analysis, and Job Design:
Assessing Human Resource requirements; Human resource forecasting; Work load analysis; Job analysis; Job description and specifications; Job design; Job characteristic approach to job design. Recruitment, Selection, Training, and Development: Factors affecting recruitment; Sources of recruitment (internal and external); Basic selection model; Psychological tests for selection; Interviewing; Placement and Induction; Job Changes- Transfers, Promotions, and Separations; An overview of Training and Development; Emerging trends in Recruitment, Selection, and development.

Text books:
1. Organizational Behaviour, India Edition, Nelson & Quick, Cengage learning.
2. Organisational Behaviour, S. Fayyaz Ahamed and others, Atlantic publisher.
3. Organisation Behaviour, A modern approach – Arun Kumar & N. Meenakshi Vikas publishing House PVT Ltd.,
4. Behaviour in organizations, Indian Edition, Jerald Green Berg and Robert A. Baron – PHI Learning PVT Ltd.,
5. Organisational Behaviour, UMA Sekaran, Tata Mcgraw Hill.
6. D'Cenzo, David A., Stephen P. Robbins, and Susan L. Verhulst, Human Resource Management, John Wiley and Sons, NewDelhi.
7. Gomez-Mejia, Luis R., D. B. Balkin, and R. L. Cardy, Managing Human Resources, Prentice Hall, NewJersey.
8. Ian, Beardwell, and Len Holden, Human Resource Management, Prentice Hall.
9. Dessler, Garry, Human Resource Management, Prentice Hall of India

BTECE OE13: Cyber Law and Ethics

COURSE OBJECTIVES

1. Students identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.
2. Students lo

cate and apply case law and common law to current legal dilemmas in the technology field.

3. Students apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
4. Students distinguish enforceable contracts from non-enforceable contracts.
5. Students demonstrate leadership and teamwork.

UNIT I: Applied Ethics
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
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

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

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

Review of cybercrime statistics and trends, Cybercrime categories, Computer fraud, Gray Hat Hacking, Crimes and penalties under the Computer Fraud and Abuse Act (CFAA)

Textbook/Reference Book:

1. Yatindra Singh : Cyber Laws.
2. Ajit Narayanan and Bennum (ed.) : Law, Computer Science and Artificial Intelligence.
3. Linda Brennan and Victoria Johnson : Social, ethical and policy implication of Information Technology.
4. Kamath Nandan : Law relating to Computer, Internet and E-Commerce.
5. Arvind Singhal and Everett Rogers : India's Communication Revolution : From Bullock Carts to Cyber Marts.
6. Lawrence Lessing : Code and other Laws of cyberspace.
7. Mike Godwin : Cyber Rights Defencing free speech in the Digital Age.
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.

BTECE OE21: History of Science

Unit-I: Science and Technology-The beginning

Development in different branches of Science in Ancient India: Astronomy, Mathematics, Engineering and Medicine. 2. Developments in metallurgy: Use of Copper, Bronze and Iron in Ancient India. 3. Development of Geography: Geography in Ancient Indian Literature.

Unit-II: Developments in Science and Technology in Medieval India

Scientific and Technological Developments in Medieval India; Influence of the Islamic world and Europe; The role of *maktabs, madrasas* and *karkhanas* set up. 2. Developments in the fields of Mathematics, Chemistry, Astronomy and Medicine. 3. Innovations in the field of agriculture - new crops introduced new techniques of irrigation etc.

Unit-III: Developments in Science and Technology in Colonial India

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

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:

HISTORY OF SCIENCE AND TECHNOLOGY IN INDIA Dr. Binod Bihari Satpathy

BTECE OE22: Principles of Management

COURSE OBJECTIVES

To understand the principles of management and their application to the functioning of an organization

UNIT I: Management

Definition of management, science or art, manager vs entrepreneur; Types of managers -managerial roles and skills; Evolution of management-scientific, human relations, system and contingency approaches;

UNIT II: Types of Business Organizations

Sole proprietorship, partnership, company, public and private enterprises; Organization culture and environment; Current trends and issues in management.

UNIT III: Planning and Organization

Nature and purpose of Planning, types of Planning, objectives, setting objectives, policies, Strategic Management, Planning Tools and Techniques, Decision making steps & processes. Nature and purpose of Organizing, formal and informal organization, organization structure, types, line and staff authority, departmentalization, delegation of authority, centralization and Decentralization, job design, human resource management, HR Planning, Recruitment selection, training & development, performance management, career planning and management.

UNIT IV: Behaviour

Directing individual and group behaviour, motivation, motivation theories, motivational techniques, job satisfaction, job enrichment, leadership, types & theories of leadership, effective communication.

UNIT V: Control Techniques:

Controlling, system and process of controlling, budgetary and non-budget control technique, use of computer and IT in management control, productivity problems and management, control and performance, direct and preventive control, reporting.

Course Outcomes:

Upon completion of this course, the students will get a clear understanding of management functions in an organization

Text Books:

1. Robins S.P. and Couiter M., Management, Prentice Hall India, 10th ed., 2009.
2. Stoner JAF, Freeman RE and Gilbert DR, Management, 6th ed., Pearson Education, 2004.
3. Tripathy PC & Reddy PN, Principles of Management, Tata McGraw Hill, 1999.

BTECE OE 23: Operational Research

COURSE OBJECTIVES

Study the role of operational research in decision making. Learn, identify and develop operational research models from the verbal description of the real system. Understand the mathematical tools that are needed to solve optimisation problems. To study various types of deterministic and stochastic models for operations research viz. linear programming, waiting time model, project line model, transportation model, simulation.

UNIT I Introduction:

Definition, role of operations research in decision-making, applications in industry. Concept on O.R. model building –Types & methods.

UNIT II Programming (LP):

Programming definition, formulation, solution- graphical, simplex, BIG-M methods, Duality, PRIMAL-DUAL relations-its solution, shadow price, economic interpretation, dual-simplex, post-optimality & sensitivity analysis, problems.

***UNIT III Deterministic Model*:**

Transportation model-balanced & unbalanced, north west rule, Vogel's Method, least cost or matrix minimal, Stepping stone method, MODI methods, degeneracy, assignment, traveling salesman, problems.

UNIT IV Waiting and Project Line Models:

Introduction, queue parameters, M/M/1 queue, performance of queuing systems, applications in industries, problems.

Network diagram, event, activity, defects in network, PERT & CPM, float in network, variance and probability of completion time, project cost- direct, indirect, total, Introduction to crashing of network & resources leveling in project, problems.

UNIT V Simulation and Decision Theory:Introduction, design of simulation, models & experiments, model validation, process generation, time flow mechanism, Monte Carlo methods- its applications in industries, Decision process, SIMON model, types of decision making environment - certainty, risk, uncertainty, decision making with utilities, problems.

Note: Concerned software's may be used to solve OR problems.

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

1. Discuss the role of operations research in decision-making, and its applications in industry and should be able to formulate and design real-world problems through models & experiments.
2. Knowledge of various types of deterministic models like linear programming, transportation model etc.
3. Explore various types of stochastic models like waiting line model, project line model, simulation etc.
4. Deduce the relationship between a linear program and its dual and perform sensitivity analysis.
5. Describe different decision making environments and apply decision making process in the real world situations.

Text Books:

1. Operation Research – TAHA, PHI, New Delhi.
2. Quantitative Techniques- Vohra, TMH, New Delhi

Reference Books:

1. Operation Research- Gupta & Sharma, National Publishers, New Delhi.
2. Introduction to Operations Research – Churchman, Ackoff, Arnoff. Pub. John Wiley
3. Principles of operation Research (with Applications to Managerial Decisions) by H.M.Wagher, Prentice Hall of India, New Delhi.
4. Operation Research – Sharma, Gupta, Wiley Eastern, New Delhi.
5. Operation Research – Philips, Revindran, Solgeberg, Wiley ISE.

BTECEOE31: Infrastructure Systems Planning

COURSE OBJECTIVES

1. To provide an overview of Infrastructure scenario in India and their sector specific features
2. To provide required knowledge and skills planning and appraising sustainable civil Infrastructure systems and their interactions
3. To make student aware of the procurement management process involved in the infrastructure projects

UNIT 1 Introduction:

Infrastructure scenario in India: Sector wise details, infrastructure players, key issues and government initiatives in transport, power, telecom, urban and rural infrastructure sectors

UNIT II Infrastructure Project Planning:

Players in Infrastructure, Long term planning issues of infrastructure projects, Infrastructure planning process, Multi-criteria analysis for comparison of infrastructure alternatives; Infrastructure delivery methods including PPP

UNIT III: Infrastructure economics and financial models

Life cycle costing, Project structuring, Project Risks, Risk allocation and management, Integration of infrastructure systems.

UNIT IV: Infrastructure Project Appraisal:

Demand Analysis & Forecasting, Technical Analysis, Economic and Financial Analysis, Environmental Clearance Procedure in India, Environment Impact Assessment: Purpose & Process, EIA Hierarchy, Impact Indicators

UNIT V Infrastructure Project Management:

Project governance, Project management planning and control systems, Stake holder management, Legal and contractual issues, Procurement of infrastructure provider: process, pricing and negotiation, MIS for infrastructure projects

Learning Outcomes:

1. Student will have a broad understanding about the key infrastructure sectors and their related planning and management issues
2. Student will be capable of appraising an infrastructure project based on demand, technical and economic point of view
3. The student will be aware of the management process involved in the procurement of infrastructure projects

Reference Books:

1. James Parkin, D. Sharma, Infrastructure Planning, Thomas Telford, 1999
2. W. Ronald Hudson, Waheed Uddin, Ralph C. Haas, Infrastructure Management: Integrating Design, Construction, Maintenance, Rehabilitation and Renovation, McGraw-Hill Professional, 1997.
3. S. Goodman and M. Hastak, Infrastructure planning handbook: Planning, engineering, and economics, McGraw-Hill, New York, 2006.
4. J. D. Finnerty, Project financing - Asset-based financial engineering, John Wiley & Sons, New York, 1996.
5. Rajarshi Majumder, Infrastructure and Development in India, Interlinkages and Policy Issues, Rawat Publications, 2008.
6. P. Chandra, Projects: Planning, analysis, selection, financing, implementation, and review, Tata McGraw-Hill, New Delhi, 2009
7. Infrastructure Planning Handbook (Alvis S. Goodman and Makarand Hastak, 2006)
8. Infrastructure Management (Hudson, Haas and Uddin, 1997)

BTECE OE32: Rural Technology and Community Development

Unit I: An Overview of Development

Traditional and Modern Concept of Development: Indicators of development; Theoretical approach to development (Marx, Rostov, Myrdal, International Dependence Theory).

UNIT 2: Major Issues in Development

Growth Vs. Distribution; Agricultural development Vs. Industrial development; Capital intensive Vs. Labour intensive technique; Urban Vs. Rural development; Centralisation Vs. Decentralisation.

UNIT 3: Rural Development and the nature of cultural transition in tribal society, Inequality and social development in Rural India State Analysis of Trends and Pattern in the period of Globalisation

UNIT 4 Importance, scope and objectives of rural Development

Various approaches to Rural Development – Gandhian approach for Community development, I.A.D.P., I.R.D.P., N.R.E.G.A., Neo Gandhian, (PURA), Need Based and demand based centers. Rural Development experiences of some Asian Countries – China, Malaysia, Sri Lanka, Bangladesh.

UNIT 5: Agriculture diversification

Population; pressure, small holdings, infrastructure, rural development. Role of Women in Rural Development, Marginalisation of Women in Land Reform Agenda, Situation of Dalitand Adivasi.

Reference Books:

1. Desai, Vasant. Fundamentals of Rural Development. New Delhi: Rawat Publications, 1991
2. Meier, Gerald (ed.). Leading Issues in Economic Development New Delhi: Oxford Uni. Press, 1987.
3. Prasad, B.K. Rural Development: Concept, Approach and Strategy New Delhi: Sarup & Sons, 2003.
4. Rau, S.K. Global Search for Rural Development Hyderabad: NIRD, 2001.
5. Satya Sundaram, I., Rural Development Mumbai: Himalaya, 2002.

BTECE OE33: Supply Chain Management-Planning

COURSE OBJECTIVES

1. To introduce the major building blocks, major functions, major business processes, performance metrics, and major decisions (strategic, tactical, and operational) in supply chain networks

2. To provide an insight into the role of Internet Technologies and Electronic Commerce in supply chain operations and to discuss technical aspects of key ITEC components in supply chain management.

3. To bring out the role of stochastic models (Markov chains, queueing networks); optimization models (LP, ILP, MILP, GA, Constraint Programming); and simulation in supply chain planning and decision-making. This will provide the foundation for design and analysis of supply chains.

UNIT I: Building Blocks, Performance Measures, Decisions

Building Blocks of a Supply Chain Network, Performance Measures Decisions in the Supply Chain World, Models for Supply Chain Decision-Making.

UNIT II Supply Chain Inventory Management

Economic Order Quantity Models, Reorder Point Models, Multiechelon Inventory Systems

UNIT III Mathematical Foundations of Supply Chain Solutions

Use of Stochastic Models and Combinatorial Optimization in: *Supply Chain Planning*, *Supply Chain Facilities Layout*, *Capacity Planning*, *Inventory Optimization*, *Dynamic Routing and Scheduling,* Understanding the "*internals"* of industry best practice solutions

UNIT IV Case Studies

Digital Equipment Case Study, IBM Case Study

UNIT V: Internet Technologies and Electronic Commerce in SCM

Relation to ERP, E-procurement, E-Logistics,Internet Auctions, E-markets, Electronic business process optimization, Business objects in SCM

Reference Books:

1. Analysis of Manufacturing Enterprises. Kluwer Academic Publishers.
2. Y. Narahari and S. Biswas. *Supply Chain Management: Models and Decision Making*
3. Ram Ganeshan and Terry P. Harrison. *An Introduction to Supply Chain Management*
4. D. Connors, D. An, S. Buckley, G. Feigin, R. Jayaraman, A. Levas, N. Nayak, R. Petrakian, R. Srinivasan. *Dynamic modelling for business process reengineering*. IBM Research Report 19944, 1995
5. W.J. Hopp and M.L. Spearman. Factory Physics: Foundations of Manufacturing Management

BTECE OE41 Enterprise Resource and Planning

- **COURSE OBJECTIVES**
- Comprehend the technical aspects of ERP systems
  Learn concepts of reengineering and how they relate to ERP system implementations
- Be able to map business processes using process mapping techniques
- Understand the steps and activities in the ERP life cycle
- Be able to identify and describe typical functionality in an ERP system
- You will gain competency in the main functional areas of SAP R/3: Sales & Distribution, Materials Management, Financial, Controlling, and HR.

- You will understand current trends and issues related to Enterprise Systems.
- You will learn about the change management issues in ERP implementations.

UNIT 1 Introduction

Introduction to ERP, Basic ERP Concepts, Justifying ERP Investments, Risks of ERP, Benefits of ERP

UNIT 2 ERP and Related Technologies

Business Intelligence, E-Business and E-Commerce, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP) , Product Life Cycle Management (PLM), Supply Chain Management (SCM), Customer Relationship Management (CRM), Advanced Technology and ERP Security

UNIT 3 ERP Implementation Challenges

ERP Transition Strategies, ERP Implementation Life Cycle, Pre-implementation Tasks—Getting Ready, Requirements Definition, Implementation Methodologies, Not all package are created equal—Package Selection, Project Management & Monitoring, Post Implementation Activities, Implementation–Success and Failure Factors

UNIT 4 Operation and Maintenance of the ERP System

Measuring the Performance of the ERP System, Maximizing the ERP System

UNIT 5 Enterprise Integration Applications (EIA)

ERP and E-business: relationship and coexistence. ERP, Internet, and WWW—ERP II, ERP and Total Quality Management, Future Directions and Trends in ERP

Text Book

***1. Enterprise Resource Planning*, second edition,** Alexis Leon, Tata McGraw-Hill, 2008. ISBN 9780070656802

2. Concepts in Enterprise Resource Planning, Third Edition, Bret Wagner & Ellen Monk ©2009 | Course Technology, ISBN 10: 1-4239-0179-7 | ISBN 13: 978-1-4239-0179-2

Reference books

1. *Concepts in Enterprise Resource Planning*, Joseph A. Brady, Ellen F. Monk, Bret J. Wagner, Course Technology, 2001, ISBN 0-619-01593-4

2. *Enterprise Resource Planning Systems*, Daniel E. O'Leary, Cambridge University Press, 2000, ISBN 0-521-79152-9
3. *Using SAP R/3 FI*, Ben Rockfeller, John Wiley, 1998, ISBN 0-471-17996-5

BTECE OE42: Customer Relationship Management

COURSE OBJECTIVES

1. To understand the concepts and principles of CRM
2. To appreciate the role and changing face of CRM as an IT enabled function, and
3. To enable managing Customer Relationship.

Unit – I 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 CRM in Marketing

One-to-one Relationship Marketing - Cross Selling & Up Selling - Customer Retention, Behaviour Prediction - Customer Profitability & Value Modeling, - Channel Optimization - Event-based marketing. - CRM and Customer Service - The Call Centre, Call Scripting - Customer Satisfaction Measurement.

Unit – III 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 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 CRM Implementation

Defining success factors - Preparing a business plan requirements, justification and processes. - Choosing CRM tools - Defining functionalities - Homegrown versus out-sourced approaches - Managing customer relationships - conflict,
complacency, Resetting the CRM strategy. Selling CRM internally - CRM development
Team - Scoping and prioritizing - Development and delivery - Measurement.

References

1. Alok Kumar Rai, CUSTOMER RELATIONSHIP MANAGEMENT CONCEPT & CASES, Prentice Hall of India Private Limted, New Delhi. 2011
2. S. Shanmugasundaram, CUSTOMER RELA TIONSHIP MANAGEMENT, Prentice Hall of India Private Limted, New Delhi, 2008
3. Kaushik Mukherjee, CUSTOMER RELATIONSHIP MANAGEMENT, Prentice Hall of India Private Limted, New Delhi, 2008
4. Jagdish Seth, et al, CUSTOMER RELA TIONSHIP MANAGEMENT
5. V. Kumar & Werner J., CUSTOMER RELA TIONSHIP MANAGEMENT, Willey India, 2008

BTECEOE 43: Planning for Sustainable Development

COURSE OBJECTIVES

1. The course seeks to build an inter-disciplinary perspective on understanding sustainable development concerns and challenges.
2. It also aims to provide students with a general introduction to the basic core competencies and practical skills
3. This course familiarizes students with current debates and perspectives in analyzing constraints and opportunities for sustainable development

UNIT I: Changing Perspectives

Definitions & Principles of Sustainable Development, Millennium Development Goals: Status (global and Indian), Inclusive Growth and Poverty Reduction, Impact on approach to development policy and practice in India, future directions

UNIT II: Challenges to Sustainable Development

Agriculture, Population & Food Security, Public Health and Nutrition, Education, Natural Resources (Forests, Energy, Water), Climate Change

UNIT III: Responses to sustainable Development Challenges

Public Policy (Community Participation and Participatory Learning)
Gender and Human Rights
Technology and Engineering
Economics and Policy Coherence

Learning outcomes

1. The students will have a "generalist" development practitioner‟s perspective towards environmental management.
2. The students will have fairly good understanding of the current debates around concepts of sustainable development and practices.

Text/Reference Books

1. Hazell P. and Diao X. (2005) *The Role of Agriculture and Small Farms in Economic Development*, Washington, D.C.: International Food Policy Research Institute.
2. Sachs J. (2006) *The End of Poverty: Economic Possibilities for Our Time*, Penguin (Chapters 1-4, 8, 14-18).
3. Cornwall A. and Brock K. (2005) What Do Buzzwords Do for Development Policy? A Critical Look at „Participation‟, „Empowerment‟ and „Poverty Reduction‟, *Third World Quarterly* 26(7), 1043–1060.
4. Human Development Reports
5. IPCC (2007) Summary for Policymakers of the Synthesis Report of the IPCC Fourth Assessment Report.
6. Johnson J.D. and Louka K. (2006) *Migration, Aid and Trade: Policy Coherence for Development*, OECD Development Centre Policy Brief No 28.
7. Laurence W.F. et al. (2001) The Future of the Brazilian Amazon, *Science*, Vol. 291 (5503), 438-439.
8. Luboobi L. and Mugisha J.T. (2005) *HIV/AIDS Pandemic in Africa: Trends and Challenges*, FondazioneEni Enrico Mattei.
9. Sachs D.J. and Wing T.W. (1994) *Structural Factors in the Economic Reforms of China, Eastern Europe and the Former Soviet Union,* Economic Policy, 9 (18), pp. 101-145.
10. Sachs J. and Malaney P. (2002) The Economic and Social Burden of Malaria, *Nature*, 415 (7).
11. Sarah D. (2004) *Key Policy Coherence Issues in Agriculture and Migration*, OECD.
12. UN Millennium Project (2005) *Innovation: Applying Knowledge in Development*, Science, Technology and Innovation Task Force Report.
13. UN Millennium Project (2005) *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals, Overview.*
14. World Bank (2006) *Enhancing Agricultural Innovation: How to Go beyond the Strengthening of Research Systems,* World Bank: Agriculture and Rural Development
15. World Commission on Environment and Development (1987) *Our Common Future*, Oxford, OUP.

BTECE OE51: Probability and Stochastic Processes

UNIT I: Sets and set operations

Probability space; Conditional probability and Bayes theorem; Combinatorial probability and sampling models.

UNIT II: Discrete random variables

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

UNIT III: Distributions

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 Sequences

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

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

Text/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,
6. S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press.

Course Outcomes:

At the end of this course students will demonstrate the ability to
1. Understand representation of random signals
2. Investigate characteristics of random processes
3. Make use of theorems related to random signals
4. To understand propagation of random signals in LTI systems.

BTECE OE52 IPR and Cyber Laws

Unit 1: IPR -Concepts and Evolution

Introduction to Intellectual Property Rights (IPR), Evolution of Intellectual Property Laws Standards and Concepts in Intellectual Property, Conventions and Treaties Relating to Global administration of Intellectual Property Rights, Protection and Classification Regional Conventions and Treaties, Organization, Jurisdiction enforcement and Administration of IPRs, IPRs and Information Technology IPRs and Bio- technology, IPRs and Traditional Knowledge, Management of Intellectual Property Rights, Law of Intellectual Property and Ethical Issues, Knowledge Driven Economy and IPR, Intellectual Property Rights in India and abroad.

Unit -2: Law of Copyright, Patents and Trademarks

Introduction ,Evolution of patent Law, Scope and Purpose, Classification of Patents, Patent Law in India: Patent Act of 1970, The Patents (Amendments) Act, 2002, Patent Office and Authorities, Grant of Patent, Right and Obligation of a Patentee, Infringement of Patents, Offenses and penalties, Patents

and other commercial Law, Patents – International Law, Patents Law- Emerging Trends, Social Implication of Patents.
Introduction to Copyrights as forms of Intellectual Property, Copyright Law in India (Copyright Act of 1957) - meaning, Form of Copyright and Ownership Assignment/License, Registration and terms of Copyright, Copyright infringement , Offences, Remedies and Enforcement, Broad casting Organization and performers, Copyright – International Law, Introduction to trademarks, Trademarks – forms of Intellectual Property, Law of trade Marks in India (trademark act of 1999)-meaning, registration and Authorities, Right conferred by Registration and use of Trademarks, Infringement of Trademarks and passing off, Offences, remedies and enforcement, Trademarks –International Law

Unit 3 : Law of Designs, geographical Indications and other Intellectual Property
Introduction to designs – Industrial Designs, Design Laws in India: Designs Act of 2000, Registration of Design, Owners Rights, Piracy of Designs, Offence, Remedies and Enforcement, Designs-International Law, Introduction to Geographical Indication, Law of Geographical Indication in India: Geographical Indication of Goods (Registration and Protection) Act, 1999, Register of Geographical Indication, Infringement of Registered Geographical Indication Offence, Remedies and Enforcement
The Semiconductor Integrated Circuit Lay Out design Act, 2000, The protection of Plant varieties and Farmers rights Act, 2001, Law Relating to Diversity

Unit 4 : Introduction to Cyber Law & Information Technology Act, 2000
Evolution of Computer Technology, Emergence of Cyberspace, Cyber Jurisprudence, Jurisprudence and Law, Doctrinal Approach, Consensual Approach, Real Approach, Cyber Ethics, Cyber-Jurisdiction, Hierarchy of Courts, Civil and Criminal Jurisdictions, Cyberspace –Web space (WWW), Web Hosting and Web Development Agreements (specimen), Domain Names, Internet as a Tool for Global Access, Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptography, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying authorities, Cyber Crime and Offences, Network Service Provider Liability, Cyber Regulation Appellate tribunal, Penalties and Adjudication

Unit 5 : Cyber law issues and related legislation
Patent Laws, Trademark law, Copyright, Software –copyright or patented, Domain Name and Copyright disputes, Electronic Database and its Protection, IT Act and Civil procedure Code, IT Act and Criminal procedure Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Section of Indian penal Code, Relevant Section of Reserve Bank of India Act, Law Relating to Employees and Internet, Alternative Dispute resolution, Online Dispute Resolution (ODR)

References

1. Law and practice of intellectual property in India by Vikas Vashishth
2. Intellectual property by A.Kalank
3. Intellectual property- patents,copyrights,trade marks and allied rights by Cornish W R
4. Patents ,copyrights, trade marks and design by B L Wadhera
5. Intellectual property law by P Narayana
6. Patents ,copyrights, trade marks and design by Rajeev Jain

BTECE OE53: Disaster Management

COURSE OBJECTIVES

1. To provide basic conceptual understanding of disasters and its relationships with development.
2. To gain understand approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction.

3. To understand Medical and Psycho-Social Response to Disasters.
4. To prevent and control Public Health consequences of Disasters
5. To enhance awareness of Disaster Risk Management institutional processes in India
6. To build skills to respond to disasters

UNIT-1: Introduction to Disaster

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

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 non structural 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

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, 275 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

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

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)

Text/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