Estd. 1962
NAAC 'A' Grade
MHRD-NIRF- 28th Rank

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दुरध्वनी (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग– २६०९०९४)
फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.e-mail:bos@unishivaji.ac.in

SU/BOS/Sci. & Tech/7400 **Date: 21/07/2018**

To,

The Principal/ Director,
All affiliated Engineering Colleges/ Institute,
Shivaji University, Kolhapur.

Subject : Regarding Guidelines, structure, of CBCS B. Tech. Program and syllabus of First Year B. Tech. Program under Faculty of Science and Technology.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the University Authorities have accepted and granted approval to Guidelines, structure of CBCS B. Tech. Program and syllabus of First Year B. Tech. Program to following branches under Faculty of Science and Technology:

B. Tech. Programme (Branch)

1.	Civil Engineering & Technology
2.	Mechanical Engineering & Technology
3.	Production Engineering & Technology
4.	Automobile Engineering & Technology
5.	Electrical Engineering & Technology
6.	Chemcial Engineering & Technology
7.	Electronics Engineering & Technology
8.	Electronics and Telecommunication Engineering & Technology
9.	Biotechnology Engineering & Technology
10.	Information Technology Engineering & Technology
11.	Environmental Engineering & Technology
12.	Computer Science Engineering & Technology

The revised syllabi shall be implemented from the academic year 2018-19 (i.e. from July 2018) onwards. A soft copy containing CBCS Guidelines, structure, and syllabus of First Year B. Tech. is enclosed herewith. The syllabus is also made available on university website www.unishivaji.ac.in.

Further, it is hereby informed that the question papers on the pre-revised syllabi shall be set for the examination to be held in October/November 2018 and April/May 2019. These chances are available for repeater students, if any.

You are therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy. Registrar

Encl-: as above.

Copy to-

1) I/c Dean, Faculty of Science & Technology
2) Director, Examination and Evaluation
3) The Chairman, respective BOS / Co-ordinating Committee

} For information

4) O.E. 4 Section
5) Appointment Section
6) Eligibility Section
7) Meeting Section

} For information & necessary action .

SHIVAJI UNIVERSITY, KOLHAPUR

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Accredided by NAAC 'A' Grade

Syllabus for

Bachelor of Technology

(B. Tech.) Program

(To be implemented from June, 2018 onwards)

SHIVAJI UNIVERSITY, KOLHAPUR

FIRST YEAR ENGINEERING AND TECHNOLOGY

Structure and Syllabus

(From the Academic Year 2018-2019)

(Course common to all branches except Architecture and Textile Engineering)

INSTRUCTIONS:

There are two groups in each semester:

1.Physics Group and

2.Chemistry Group

Allotment of groups to students:

a) Semester I: 50% students from each college will be admitted to Physics Group and remaining 50% will be admitted to Chemistry Group. The concerned College will decide the number and names of the students to be admitted in physics and chemistry groups and inform the same to the University.

b)Semester II: The students for Physics group in semester-I will be admitted to Chemistry Group in semester-II. The students for Chemistry Group in semester-I will be admitted to Physics Group in semester-II.

First Year Engineering and Technology – CBCS PATTERN (All Branches) (Sem I & II)

Sr. No		TEACHING SCHEME									EXAMINATION SCHEME							
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL (Term wok)		
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	%Min	Hours	Max	%Min
SEMESTER - I																		
1	BSC-P-101 / BSC-C-101	3	3	3	-	-	-	1	2	2		CIE	30	100	40%	As per BOS Guidelines	25	40%
												ESE	70					
2	BSC-M-I-102	3	3	3	1	1	1	-	-	-		CIE	30	100	40%		25	40%
												ESE	70					
3	ESC-103	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
4	ESC-104	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
5	ESC-105	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
6	HM-I-106	1	1	1	-	-	-	1	2	2		-	-	-	-		25	40%
7	ESC-W-I-107	1	1	1	-	-	-	1	2	2		-	-	-	-		50	40%
	TOTAL	17	17	17	1	1	1	6	12	12				500			200	
SEMESTER –II																		
1	BSC-P-201 / BSC-C-201	3	3	3	-	-	-	1	2	2		CIE	30	100	40%	As per BOS Guidelines	25	40%
												ESE	70					
2	BSC-M-II-202	3	3	3	1	1	1	-	-	-		CIE	30	100	40%		25	40%
												ESE	70					
3	ESC-203	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
4	ESC-204	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
5	ESC-205	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
6	HM-II -206	1	1	1	-	-	-	1	2	2		-	-	-	-		25	40%
7	ESC-W-II-207	1	1	1	-	-	-	1	2	2		-	-	-	-		50	40%
	TOTAL	17	17	17	1	1	1	6	12	12				500			200	
	TOTAL	34	34	34	2	2	2	12	24	24				1000			400	

CIE – Continuous Internal Evaluation ESE – End Semester Examination

Candidate contact hours per week : 30 Hours(Minimum)
Total Marks for B.Tech I. Sem I & II :**1400**
Theory and Practical Lectures : 60 MinutesEach
Total Credits for B.Tech.-I (Semester I & II) :**48**
IntheoryexaminationtherewillbeapassingbasedonseparateheadofpassingforexaminationofCIEandESE
There shall be separate passing for theory and practical (term work)courses
Non-Credit Self Study Course : Compulsory Civic Courses(CCC) **For Sem I: CCC – I :** Democracy, Elections and Good Governance
Non-Credit Self Study Course : Skill Development Courses (SDC) For Sem II: SDC – I : Any one from following (i) to(v) i) Business Communication & Presentation ii) Event management iii) Personality Development, iv) Yoga & Physical Management v) Resume, Report & proposal writing

Note:
1.BSC : Basic Science Course arecompulsory.
2.HM : Humanities and Management arecompulsory.
3.ESC : Engineering Science Course **: ESC- P**for courses (subjects) are mandatory**Physics** group, while **ESC – C** courses (subjects) are mandatory for **Chemistry**group.
4.There will be two groups for Sem I & II Physics and Chemistry. The Candidate's those opting Physics group in Sem I shall appear for Chemistry group in Sem II andVice-versa.
5.ESC-W: Engineering Science Course-Workshop arecompulsory.

Course List

Semester – I

Physics Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-P-101	Engineering Physics	4
2.	BSC-M-I-102	Engineering Mathematics-I	4
3.	ESC-P-103	Basic Electrical Engineering	4
4.	ESC-P-104	Basic Civil Engineering	4
5.	ESC-P-105	Engineering Graphics	4
6.	HM-I-106	Professional Communication-I	2
7.	ESC-W-I-107	Workshop Practice-I	2
		Total	24

Chemistry Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-C-101	Engineering Chemistry	4
2.	BSC-M-I-102	Engineering Mathematics-I	4
3.	ESC-C-103	Fundamentals of Electronics and Computer Programming	4
4.	ESC-C-104	Applied Mechanics	4
5.	ESC-C-105	Basic Mechanical Engineering	4
6.	HM-I-106	Professional Communication-I	2
7.	ESC-W-I-107	Workshop Practice-I	2
		Total	24

Semester II

Chemistry Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-C-201	Engineering Chemistry	4
2.	BSC-M-II-202	Engineering Mathematics-II	4
3.	ESC-C203	Fundamentals of Electronics and Computer Programming	4
4.	ESC-C204	Applied Mechanics	4
5.	ESC-C205	Basic Mechanical Engineering	4
6.	HM-II-206	Professional Communication-II	2
7.	ESC-W-II-207	Workshop Practice-II	2
		Total	24

Physics Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-P-201	Engineering Physics	4
2.	BSC-M-II-202	Engineering Mathematics-II	4
3.	ESC-P-203	Basic Electrical Engineering	4
4.	ESC-P-204	Basic Civil Engineering	4
5.	ESC-P-205	Engineering Graphics	4
6.	HM-II -206	Professional Communication-II	2
7.	ESC-W-II-207	Workshop Practice-II	2
		Total	24

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester I and II
EngineeringPhysics

SECTION – I

Unit 1.Diffraction and Polarization of Light :(12 Marks)(7)

Diffraction : Diffraction- Concept and types (Fresnel and Fraunhofer diffraction), Diffraction grating – construction and theory, resolving power of planetransmission grating.

Polarization:

Introduction, double refraction, Huygens' theory (positive and negative crystals), Optical Activity, Specific Rotation, Laurent's half shade polarimeter.

Unit 2. Laser and FibreOptics:(12 Marks)(7)LASER :

Absorption, spontaneous emission, stimulated emission, pumping, population inversion, Ruby laser, characteristics of laser, Holography (construction and reconstruction)

Fibre Optics:

Total Internal Refection, structure of opticalfibre, acceptance angle, acceptance cone, numerical aperture and fractional refractive index change (noderivation), fibre optic communication system, advantages of optical fibres.

Unit 3. Sound: (11 Marks)(7)

Conditions for good acoustics, Reverberation, Reverberation time, Sabine's formula for reverberation time (no derivation), Absorption coefficient, Factors affecting architectural acoustics and their remedy.

SECTION – II

Unit 4.Crystal Physics: (12 Marks)(7)

Space Lattice, Basis and Crystal structure, Unit cell, Seven crystal system, number of atoms per unit cell, coordination number, atomic radius, packing fraction, relation between density and lattice constant, Miller indices - procedure, features and sketches for differentplanes, symmetry elements of cubic crystal,Bragg's law for X-ray diffraction.

Unit 5. Physics of Nano-materials: (12 Marks)(7)

Concept- Nanomaterial, Nanoscience and Nanotechnology, production techniques(Top down and bottom up), Ball milling and Colloidal technique for synthesis of nano particles, Types of Nanomaterial, Tools- Scanning Tunneling Microscope and Atomic Force Microscope, properties and applications of nano-materials.

Unit 6.QuantumMechanics (11 Marks)(7)

Wave-particle duality of light, dual nature of matter (De-Broglie's concept of matter waves) Wavelength of matter wave in terms of K.E. and P. D., Properties of matter waves, Heisenberg's uncertainty principle for position and momentum, Compton Effect (Statement, explanation and experimental verification).

List of Experiments;

Minimum 8 experiments should be performed from the following list.

01. Bi-prism experiment
02. Diffraction at Cylindrical obstacle.
03. Calculation of divergence of LASER beam.
04. Determination of wavelength of LASER using diffraction grating.
05 Wavelength of different spectral lines of mercury using grating.
06. Polarimeter.
07. Verification of inverse square law of intensity of light.
08. Resolving power of Telescope
09. Measurement of band gap energy.
10. Study of crystal structure.
11. Study of symmetry elements of cubic crystal.
12. Determination of 'd' (interplaner distance) using XRD pattern.
13. Study of Planes with the help of models related Miller Indices.
14. Determination of e/m of an electron
15. R. P. of grating

References :

1. R. K. Gaur & Gupta S. L, Engineering Physics -DhanapatRai Publication.
2. M. N. Avadhanulu& P. G. Kshirsagar - A Text Book of EngineeringPhysics -S. Chand Publication.
3. B. L. Theraja -Modern Physics - S. Chand & Company Ltd., Delhi.
4. Subramanyam&BrijLal, A Text Book of Optics –S. Chand & Company (P.) Ltd.
5. B. K. Pandey and S. Chaturvedi- EngineeringPhysics, Cengage Learning-2012
6. S. O. Pillai, Solid State Physics : Structure & Electron Related Properties,Eastern Ltd,, New Age International Ltd.
7. Charles Kittle, Introduction to Solid State Physics - Wiley India Pvt. Ltd.(8^{th}Edtion).
8. V. Rajendran – Engineering Physics- Mc. Graw Hills
9. Alan Giambattista and others- Fundamentals of physics, Tata Mc. Graw Hills
10. Vijay Kumari- Engineering Physics, Vikas Publications
11. ResnickHalliday, Physics Volume-I, Krane -John Wiley & Sons Pub.
12. ResnickHalliday, Physics Volume-II, Krane -John Wiley & Sons Pub.
13. Hitendra K. Malik, A. K. Singh – Engineering Physics - Tata Mc. Graw Hills Education Private Ltd.
14. A. Beiser – Concepts of Modern Physics - Tata Mc. Graw Hills
15. L. J. Schiff – Quantum Mechanics - Tata Mc. Graw Hills

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I

EngineeringMathematics-I

SECTION I

Unit 1: Matrices and Solution of Linear System Equations(8)(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)

1. Rank of matrix: definition, normal form and echelon form
2. Consistency of linear system equations
3. System of linear homogeneous equations
4. System of linear Non-homogeneous equations

Unit 2: Eigen Values and Eigen vectors (7)

(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. Eigen Values
2. Properties of Eigen Values
3. Eigen vectors
3. Properties of Eigen vectors
4. Cayley-Hamilton's theorem (Without proof)

Unit 3: Complex Numbers (6)

(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. De Moivre's Theorem (Without proof)
2. Roots of complex numbers by using De Moivre's Theorem
3. Expansion of sinnθ and cosnθ in powers of sinθ and /or cosθ.
4. Circular functions of a complex variable - definitions

5Hyperbolic and Inverse Hyperbolic Functions- definitions .

SECTION II

Unit 4: Numerical Solution of linear simultaneous equations: (6)(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. Gauss elimination method
2. Gauss-Jordan method
3. Jacobi's iteration method
4. Gauss-Seidel iteration method

Unit 5: Expansion of Functions and Indeterminate forms: (7)(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. Maclaurin's theorem
2. Standard expansions
3. Taylor's theorem
4. Indeterminate forms and L' Hospital's rule

Unit 6: Partial Differentiation:(8)(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)

1. Partial derivatives: Introduction
2. Total derivatives
3. Differentiation of implicit function
4. Euler's theorem on homogeneous function of two variables
5. Jacobian and its Properties .
6. Maxima and Minima of functions of two variables

General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per the university pattern for practical batches.
2. Minimum number of assignments should be 8 covering all topics.

Recommended Books:

1. A text book of Applied Mathematics, Vol.I by P. N. Wartikar& J. N. Wartikar, Pune VidyarthiGrihaPrakashan, Pune.
2. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers, Delhi.

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.
2. Advanced Engineering Mathematics by H. K. Dass, S. Chand, New Delhi.
3. A text book of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K.Sengar, Cengage Learning.
4. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
5. Numerical methods by Dr. B. S. Grewal, Khanna Publishers, Delhi.
6. A text book of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd.,NewDelhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II

Basic Electrical Engineering

SECTION I

Unit1: Analysis of D.C. circuits: (8)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Concept of E.M.F, Potential Difference, Current, Resistance, Ohm's Law Kirchhoff's laws, mesh and node analysis

(Numerical on Mesh and Nodal Analysis of Two loops)

Unit 2:Magnetic circuits:(8)

(Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

Concept of mmf, reluctance, magnetic flux, Magnetic Flux density, Magnetic field strength, BH curve, magnetic leakage, fringing, Comparison of Electric and Magnetic circuit, series magnetic circuits (Theoretical Concepts only).

Unit 3: Single phase AC Circuits: (8) (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Fundamentals of Alternating quantities, Faraday's Law, Types of Induced E.M.F ,Generation of sinusoidal voltage, concept of R.M.S. & Average value, form factor, Peak Factor, Pure Resistive, Inductive, Capacitive , R-L, R-C, R-L-C series circuits, powers, Significance of power factor.

(Numerical Treatment on Series R-L, R-C, R-L-C circuits)

SECTION II

Unit 4: Three phase A.C. Circuits (7) (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Advantages of 3 phase system, Generation of 3 phase AC supply, balanced 3 phase load, relation between line and phase quantities for star connected circuit and delta connected circuit.

Unit 5:Earthing and lamps: (7) (Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

Necessity of Earthing, Earthing methods, Fuse (rewireble and HRC). MCB, Incandescent Lamp, Fluorescent tube, CFL, LED lamp, Mercury vapour lamp, single line diagram of electrical systems.

Unit 6: Single phase Transformer: **(8)** (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Construction, operating principle, Types, emf equation, Ratios of voltage and current, operation on no load and with load, power losses, efficiency, voltage regulation, applications.

(Numerical Treatment on E.M.F Equations &Transformer losses and Efficiency)

List of Experiments

Minimum 8 experiments should be performed from the following list.

1. Laboratory Sessions covering,General Introduction to Electrical Engineering laboratory, Experimental Set ups, Instruments etc.. Electrical Symbols.
2. Electric Shocks and precautions against shocks(Do's and Don'ts) .
3. Study of Ohm's Law.
4. Verification of Kirchhoff's Voltage Law and Kirchhoff's Current Law.
5. B-H curve of magnetic material.
6. Study of Faraday's law.
7. Determination of Reactance's for Series R-L- C Circuit.

8. Measurement of active and reactive power in balanced 3-phase circuit using Two-watt meter method.
9. Study of Basic methods of Earthing. Use of Fuse and Miniature Circuit breaker.
10. Study of different luminaries including Incandescent lamp, Mercury vapor lamps, fluorescent tube, CFL, and LED lamps.
11. Polarity and Ratio Test for single Phase Transformer.
12. Pre-determination of efficiency and regulation by Open Circuit and Short circuit tests on single phase transformer.
13. Determine the Efficiency of single Phase Transformer by Direct Loading Test

Reference books:

1. P.V.Prasad and S.Shivan Raju – Electrical Engineering concepts and Applications – Cengage learning.
2. B.L.Theraja – Electrical Technology vol.1. – S.Chand.
3. B.L.Theraja – Electrical Technology vol.2. – S.Chand.
4. NagrathI.J. and D.P.kothari – Basic Electrical Engineering(2001) – Tata McGraw Hill.
5. .BharatiDwivedi and AnurasgTripathi – Fundamentals of Electrical Engineering – Willey Precise

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Basic Civil Engineering

SECTION I

Unit 1: Relevance of Civil Engineering and Building Planning(7)

Introduction, branches of civil engineering, application of civil engineering inother alliedfields.Principles of planning, introduction to Bye-Laws regarding building line, height of building, open space requirements, F.S.I., setbacks, ventilation, sanitation as per municipal corporation area requirement.

Unit 2: Components of Building (7)

A) Sub-structure: Types of soil and rocks as foundation strata, concept of bearing capacity,types of foundations i.e. shallow and deep and their suitability. Shallow foundation such as wall foundation, isolated foundation, deep foundation such as pile foundation.

B) Super-structure: Elements of super-structures and their functions

Unit 3: Building Materials and Design (7)

Use and properties of the following materials--Concrete – ingredients and grades, plain and reinforced cement concreteand ready mixconcrete, bricks, steel, timber, roofingmaterials etc.

Introduction to types of loads, load bearing and framed structures.

SECTION II

Unit 4: Linear and Angular Measurements(7)

Principles of surveying, Classification of surveys, Chain Surveying, Introduction to metricchain and tapes, error in chaining, nominal scale and R.F., ranging, chaining and offsetting, index plan, location sketch and recording of field book, Chain and compass survey, Meridian, bearing and its types, system of bearing, Types of compass: prismatic and surveyor's compass. Calculation

Ofincluded angles, correction for local attraction.

Unit 5: Leveling (7)

Terms used in leveling, use of Dumpy level and Auto Level, temporary adjustments.Methodsof reduction of levels, types of leveling, Contours, characteristics of contours, use of contour maps.Introduction and use of EDM's with special reference to Total Station.Measurement of area by planimeter – mechanical and digital.

Unit 6: Introduction to Transportation, Environmental and Irrigation Engineering (7)

Components of rigid and flexible pavement, components of railway track (Broad Gauge)Components of water supply scheme (flow diagram), Necessity of Irrigation, Types of Dams (Earthen and Gravity Dam)

Term work:

Student can choose either Model A or Model B for performing practical

Model A

List of Experiments: Minimum 8 experiments should be performed from the following list-Practicalexercises given be carried out and drawing sheets be plotted wherever necessary.

1. Introduction to Measurement of Distances.
2. Plotting the outlines of building by chaining, ranging and offsetting.

3. Plotting of closed traverse by prismatic compass.
4. Reduction of levels by rise and fall method.
5. Finding out gradient of line by rise and fall method
6. Measurement of area by mechanical
7. Study of total station for various measurements.
8. Site visit to study various construction processes and principles of planning.
9. Drawing sheet showing various building elements.
10. Drawing sheet showing various sign conventions

Model B

List of Experiments: Minimum 8 experiments should be performed from the following list- Practicalexercises given be carried out and drawing sheets be plotted wherever necessary.

1. Introduction to Measurement of Distances.
2. Plotting the outlines of building by chaining, ranging and offsetting.
3. Plotting of closed traverse by surveyor's compass.
4. Reduction of levels by collimation plane method.
5. Finding out gradient of line by collimation plane method.
6. Measurement of area by digital planimeter
7. Study of total station for various measurements.
8. Site visit to study various construction processes and principles of planning.
9. Drawing sheet showing various building elements.
10. Drawing sheet showing various sign conventions

Reference Books:

1. Basic Civil Engineering by S. S. Bhavikatti, New Age International Publications.
2. Civil Engineering Materials - Technical Teacher's Training Institute, Chandigarh
3. Surveying by N. Basak, Tata Mc-Graw Hill Publication.
4. Basic Civil Engineeringby G. K. Hiraskar, DhanpatRai Publication.
5. Surveying Vol.I, Vol.II, Vol.III by B.C. Punmia, Laxmi Publication.
6. Irrigation Engineering by B. C. Punmia, DhanpatRai Publications

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

EngineeringGraphics

SECTION I

Unit1: Fundamentals of Engineering Graphics& Engineering Curves (6)

A) Fundamentals of Engineering Graphics: Introduction to Drawing instruments and their uses. Layout of drawing sheets, different types of lines used in drawing practice, Dimensioning system as per BIS (Theoretical treatment only)

B) Engineering curves: Construction of regular polygons (up to hexagon). Construction of Ellipse – (Directrix-Focus & Arcs of circle Method) Parabola-(Directrix-Focus & Rectangle Method) , Hyperbola-(Directrix-Focus & Rectangular Method), Involutes, Archimedian spiral and Cycloid only. (10 marks)

Unit 2: Projections of lines & Planes (9)

A) Projections of lines: Introduction to First angle and third angle methods of projection.
Projections of points on regular reference planes. Projections of horizontal, frontal and Profile lines on regular and auxiliary reference planes. Projection of oblique lines it's True length and angle with reference planes by rotation and auxiliary plane method. Concept of grade and bearing of line.

B) Projections of planes: Projections on regular and on auxiliary reference planes. Types of planes (horizontal, frontal, oblique and Profile planes). Edge view and True shape of a Plane. Angles made by the plane with Principle reference planes. Projections of plane figures inclined to both the planes. (Circle and regular polygon) (15 marks)

Unit 3: Projections of solids (5)

Projections of Prisms, Pyramids, Cylinder and Cones inclined to both referenceplanes(Excluding frustum and sphere)(10 marks)

SECTION- II

Unit 4: Orthographic Projections (7)

Orthographic views: lines used, Selection of views, spacing of views, dimensioning and sections. Drawing required views (any two views) from given pictorial views (Conversion of pictorial view into orthographic view) including sectional orthographic view. (15 marks)

Unit 5: Isometric projections (6)

Isometric projections: Introduction to isometric, Isometric scale, Isometric projections and Isometric views / drawings. Circles in isometric view. Isometric views of simple solids and objects. (10 marks)

Unit 6: Development of plane and curved surfaces (7)

Development of plane and curved surfaces: of the solids, Prisms, Pyramids, Cylinders and Cones along with cutting planes (Solids in simple position only). (10 marks)

Note: The above syllabus is to be covered according to the first angle method of projection.
Self-Study: Geometrical constructions and free hand sketches**,** Missing Views

Term work:

The following six sheets are to be drawn based on the above topics. All these sheets should be drawn on half imperial (A3 size) drawing sheets only.

1. Engineering curves	01
2. Projections of lines and planes	01
3. Projections of solids	01
4. Orthographic projections	01
5. Isometric projections	01
6. Sections of solids and development of surfaces	01

Reference Books:

1. Engineering Drawingby N. D. Bhatt, Charotor Publication House, Bombay
2. Fundamentals of Engineering by W. J. Luzadder, Drawing, Prentice Hall of India.
3. Engineering Design and Visualization by Jon M.Duff,William A. Ross, CENGAGE Learning
4. Machine Drawing by N. D. Bhatt, Charotor Publication House, Bombay.
5. Graphic Science by French and Vierck, Mc-Graw Hill International.
6. Engineering Drawing and Graphics by K. Venugopal, New Age Publication
7. A text book of Engineering Drawing by R. K. Dhawan, S. Chand and Co.
8. Machine Drawing by K. L. Narayana, New Age Publication
9. Engineering Drawing by N. B. Shaha and B. C. Rana, Pearson Education.
10. Engineering Drawing and Graphics Using AutoCAD by T. Jeyapoovan, Vikas Publication.
11. Engineering Drawing by Prof. Amar Pathak, WIELY India Publication.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I
Professional Communication-I

Unit 1: Understanding Communication **(3)**

1. Introduction, nature and importance
2. Process of communication
3. Basic types of communication- Verbal and Non- verbal
4. Barriers and filters of communication

Unit 2: Grammar and Vocabulary **(2)**

1. Forms of Tenses
2. LSRW skills
3. Developing vocabulary (synonyms, antonyms, confused words etc.)

Unit 3: Phonetics **(2)**

1. Understanding Phonetics and its alphabets
2. Transcription practices

Unit 4: Developing Oral Skills **(3)**

1. Importance and techniques of spoken language.
2. Techniques of formal speech, meetings, Elocution, Extempore etc.

Unit 5: Professional Correspondence **(4)**

1. Importance, language and style, formats (British & American)
2. Letter Writing – Simple letter (seeking permission regarding absence etc.),
3. Preparation of technical events information broacher and manuals.

Term Work: Minimum 8 should be performed from the following list.

1. Elocution
2. Vocabulary building
3. Phonetic Alphabets (Listen & repeat)
4. Pronunciation
5. Fluency Tips
6. Extempore
7. Teamwork- story making
8. Effective reading (newspaper articles)
9. Active listening (memorizing)
10. Letter writing
11. Situational conversation

Instructions:

1. Minimum 7 assignments should be covered.
2. Use of language lab is mandatory for both the semesters.

Reference Books:

1. Handbook for Technical Writingby David A. McMurrey, Joanne Buckley, Cengage.
2. A Course in Englishby J.D. O'Connor.
3. Better English Pronunciation by J.D. O'Connor.
4. Communication Skills Handbook: How to succeed in written and oral communication by Jane Summers, Brette Smith, Wiley India Pvt.Ltd.
5. Personal Development for Life and Work by Masters, Wallace, Cengage.
6. Soft Skills for Managers by Dr. T. KalyanaChakravarthi, Dr. T. LathaChakravarthi, Biztantra.
7. Soft Skills for every one by Jeff Butterfield, Cengage.
8. Behavioural Science by Dr.Abha Singh, Wiley India Pvt.Ltd.
9. An Introduction to Professional English and Soft Skills by Bikram K. Das, KalyaniSamantray, Cambridge University Press New Delhi.
10. Speaking Accurately, K.C. Nambiar, Cambridge University Press New Delhi.
11. Speaking Effectivelyby Jeremy Comfort, Pamela Rogerson, Cambridge University Press New Delhi.
12. Cambridge English for Job Hunting by ColmDownes, Cambridge University Press New Delhi.
13. Body Language by Allen Pease.
14. The Ace of Soft Skills by Gopalswami Ramesh, Mahadevan Ramesh, Pearson Publication, Delhi.
15. Decision Making Skills by Khanka S.S.
16. Business Ethics and Communication by C.S. TejpalSheth.
17. Write Right by Syed AbdurRaheem.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Workshop Practice-I

Unit 1: Safety (3)

Concept of accidents, causes of accidents, safety precautions while working in shop, safetyequipments and their use.

Unit 2: Measuring Instruments (3)

Brief introduction to instruments like – Steel rule, Calipers, Vernier Caliper, Micrometer, DialGauge, Vernier height Gauge etc. Least counts, common errors and care while using them, Use ofmarkinggauge, 'V'block and surface plate.

Unit 3: Smithy (4)

Introduction to smithy operations like- bending, forming, upsetting, drawing. Smithy toolshammer,hot & cold chisel flatters, tongs, anvil etc.

Unit 4: Fitting (4)

Study of various tools like- files, drills, taps, dies. Fitting operations.

Term work:

The term work consists of assignment on safety, measuring instruments, Smithy and fitting.
Every student should perform,

1. Smithy
One job in smithy involving upsetting, Drawing, bending such as- Hook, peg, square headedbolt etc.

2. Fitting
One job Male/Female fitting with operations- Marking, cutting, drilling, tapping filing etc.

Reference Books:
1. A Course in Workshop Technology, Vol – I by B. S. Raghuvanshi, Dhanapat Rai and Sons.
2. Elements of Workshop Technology, Vol – I by HajaraChaudhari, Media Promoters.
3. Workshop Technology, Vol – I by Gupta and Kaushik, New Heights.
4. Workshop Technology, Vol – I by Chapman, The English Language Book Society.
5. Workshop Technology, Vol.-I by H.S. Bawa, TMH Publications, New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

EngineeringChemistry

Unit 1: Water **(7)**

Introduction, impurities in natural water, water quality parameters total solids, acidity, alkalinity, chlorides, and dissolved oxygen (definition, causes, significance), hardness of water types of hardness, units of hardness, ill effects of hard water in steam generation in boilers (scale & sludge formation), numerical on hardness, treatment of hard water (ion exchange and reverse osmosis).

Unit 2: Instrumental methods of chemical analysis **(7)**

Introduction, advantages and disadvantages of instrumental methods-----

A)Spectrometry: Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's law),Single beam spectrophotometer (schematic, working and applications).

B)Chromatography: Introduction, types, gas-liquid chromatography (GLC), basic principle, instrumentation and applications.

Unit 3: Advanced materials **(7)**

A)Polymers: Introduction, plastics, thermo softening and thermosetting plastics, industrially important plastics like phenol formaldehyde, urea formaldehyde and epoxy resins, Conducting polymers and Biopolymers(Introduction, examples and applications.)

B)Composite materials: Introduction, Composition, properties and uses of fiber reinforced plastics (FRP) and glass reinforced plastic (GRP).

SECTION II

Unit 4: Fuels(7)

Introduction, classification, calorific value, definition, units (calorie, kcal, joules, kilojoules), characteristics of good fuels, comparison between solid, liquid and gaseous fuels, types of calorific value (higher and lower), Bomb calorimeter and Boy's calorimeter. Numericalproblems on Bomb and Boy's calorimeter.

Unit.5: Corrosion: **(7)**

Introduction, causes, classification, atmospheric corrosion (oxidation corrosion), electrochemical corrosion (hydrogen evolution and oxygen absorption mechanism), factors affecting rate of corrosion. Prevention of corrosion by proper design and material selection,cathodic protection, Protective coatings-hot dipping (galvanizing and tinning,), electroplating.

Unit 6: Metallic materials & Green Chemistry **(7)**

A)Metallic materials: Introduction, Alloy- definition and classification, purposes of making alloys. Ferrous alloys: Plain carbon steels (mild, medium and high), stainless steels. Nonferrous alloys: Copper alloy (Brass), Nickel alloy (Nichrome), Aluminum alloy (Duralumin and Alnico).

B)Green Chemistry: Definition, Twelve principles of Green Chemistry.

Term work:

List of Experiments:

Minimum 8 experiments should be performed from the following list out of which two experiments should be demonstrative on instrumental methods.

1. Determination of acidity of water.
2. Determination of alkalinity of water.
3. Determination of chloride content of water by Mohr's method.

4. Determination of total hardness of water by EDTA method.
5. Determination of moisture, volatile and ash content in a given coal sample by proximate analysis.
6. Preparation of urea-formaldehyde resin.
7. Preparation of phenol-formaldehyde resin.
8. Determination of percentage of copper in brass.
9. Estimation of zinc in brass solution.
10. Determination of rate of corrosion of aluminium in acidic and basic medium.
11. Demonstration of pH meter.
12. Demonstration of photo-colorimeter / spectrophotometer.
13. Demonstration of paper chromatography.

Reference books:

1.Engineering Chemistry by Jain and Jain, DhanpatRai Publishing Company Ltd., New Delhi.
2.A Textbook of Engineering Chemistry by S. S. Dara and S. S. Umare, S. Chand & Company Ltd., New Delhi.
3.A Textbook of Engineering Chemistry by C. P. Murthy, C. V. Agarwal and A. Naidu, BS Publications, Hyderabad.
4.Chatwal and Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House, New Delhi.
5.Engineering Chemistry by Dr. A. K. Pahari and Dr. B. S. Chauhan, Laxmi Publications (P) Ltd, New Delhi.
6.A text Book of Engineering Chemistry by ShashiChawla, DhanpatRai& Co. (Pvt.) Ltd, Delhi.
7.Engineering Chemistry by Wiley India.
8.Engineering Chemistry by RenuBapna and Renu Gupta, MacMillan Publishers (India) Ltd, Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II

Fundamentals of Electronics and Computer

Unit 1: Semiconductor Devices and Applications (7)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Semiconductor Diode, Half wave, Full wave, Bridge rectifier, Voltage Regulator Using Zener Diode,BJT: characteristics, CE configuration, CE as an amplifier. Load Line, Operating Point, Leakage Currents, Saturation and Cut off Mode of Operations.

Unit 2: Digital Electronics (7)

(Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

Logic Gates, Boolean algebra, Comparison of Specifications of Logic Families, Combinational Logic, Half Adder, Full Adder, Multiplexer, De-Multiplexer.

Unit 3: Applications (7)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Transducers: for Displacement (LVDT), Temperature (RTD), Pressure (Strain Gauge), Speed (Shaft Encoder), Range, Specifications and Limitations.

B) Appliances: Operation of Appliances: Digital Thermometer, Weighing Machine, Washing Machine, Microwave Oven and Tachometer.

SECTION II

Unit 4: Computer Basics and Hardware (5)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Generations & Classification of Computers.

B) Computer System Architecture– CPU, Input Unit, Output Unit, Storage Unit.

C) Applications of Computers.

Unit 5: Data Representation and Computer Software (8)

(Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

A) Data Representation In Computer: Types Of Number System – Binary, Octal, Decimal, Hexadecimal & Their Conversions, Coding Schemes – ASCII, Unicode.

B) Computer Software:

A) Operating System: Types Of Operating System, Functions, Unix/Linux Commands: Listing, Changing, Copying, And Moving Files & Directories (ls, cd, cat, mkdir, rmdir)

B) System Software: Assembler, Interpreter, Compiler.

C) Application Software's: Word Processor, Spreadsheets, Presentation andtheir Applications.

Unit 6: Computer Programming and Networks (8)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Computer Programming: Program Development Cycle, Algorithm, Flowchart, Programming Control Structures – Sequence, Selection, and Repetition.

B) Introduction to Computer Networks: Definition Of Computer Network, Need, Standards: OSI, TCP/IP, Types of Networks: LAN, WAN, MAN, Network Topologies.

Term work: FUNDAMENTAL OF ELECTRONICS

List of Experiments: Minimum 4 experiments should be performed from the following list.

1. Testing of Electronic components- resistors, capacitors, inductor, diode, transistor, LED and Switches using multi-meter &C.R.O.
2. V-I Characteristics of PN junction diode and Zener diode.
3. Study of Half and Full wave rectifiers and their comparison.
4. Study of Frequency response of CE amplifier.
5. Study of truth tables of logic Gates: OR, AND, NOT, NAND, NOR, EXOR.
6. Study of MUX/DEMUX.
7. Measurement of Displacement using LVDT/strain Gauge.
8. Measurement of Temperature using any transducer.

Self-Learning Activities: Different types of Communication systems & Communication Media.

Term work: FUNDAMENTAL OF COMPUTER

List of Experiments: Minimum 4 experiments should be performed from the following list.

1. Study of computer system – Internal Components & peripherals.
2. Use of Unix/Linux commands & create a file using any editor in Linux.
3. Create a document using any word processor (In Linux (open office) /Windows (Microsoft office).
4. Use any spreadsheet application to manipulate numbers, formulae and graphs (In Linux/Windows).
5. Use any power point presentation application and create a professional power point presentation using text, image, animation etc. (In Linux/Windows).
6. An assignment based on use of Internet and Web for searching and downloading Technical information.
7. Study of Tablet and Android Operating System Features and applications.

Text Books:

1. A Text Book of Applied Electronics by R S Sedha, S. Chand
2. Basic Electronics Engineering by Vijay Baru, RajendraKaduskar, S T Gaikwad (Wiley/ DREAMTECH)
3. Digital Principles & Applications by Albert Malvino, Donald Leach, TMGH Publication.
4. Principle of Electronics by V.K. Mehata, S. Chand
5. Electronic Instrumentation by H. S. Kalasi, Tata McGraw Hills Publication

Reference Books:

1) Electronics Devices and Circuit Theory by Robert L. Boylestad and Louis Nashelsky (Pearson Education Publication)
2) Fundamental of Digital Circuits by A. Anand Kumar (PHI- Publication)
3) Fundamental of Electronics Engineering by R.Prasad(CENGAGE- Learning)
4) Introduction to Information Technology, ITL Education Solutions LTD. Pearson Education
5) Fundamentals of Computers by V. Rajaram, PHI Publications.
6) UNIX concepts and applications by Sunitabha Das, TMGH.
7) Computer FundamentalsArchetucture and Organization by B.Ram New Age International Publishers.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Applied Mechanics

Unit 1: Fundamentals of Statics (7)

Basic Concepts and Fundamental Laws, Force, Moment and Couple, System of Forces, Resultant, Resolution and Composition of Forces, Varignon's Theorem, Law of Moments.

Unit 2: Equilibrium (7)

Lami s' Theorem, Free Body Diagram, Equilibrium of Forces, Equilibrium conditions, Surface friction for bodies on horizontal and inclined planes.

Beams: Types of Loads, Types of supports, Analysisof Simple beams, Virtual work method for support reactions.

Unit 3: Centroid and Moment of Inertia (7)

Centroid and Center of Gravity, Moment of Inertia of Standard shapes from first principle, Parallel and perpendicular axis theorem, Moment of Inertia of plain and composite figures, Radius of Gyration.

SECTION II

Unit 4: Kinetics of Linear (8)

Introduction to Kinematics of Linear motion (no numerical on kinematics), Kinetics of linear motion, Newton's Laws, D'Alembert's Principle, Work- Energy Principle, Impulse Momentum Principal

Unit 5: Kinetics of Circular Motion (8)

Introduction to Kinematics of Circular motion (no numerical on kinematics), Rotation with constant and variable angular acceleration, centripetal and centrifugal force, condition of skidding and overturning.

Unit 6: Impact and Collision (5)

Impact, Types of Impact, Law of conservation of Momentum, Coefficient of Restitution,Numerical on Direct central Impact.

Term work:

Student can choose either Model 1 or Model 2 for performing practical

Model 1	Model 2
A) Experiments:	
1. Law of polygon of forces	**1.** Law of polygon of forces
2. Jib crane	**2.** Jib crane
3. Bell crank lever	**3.** Bell crank lever
4. Support Reactions of Beam	**4.** Support Reactions of Beam
5.Fleture's Trolley	**5.** Centrifugal force
B) Graphics Statics: (To be solved on A3 sheet)	
1. To find Resultant - 3 problems	1. To find Resultant - 3 problems
2.To find support reactions - 3 problems	**2.**To find support reactions - 3 problems
C) Home Assignments	
At least one assignment on each unit with minimum 5 numericals	At least one assignment on each unit with minimum 5 numericals

Reference Books:

1.Engineering Mechanics by S. S. Bhavikattis, New Age International Pvt. Ltd.
2.Engineering Mechanics by R. K. Bansal and Sanjay Bansal.
3.Vector Mechanics for Engineers Vol.I and II by F. P. Beer and E. R. Johnston, Tata Mc-Graw Hill Publication.
4.Engineering Mechanics by Manoj K Harbola, Cengage Learning
5.Engineering Mechanics by K. I. Kumar, Tata Mc-Graw Hill Publication
6.Engineering Mechanics by S. B. Junnerkar.
7.Engineering Mechanics by Irving H. Shames, Prentice Hall of India, New Delhi.
8.Applied Mechanics by S. N. Saluja, Satya Prakashan, New Delhi.
9.Engineering Mechanics by Statics and Dynamics by Ferdinand Singer, Harper and Row Publications
10.Engineering Mechanics by R. S. Khurmi, S. Chand Publications
11.Fundamentals of Engineering Mechanics by S. Rajasekaran, G. Sankarasubramanian,VikasPublishing House
12) "Applied Mechanics- Dynamics &Statics " by I.B.Prasad, Khanna Publisher, Delhi

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Basic Mechanical Engineering

Unit1:Thermodynamics(7)

Thermodynamic State, Process, Cycle, Thermodynamic System, Heat, work, Internal Energy,First Law of Thermodynamics, Application of First Law to steady Flow processes,Limitations of First Law (Numerical Treatment) Statements of Second Law of Thermodynamics.(12 marks)

Unit 2: Introduction to I C Engine (7)

Carnot Engine, Construction and Working of C.I. and S.I., Two stroke, Four Stroke Cycles,Air standard cycles- Carnot Cycle, Joule Cycle, Otto Cycle, Air Standard efficiency (DescriptiveTreatment only) (12 marks)

Unit 3: Introduction to Refrigeration and Air Conditioning (6)

Carnot refrigerator, Refrigerant types and properties, Vapour compression and vapourabsorption system, solar refrigeration, Window Air Conditioning, Psychometric properties ofmoistair, Applications of refrigeration and air conditioning (Descriptive Treatment only).(11 marks)

Unit4:EnergySources and power plants (7)

Renewable and nonrenewable, Solar-flat plate collector, concentric collector–Parabolic andcylindrical, Photovoltaic cell, Wind, Hydropower plant, Steam Power plant,Bio-gas, Bio-Diesel (Descriptive Treatment only). (12 marks)

Unit 5: Mechanical Power Transmission and Energy conversion devices(7)

Type of Belt and belt drives, chain drive, Types of gears and gear Trains, (Numerical Treatment on belt drive), Construction, workingand applications of centrifugal Pump, Reciprocating compressor and Peloton wheel Turbine.(12 marks)

Unit 6: Manufacturing Processes (6)

Introduction to manufacturing processes - Casting Process, Steps involved in castingprocesses, and their applications, Metal removing processes (Lathe, milling & drilling operations) Metal JoiningProcesses – Arc welding, soldering and brazing and their applications.(11 marks)

Term Work:

List of experiments: Minimum 8 experiments should be performed from the following list--

1. Demonstration of I.C. engine
2. Demonstration of Two stroke and four stroke engine
3. Demonstration of vapor compression refrigeration system and window airconditioner.
4. Demonstration of Solar water heating system.
5. Demonstration of Steam or Hydroelectric Power Plant
6. Demonstration of Diesel power plant
7. Demonstration of types of Gears and gear trains.
8. Demonstration of pumps and compressor.
9. Demonstration of hydraulic turbine
10. Demonstration of metal joining processes.
11. Demonstration of metal removal processes
12. Industrial visit based on syllabus.

Reference Books:

1. Solar Energy by Dr.S.P. Sukathame,Tata Mc-Graw Hill Publication
2. Non-Conventional Sources of Energy by G.D. Rai, Khanna Publication
3.Engineering Thermodynamics by R.Joel, The English Language Book Society.
4.Engineering Thermodynamics by Achultan, Prentice Hall of India.
5.Thermal Engineering by R.K. Rajput, Laxmi Publication, Delhi.
6.Elements of Heat Engine Vol.I,II,III by Patel and Karamchandani, Acharya Book Depot.
7.Power Plant Engineering by Arora and Domkunwar, Dhanpat Rai and Sons.
8. Manufacturing Technology Volume I and II by P. N. Rao, Tata Mc-Graw Hill Publication
9. Elements of Workshop Technology, Vol.I and II by HajaraChoudhari, Media Promoters
10. Basic Mechanical Engineering by Basant Agrawal & C. M. Agrwal, Wiley India Pvt. Ltd.
11.Energy Technology by S. Rao and Dr.B.B. Parulekar, Khanna Publication.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -II

EngineeringMathematics-II

SECTION-I

Unit 1: Ordinary Differential Equations of First Order and First Degree (7)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1. Linear differential equations
2. Reducible to Linear differential equations
3. Exact differential equations
4. Reducible to Exact differential equations

Unit 2: Applications of Ordinary Differential Equations of First Order and First Degree (6)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1.Applications to Orthogonal trajectories (Cartesian and Polar equations)
2. Applications to Simple Electrical Circuits
3. Newton's law of cooling

Unit 3: Numerical Solution of Ordinary Differential Equations of First Orderand First Degree(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)**(8)**
1. Taylor's series method
2. Euler's method
3. Modified Euler's method
4. Runge-Kutta fourth order formula

SECTION-II

Unit 4:Numerical Solutions Of Algebraic and Transcendental Equations (6)(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1. Bisection Method
2. Secant Method
3. Newton Raphson Method

Unit 5: Special Functions (7)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks) 1. Gamma function and its properties
2. Beta function and its properties
3. Error function and its properties

Unit 6: Multiple Integration and its applications: (8)
(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)
1. Double Integrals and evaluation
2. Change of order of integration
3. Change into Polar Coordinates
4. Area enclosed by plane curves
5. Mass of a plane lamina

General Instructions:
1. Batch wise tutorials are to be conducted. The number of students per batch should be asperthe Universitypattern for practical batches.

2. Minimum number of assignments should be 8 covering all topics.

Recommended Books:

1. A text book of Applied Mathematics, Vol.-I by P. N. Wartikar& J. N. Wartikar, PuneVidyarthiGrihaPrakashan, Pune.
2. A text book of Applied Mathematics, Vol.-II by P. N. Wartikar& J. N. Wartikar, PuneVidyarthiGrihaPrakashan, Pune.
3. Dr. B. S. Grewal - Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers,Delhi.

Reference Books:

1. Higher Engineering Mathematics by B.V.Ramana, Tata McGraw-Hill Publications, NewDelhi
2. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.
3. Advanced Engineering Mathematics by H. K. Dass.
4. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
5. A textbook of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K. Sengar, Cengage Learning.
6. A textbook of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd.,New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Workshop Practice-II

Unit 1: Welding (4)

Types of welding – gas welding, arc welding, resistance welding, Welding equipment's,welding of various metals, electrode classification and coding, welding joints.

Unit 2: Carpentry (4)

Introduction, Classifications of wood, common varieties of Indian timber, carpentry toolslike- Marking tools, cutting tools, planes, striking tools, holding tools. Carpentry operations- marking,sawing,chiseling, grooving etc. carpentry joints.

Unit 3: Sheet metal work (4)

Specifications of metal sheets, working tools, sheet metal operations like-cutting, bending,folding, punching, reverting and joining by brazing and soldering.

Unit 4: Air pollution: (2)

Air pollution due to automobiles, causes, PUC testing.

Term work:

The term work consists of assignment on Welding, Carpentry, Sheet metal work, Airpollution.
Every student should perform---

1. Welding: One job on Arc welding- Lap / Butt Joint etc. (For individual student)
OR
Table, Shoe stand, Bag stand etc. (For 4-6 students)

2. Carpentry :One composite job involving dovetail joint, T joint, cross halving joint, pen stand etc.(Forindividual student)
OR
Table, Teapot, Stool etc. (For 4-6 students)

3. Sheet metal Work:

One job on commercial items such as Dust bin, funnel, tray etc.

Reference Books:

1. A Course in Workshop Technology, Vol – I by B. S. Raghuvanshi, Dhanapat Rai and Sons.
2. Elements of Workshop Technology, Vol – I by HajaraChaudhari, Media Promoters.
3. Workshop Technology, Vol – I by Gupta and Kaushik, New Heights.
4. Workshop Technology, Vol – I by Chapman, The English Language Book Society.
5. Workshop technology, Vol.-I by H.S. Bawa, TMH Publications, New Delhi.
6. I.C. Engines by Mathur& Sharma, Dhanpat Rai Publications, New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -II

Professional Communication-II

Unit 1: Developing Writing Skills(3)

1. Importance of technical writing
2. Report Writing:

a) Techniques of Report Writing
b) Methods of data collection
c) Types of Report Writing- Survey, Inspection and Investigation

Unit 2: Behavioral Skills(5)

1. Understanding Self (SWOT analysis)
2. Attitude Building/ Developing Positive attitude
3. Decision Making Skills
4. Leadership Skills
5. Stress Management
6. Time Management
7. Team Work

Unit 3: Presentation Skills(2)

1. Importance & techniques
2. Presenting yourself professionally

Unit 4: Career skills (4)

1. Corporate Manners and Etiquettes
2. Planning and Managing Career
3. Job Application and Resume
4. Interview: Techniques& skills
5. Group Discussion
6. Debate

Term Work: Any 8 out of the following should be conducted

1. Group Discussion (lab session/class room activity)
2. Mock Interview
3. Report writing (lab session/class room activity)
4. Paragraph writing on current technical writing
5. Presentation on current affairs
6. Developing Professional Telephonic skills
7. Exercise of Application writing and Resume writing
8. Practice of Case Study
9. Team building activities
10. Report writing (3 types)
11. Introduction and use of modern communication techniques
12. Computer aided presentation of a project report (PPT)

Instructions:

1. Minimum 7 assignments should be covered.
2. Use of language lab is mandatory for both the semesters.

Reference Books:

1. Handbook for Technical Writingby David A. McMurrey, Joanne Buckley, Cengage.
2. A Course in Englishby J.D. O'Connor.
3. Better English Pronunciation by J.D. O'Connor.
4. Communication Skills Handbook: How to succeed in written and oral communication byJane Summers, Brette Smith, Wiley India Pvt.Ltd.
5. Personal Development for Life and Work by Masters, Wallace, Cengage.
6. Soft Skills for Managers by Dr. T. KalyanaChakravarthi, Dr. T. LathaChakravarthi,Biztantra.
7. Soft Skills for every one by Jeff Butterfield, Cengage.
8. Behavioural Science by Dr.Abha Singh, Wiley India Pvt.Ltd.
9. An Introduction to Professional English and Soft Skills by Bikram K. Das, KalyaniSamantray, Cambridge University Press New Delhi.
10. Speaking Accurately, K.C. Nambiar, Cambridge University Press New Delhi.
11. Speaking Effectivelyby Jeremy Comfort, Pamela Rogerson, Cambridge University PressNew Delhi.
12. Cambridge English for Job Hunting by ColmDownes, Cambridge University Press NewDelhi.
13. Body Language by Allen Pease.
14. The Ace of Soft Skills by Gopalswami Ramesh, Mahadevan Ramesh, PearsonPublication, Delhi.
15. Decision Making Skills by Khanka S.S.
16. Business Ethics and Communication by C.S. TejpalSheth.
17. Write Right by Syed AbdurRaheem.

SHIVAJI UNIVERSITY, KOLHAPUR

REVISED SYLLABUS AND STRUCTURE

SECOND YEAR (B. Tech)

Electronics and Telecommunication Engineering

To be introduced from the academic year 2019-20

(i.e. from June 2019) onwards

Semester III

Sr. No	Code No.	Subject	Semester	Credits
1	BSC-ETC301	Engineering Mathematics-III	3	4
2	PCC-ETC-301	Electronic Circuit Design-I	3	5
3	PCC-ETC302	Network Analysis	3	5
4	PCC-ETC303	Transducers and Measurement	3	4
5	PCC-ETC304	Analog Communication	3	4
6	PCC-ETC305	Programming Lab-I	3	3
7	MC-ETC-301	Environmental studies	3	3**
Total				**25**

**over and above credit

Semester IV

Sr. No.	Code No.	Subject	Semester	Credits
1	PCC-ETC401	Electronic Circuit Design-II	4	5
2	PCC-ETC402	Linear integrated Circuits	4	5
3	PCC-ETC403	Control System Engineering	4	4
4	PCC-ETC404	Digital Communication	4	4
5	PCC-ETC405	Data Structures	4	4
6	PCC-ETC406	Programming Lab-II	4	3
Total				25

***For Theory CIE 30 Marks,**

Two tests of 30 marks at college should be conducted and best of two marks should be communicated to university.

***Guidelines to paper setter:**

In theory ESE examination of 70 marks following pointes should be considered,

1. First question of 10 marks should be allotted to Objective type questions.
2. In Remaining 60 marks, four questions of 15 marks should be considered.

SECOND YEAR ELECTRONICS & TELECOMMUNICATION ENGINEERING – CBCS PATTERN

Semester Examination

SEMESTER - III																								
Sr. No	Course (Subject Title)	TEACHING SCHEME									EXAMINATION SCHEME													
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL			TERM WORK				
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	Min	Hours	Max	Min	Hours	Max	Min			
1	BSC-ETC301	3	3	3	1	1	1	-	-	-		CIE	30	100	40	As per BOS Guidelines	-	-	2	25	10			
												ESE	70											
2	PCC-ETC301	4	4	4	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10			
												ESE	70											
3	PCC-ETC302	4	4	4	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10			
												ESE	70											
4	PCC-ETC303	3	3	3	-	-	-	1	2	2		CIE	30	100	40				2	25	10			
												ESE	70											
5	PCC-ETC304	3	3	3	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10			
												ESE	70											
6	PCC-ETC305	2	2	2	-	-	-	1	2	2		-	-	-	-		50	20	2	25	10			
	TOTAL	**19**	**19**	**19**	**2**	**2**	**2**	**4**	**8**	**8**				**500**			**150**			**150**				
SEMESTER –IV																								
1	PCC-ETC401	4	4	4	-	-	-	1	2	2		CIE	30	100	40	As per BOS Guidelines	50	20	2	25	10			
												ESE	70											
2	PCC-ETC402	4	4	4	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10			
												ESE	70											
3	PCC-ETC403	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10			
												ESE	70											
4	PCC-ETC404	3	3	3	-	-	-	1	2	2		CIE	30	100	40		-	-	2	25	10			
												ESE	70											
5	PCC-ETC405	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10			
												ESE	70											
6	PCC-ETC406	2	2	2	-	-	-	1	2	2							50	20	2	25	10			
7	MC-ETC	-	-	-	-	-	-	-	-	-		CIE	30	100	10		-	-		-	-			
												ESE	70		30									
	TOTAL	**19**	**19**	**19**	**2**	**2**	**2**	**4**	**8**	**8**				**600**			**150**			**150**				
	TOTAL	**38**	**38**	**38**	**4**	**4**	**4**	**8**	**16**	**16**				**1100**			**300**			**300**				

CIE- Continuous Internal Evaluation. ESE – End Semester Examination

• Candidate contact hours per week : 30 Hours (Minimum)	• Total Marks for S.E. Sem III & IV : **1600**
• Theory and Practical Lectures : 60 Minutes	• Total Credits for S.E. Sem III & IV : **50**
• In theory examination there will be a passing based on separate head of passing for examination of CIE and ESE.	
• There shall be separate passing for theory and practical (term work) courses.	

Note:

1. **BSC-ETC**: Basic Science Course- Electronics & Telecommunication Engineering are compulsory.
2. **PCC-ETC:** Professional Core course –Electronics & Telecommunication Engineering are compulsory.
3. **MC-ETC:** Mandatory Course**:** Environmental Studies which is compulsory for theory 70 marks and project work 30 marks.

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ENGINEERING MATHEMATICS-III

Course Details

Class	**S. Y. B. Tech Sem - III**
Course Code and Course Title	**BSC-ETC-301- Engineering Mathematics -III**
Prerequisites	**Basic Trigonometry, Derivative and Integration, Basic Probability.**
Teaching scheme :Lecture /Practical/Tutorial	**3/0/1**
Credits	**3+1**
Evaluation scheme CIE/ESE for Theory	**30/70**

Teaching scheme	Examination scheme
Lectures :03Hrs/week	**Theory : 100 Marks, 70(ESE)+30(CIE)**
Tutorial : 01Hr/week	**TW: 25 Marks**

Course Objectives: The course aims to :

01	To develop mathematical skills and enhance thinking power of students
02	To give the knowledge to the students of fuzzy set theory, Linear Differential Equations probability,Laplace transforms,Fourier series with an emphasis on the application of solving engineering problems
03	To prepare students to formulate a mathematical model using engineering skills & interpret the solution in real world.

Course Outcomes:
Upon successful completion of this course ,the students will be able to:

01	Make use ofLinear Differential Equations to solve the Electrical Engineering problems.
02	Applyknowledge of vector differentiation to find directional derivatives, curl and divergence of vector fields.
03	Define fuzzy sets using linguistic words and represent these sets by membership functions, convexity, Normality, support, etc.
04	Develop Fourier series expansion of a function over the given interval.
05	Find Laplace transforms of given functions and use it to solve linear differential equations.
06	Solve basic problems in probability theory, including problems involving the binomial, Poisson, and normal distributions

Course Content

Section I

Unit No 1 **Linear Differential Equations (LDE) and its Applications**: **07hrs**

1.1 Linear Differential equations with constant coefficients.

1.2 Rules to find complementary function.

1.3 Methods to find particular Integral

(e^{ax}, sinax or cosax, $x^m, e^{ax}x^m, e^{ax}sinax$ or $e^{ax}cosax$)

1.4 Cauchy's homogeneous linear differential equations.

1.5 Applications of linear differential equations with constant coefficients to Electrical engineering.

Unit No 2 **Vector Differential Calculus**: **07 hrs**

2.1 Differentiation of vectors.

2.2 Gradient of scalar point function.

2.3 Directional derivative.

2.4 Divergence of vector point function.

2.5 Curl of a vector point function.

2.6 Irrotational, Solenoidal and Scalar potential function of a vector field.

Unit No 3 **Introduction to Fuzzy sets:** **07hrs**

3.1 Crisp set and Fuzzy set.

3.2. Basic concepts of fuzzy sets

3.3 Basic operations on fuzzy sets.

3.4 Properties of fuzzy sets.

Section II

Unit No 4. **Fourier Series:** **07hrs**

4.1 Introduction.

4.2 Definition, Euler's formulae.

4.3 Dirichlet's conditions.

4.4 Change of interval.

4.5 Expansions of odd and even functions.

4.6 Half range series.

Unit No 5 **Laplace Transform and its Applications:** **07hrs**

5.1 Laplace transform of elementary functions.

5.2 Properties of Laplace transforms(First Shifting , Change of scale property , Multiplication & Division by t).

5.3 Laplace transforms of derivatives and integral.

5.4 Inverse Laplace transforms by partial fractions & convolution theorem.

5.5 Solution of Linear differential equation with constant coefficients using Laplace transform.

Unit No 6 Probability Distribution: 07hrs

6.1 Random variables.

6.2 Discrete Probability distribution.

6.3 Continuous probability distribution.

6.4 Binomial Distribution.

6.5 Poisson Distribution.

6.6 Normal Distribution.

Text Books:

01 Higher Engineering Mathematics, by B. S. Grewal (Khanna Publication Delhi.)

02 Applied Mathematics Wartikar P N and Wartikar J N , (Pune Vidyarthi Grah Prakashsn)

Reference Books:

01 Advance Engineering Mathematics by Erwin Kreyszig (Wiley India.)

02 Mathematical Methods of Science and Engineering, by Kanti B. Datta (Cengage Learning.)

03 Advanced Engineering Mathematics, 3e, by Jack Goldberg (Oxford University Press.)

04 Engineering Mathematics by V. Sundaram (Vikas Publication.)

05 Higher Engineering Mathematics, by B. S. Grewal (Khanna Publication Delhi.)

06 Higher Engineering Mathematics, by B. V. Ramana (Tata McGraw-Hill)

07 Advanced Engineering Mathematics, by H. K. Das (S. Chand Publication.)

08 Fuzzy Sets and Fuzzy Logic: Theory and Applications, by George J. Klir and Bo Yuan (Prentice Hall of India Private Limited.)

09 Applied Mathematics by Navneet D. Sangle (Cengage Publication)

General Instructions:

1)For the term work of 25 marks, batch wise tutorials are to be conducted. The number of students per batch per tutorial should be as per University rules.

2)Number of assignments should be at least six (All units should be covered).

Prepared By BOS Maths :

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1. Electronic Circuit Design - I

Course Details:

Class	S.Y.B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-301-**Electronic Circuit Design - I**
Prerequisites	**Basic Circuit Law's, Semiconductor diode, Zener diode, BJT details.**
Teaching scheme: Lecture/Practical	**4/2**
Credits	**4 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 04 Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks POE: 50 Marks

CourseObjectives:
The course aims to:

1. Provide an introduction and basic understanding of Semiconductor Devices viz. diodesand BJT, JFET.
2. Provide basic analog electronic circuit design techniques using diodes and bipolarjunction transistors and to develop analytical skills.
3. Develop student ability to apply basic engineering sciences to understand the operation& analysis of electronic circuits using diodes and bipolar junction transistors.
4. Design electronic circuits to meet the desired specifications.

Course Outcomes:
Upon successful completion of this course, the student will be able to:

1. Analyze and design electronic circuits such as rectifiers & unregulated power supply.
2. Analyze and design electronic circuits such as regulated power supply.
3. Analyze & Design of BJT & FET Biasing.
4. Explain the hybrid model of transistor and analyze the transistor amplifier (CE, CB,CC) using h-parameters
5. Analysis of CE Amplifier for low frequency & High frequency response for sinusoidal & square wave input.
6. Analyze & Design LPF, HPF, Clipper, Clampers, Multipliers

Course Contents

Unit No: 1 Wave Shaping Circuits: **08 Hrs**

Low pass & high pass RC circuits (analysis for square,step, ramp, exponential input), High pass RC circuit as a differentiator, Low pass RC circuit as integrator. Clipping circuits: diode clippers, transistor clippers, Transfer characteristics, Clamping circuits: Classification, clamping operations, Clamping circuit theorem, practical clamping circuits, and voltage multipliers.

Unit No: 2 Unregulated Power Supplies: **08 Hrs**

Rectifiers: Half wave, full wave: center tap and bridge type, analysis for different parameters: PIV, TUF, efficiency, ripple factor, regulation, form factor etc. Filters: Need of filters, Types: capacitor, inductor, LC, CLC, and Analysis for ripple factor. Design of unregulated power supply with filterusing full wave rectifier.

Unit No: 3 Voltage Regulators : **08 Hrs**

Need of voltage regulator, Stabilization factors, Analysis & Design of Shunt regulator (using Zener diode & BJT),emitter follower regulator, series pass voltage regulator (using BJT), Pre- regulator & Overload protection circuit.

Unit No: 4 BJT & FET Biasing **08 Hrs**

Introduction to BJT, Need of Biasing, Generalized stability factor derivation, Biasing of CE configuration-Fixed Bias, Collector to Base Bias & Voltage Divider Bias (Analysis & Design of the same with & without Re). Introduction to JFET,Biasing of CS configuration- Fixed Bias, Self Bias (Analysis & Design of the same).MOSFET- EMOSFET & DMOSFET (Working & Characteristics)

Unit No: 5 Voltage Amplifiers: **08 Hrs**

H-Parameters, Hybrid model for transistor (CE, CB& CC configuration), amplifier equations for Voltage Gain, Current gain, Input resistance & Output resistance taking Rg of source into account.(Numericalare expected)

Unit No: 6 Frequency Response of Single Stage RC Coupled Amplifier: **08 Hrs**

Low frequency response: Effect of emitter bypass capacitor(CE) & Coupling capacitor(CC), Amplifier response to square wave, percentage Sag calculation, (Numerical are expected)

High frequency response: Hybrid π model , Derivation for CE short circuit &resistivecurrentgain,βcutoff,αcutofffrequency,amplifier highfreq.responsetosquarewave,gainbandwidthproduct,

(Numericalare expected). Design of single stage RC coupledamplifier.

Text Books:

1. Electronic devices & circuits, Allen MottershedPrentice- Hall India
2. Electronic devices & circuits, J. Millman & C.Halkias,Tata McGraw HillPublication
3. A Monograph on ElectronicsDesignPrinciplesN.C. Goyal & R.K. Khetan-Khanna Publishers
4. Pulse digital and switchingcircuitsMillman Taub,Tata MCGraw hill 2nd edition

Reference Books:

1. Electronic devices & circuits,David A. Bell ,Oxford University
2. Electronic devices & circuits', Salivahanan, N Sureshkumar, Tata McGraw HillPublication
3. Electronic devices & circuittheory, Robert L. Boylsted, LouisNashelsky,Pearson Education

List of Experiments (Minimum 08 experiment + 01 Simulation + 01 Mini Project compulsory):

1. Design and study of Low pass filter a.Frequency response (sinusoidal)
   b. integrator (Square wave input)
2. Design and study of High pass filter a.Frequency response (sinusoidal)
   b. Differentiator (Square wave input)
3. Study of different types of clipper circuits.
4. Study of different types of clamping circuits.
5. Design and analysis of full wave rectifier with capacitive filter.
6. Design and analysis of full wave rectifier with inductive filter.
7. Design and analysis of zener shunt regulator
8. Design and analysis of transistorized shunt regulator
9. Design and analysis of emitter follower regulator
10. Design and analysis of series pass voltage regulator
11. Determination of H-parameter for CE configuration using input and output characteristics.
12. Simulation of FWR using C-filter
13. Simulation of Single stage RC-Coupled Amplifier
14. Mini Project (PCB Design)
    a. Design of FWR (Different output voltages for different groups)with C filter.
    b. Design of Single Stage RC Coupled Amplifier (Different voltage Gain for different groups).

Guidelines for Paper Setter: 70 marks.

Q.1. 10 MCQ's based on complete syllabus. (10 Marks)

Q.2 & Q. 3 Based on unit no 1,2,3 (Each carries 15 marks)

Q.4 & Q. 5 Based on unit no 4,5,6 (Each carries 15 marks)

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3. Network Analysis

Course Details:

Class	B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-302-Network Analysis
Prerequisites	**Fundamentals of Network Elements**
Teaching scheme: Lecture/Practical/ Tutorial	**4/0/1**
Credits	**4 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 04Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Tutorial : 01Hr /week		TW: 25 Marks

CourseObjectives:
The course aims to:

1 To understand basic theorems used for network analysis.
2 To understand two port networks and its parameters
3 To understand series and parallel resonance and its effects
4 To understand system behavior using pole zero plot
5 To understand and implement filter approximations

Course Outcomes:

CourseOutcomes:
Upon successful completion of this course, the student will be able to:

1 Analyze AC and DC circuits using different network Theorems and Apply graph theory to solve network equations
2 Identify and analyze the series, parallel resonance circuits, calculate the bandwidth, selectivity factor also
3 Evaluate two port parameters and Understand network transfer functions in s-domain
4 Analyze and design prototype LC filters.
5 Evaluate initial conditions and solve differential equation for RL, RC, and RLC circuits and carry out transient analysis.

Course Contents

UnitNo: 1	**Network Fundamentals:** Network Elements & its types, Energy sources, KVL & KCL, series & parallel connection of passive elements(R,L,C) , Combination of energy sources ,Current Division & Voltage division, source transformation ,Star-Delta transformation, Mesh & Super mesh analysis, Node & super node analysis **Graph Theory:** graph of network & its parts, tree & co-tree, incidence matrix, Tie Set matrix, cut sets	**Hrs8**
UnitNo: 2	**Network Theorems:** Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, ReciprocityTheorem, Compensation theorem, Duality theorem, Millman's Theorem	**Hrs8**
UnitNo: 3	**Resonance :** Definition, Types: series & parallel resonance, Series resonance-resonant frequency, variation of impedance, admittance, current & voltage across L & C with respect to. Frequency, Effect of resistance on frequency response, Selectivity, B.W. &Quality factor. Parallel resonance–Ant resonance frequency, Resonant frequency for a tank circuit, variation of impedance &admittance with frequency, Selectivity, Quality factor. & B.W. Comparison of series and parallel resonant circuits.	**Hrs8**
UnitNo: 4	**Two Port Network & Network Functions:** **Two port network**: **Z, Y, ABCD , h** parameters, Interrelation of different parameters, Interconnections of port network (Series, Parallel, Cascaded, Series-Parallel) **Network Functions:** Network functions for one port & two port networks, Driving point impedance and admittance of one port network, Driving point impedance & admittance function, Transfer function Concept of complex frequency, significance of poles & zeros. Restrictions on poles& zeros for transfer& drawing point's function, Stability of circuit using Routh criterion, Pole zero diagram, Time response from pole zero plot.	**Hrs8**
UnitNo: 5	**Filters** Definitions, classification & characteristics of different filters, decibel & Neper. Filter fundamental such as attenuation constant (α),phase shift(β) propagation constant (γ) and characteristic impedance(Z_o) , Design & analysis of constant K, M derived (low pass, high pass, band pass & band stop filters): T & Pi sections.	**Hrs8**
UnitNo: 6	**Transient Response:** Network Solution using Laplace transforms, Initial Conditions of elements. Steady state & transient response (Voltage & Current) DC response of RL circuit DC response of RC circuit DC response of RLC circuit	**Hrs8**

Text Books:

1. A. Sudhakar ,ShyammohanS.Palli ‘Circuit & Network – Analysis & Synthesis’ IIIrd Edition – Tata McGraw Hill Publication
2. Ravish Singh, “Networks Analysis & Synthesis” Tata McGraw Hill Publication
3. A.Chakrabarti ‘Circuit Theory (Analysis & Synthesis)’ - IIIrd Edition DhanpatRai& co
4. William H Hayt, Jack E Kimmerly and Steven M.Durbin, Engineering Circuit Analysis, Tata McGraw Hill

Reference Books:

1. D. Roy Choudhury ‘Networks & Systems’ - New Age International Publisher
2. Soni Gupta ‘Electrical Circuit Analysis’ DhanpatRai& Co.
3. Boylestad ‘Introductory Circuit Analysis – Universal book stall, New Delhi
4. M.E.VanValkenburg ‘ Network Analysis’ – IIIrd Edition , Pearson Education / PHI
5. JosephEdministrar ‘Theory & Problems of Electronic Circuit (Schaum’s series) – Tata McGraw Hill, Publication
6. R.G .Kaduskar, S.O.Rajankar, T.S. Khatavkar, Network Fundamentals and Analysis – Wiley India

Note for Paper setter: 40% theory and 60% numerical are expected

Term Work: (Minimum 06 tutorials):

Minimum 06 tutorials based on above syllabus covering all units.

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4. Transducers and Measurements

Course Details:

Class	S.Y.B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-303-Transducers and Measurements
Prerequisites	Knowledge of Fundamentals of Electronics and Computer course of F.Y.B.Tech
Teaching scheme: Lecture/Practical	**3/2**
Credits	**3 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 03Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks POE: -----

CourseObjectives:

The course aims to:

1. Provide introduction to different types of Transducers with their classification, construction & application
2. Provide knowledge of different sensors and their applications
3. Provide knowledge of signal conditioning and instrumentation system
4. Provide basic knowledge of measurement system
5. Provide basic understanding of different Electronic instruments
6. Provide knowledge of different types of bridges

Course Outcomes:

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1. Student will able to select appropriate transducer and sensors as per required.
2. Students will get acquainted with different DAS
3. Student will be able to design instrumentation system
4. Student will able to understand measurement basics and select proper instrument for particular measurement of electrical parameters.

Course Contents

UnitNo: 1	**Transducers :** Definition, Various Types of Transducers, Classification of Transducers, Selection Factors and General Applications of Transducers, Detailed Study of Transducers: (i) Motion, (ii) Flow, (iii) Pressure, (iv) Temperature, (v) Force and Torque, (vi) Sound Transducer, Hall Effect Transducers, Digital Transducers: Shaft Encoder, Digital Resolver, Digital tachometer	**7Hrs**
UnitNo: 2	**Sensors:** Proximity Sensors, optical Sensors, IR sensors, Piezo – electric sensors Smart Sensors: Fiber opticsensors, Film sensors, Nano sensors, Electrochemical sensors, biosensors, MEMS	**4Hrs**
UnitNo: 3	**Signal Conditioning & Data Acquisition System:** Introduction, AC & DC Signal Conditioning, Chopper Stabilized Amplifier, Instrumentation Amplifier, Isolation And Programmable Gain Amplifier, Grounding And Shielding, principles and working of different types of ADCand DAC Instrumentation Techniques:Introduction to Process Instrumentation, Instrumentation set up for measurement of nonelectrical quantity such as weight using strain gauge.	**7Hrs**
UnitNo: 4	**Introduction to Measurement:** Introduction,PerformanceCharacteristics,StaticCharacteristics,Errorin Measurement, Types of Static Error, Sources of Error, Dynamic Characteristics, Statistical Analysis, Electrical Standards, Atomic Frequency and Time Standards, Graphical Representation of Measurements as a Distribution, Digital voltmeters- Introduction, Types of DVM , general specifications of DVM, digital multimeter, digital measurements of time, digital frequency meter , Q meter, Instrument calibration	**7Hrs**
UnitNo: 5	**Measurement & Display Devices:** CRO: Dual Beam, Dual Traces Sampling, Digital storage, measurement of phase and frequency using Lissajous pattern, CRO probes: active, passive, current, attenuators, LED, LCD, Graphics Display, Signal Generators, Function generators. Spectrum analyzer, logic analyzer	**7Hrs**
UnitNo: 6	**Bridges:** Measurement of Resistance with Bridges, Wheatstone's Bridge, Kelvin Double Bridge, AC Bridges such as Haye's Bridge, Wein Bridge, Maxwell's-Wein Bridge, Maxwell' L/C Bridge, Descourty's Bridge& Schering Bridge	**4Hrs**

Text Books:

1. A course in Electrical, Electronics measurement and Instrumentation, A.K.Sawhney
2. Electronic Instrumentation, H. S. Kalsi, MGH, 3rd Edition

Reference Books:

1. Electronic Instrumentation and Measurement Techniques, Welfrick Cooper.
2. InstrumeIntation for Engineers And Scientists , John Turner ,II Edition , Wiley
3. Electronic Instrumentation and Measurements, David A Bell, Third Edition, Oxford
4. Instrumentation for Engineering Measurements, James W Dally, II Edition , Wiley
5. Sensors And Transducers,Patranabis D., PHI, 1999
6. Smart Sensors For Industrial Applications, Krzystof Iniewski, CRC press, Tailor & Francis
7. Introduction to electrochemical transducer, Brian R Eggins, Willey

(for chapter 2: Electrochemical sensors, biosensors)

List of Experiments (Minimum 10):

1. Study of weight measurement using strain gauge
2. Study of displacement measurement using LVDT.
3. Study of temperature measurement using RTD PT100/LM 35
4. Study of temperature measurement using Thermistor
5. Study of temperature measurement using Thermocouple
6. Study of cathode ray oscilloscope & Measurement of amplitude and frequency using CRO
7. Measurement of phase and frequency by lissajous pattern using CRO.
8. Study of function generator
9. Study of spectrum analyzer
10. Study of AC bridges
11. Study of DC bridges
12. Study of Logic analyzer
13. Study of smart sensors

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5.Analog Communication

Course Details:

Class	B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-304-Analog Communication
Prerequisites	Basics of baseband communication
Teaching scheme: Lecture/Practical	**3/2**
Credits	**3 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 03Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks POE: 50 Marks

CourseObjectives:

The course aims to:

The basic objective of this course is to introduce the students with analog communication, AM, FM modulation techniques, their analysis, bandwidth calculations.Italsofocusesontheperformanceanalysisofanalogcommunications systems under the presence of noise and finally introduces the pulse and digital modulation techniques.

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1. Understandandidentifythefundamentalconceptsandvariouscomponentsofanalog communication systems.
2. Understand, analyze and explain various analog modulation schemes.
3. Understand the performance of analog communications systems under the presence of noise.
4. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems
5. Analyze Basic communications systems and their performance under the presence of noise
6. Differentiate between various pulse modulation techniques

Course Contents

UnitNo: 1 **Amplitude Modulation:** **8Hrs**

Elements of electronic communication systems, Need for modulation, channel, frequency spectrum, time and frequency domain signals, Amplitude Modulation principles, AM envelope, frequency spectrum & BW, Modulation index, % modulation, AM transmitters: Block of low level DSBFC, High level DSBFC, Trapezoidal patterns Evolution and descriptions of SSB, Suppression of carrier using balanced modulator, Suppression of unwanted sideband, Methods: Filter system, phase shift & third method Vestigial sideband(VSB)

UnitNo: 2	**Angle Modulation:** Instantaneous frequency, Concept of angle modulation, frequency spectrum, Narrowband& WideBand FM, Modulation Index, Bandwidth, Phase modulation, Bessel,^{s} Function and its mathematical Analysis, Generation of FM (Direct and Indirect Method)	**6Hrs**
UnitNo: 3	**Noise:** Sources of noise, Types of noise White noise, shot noise, thermal noise, partition noise, low frequency or flicker noise, burst noise, avalanche noise,signal to noise ratio, Noise Figure, Noise Temperature, FRISS formula for noise figure	**4Hrs**
UnitNo: 4	**AM Receiver:** Simplified block diagram of AM receiver, receiver parameters: Sensitivity, Selectivity, dynamic range, Tracking, fidelity, Types of AM receiver: TRF and superheterodyne (block diagram), AM detection types: using diode detector, distortion in diode detector. Negative peak clipping & diagonal clipping, Demodulation of SSB Automatic Gain Control (AGC).	**6Hrs**
UnitNo: 5	**FM Receiver:** Double conversion FM receivers, block diagram, FM demodulator, tuned circuit frequency discriminators, slope detectors, fosters seeley discriminator, ratio detectors,PLL-FM demodulators, FM noise suppression	**6Hrs**
UnitNo: 6	**Pulse Modulation :** Introduction, Sampling theorem: Occurrence of allising error, PAM: Channel BW for PAM, Natural Sampling, Flat-top Sampling, PAM & TDM, Signal Recovery,; PWM: Uses of PWM, Genration of Analog W/F using PWM, PPM: Generation of PAM, Generation of PWM, Generation of PPM	**6Hrs**

Text Books:

1. George Kennedy, "Electronic Communications", McGraw Hill Kennedy.
2. WayneTomasi'ElectronicsCommunicationSystem'-FundamentalsthroughAdvanced.-Vth Edition- Pearson Education.
3. V. Chandra Sekar, "Analog Communication", OXFORD University press.

Reference Books:

1. B.P. Lathi, "Analog and Digital Communication", OXFORD University press.
2. Simon Haykin, "An introduction to analog & digital communications", John Wiley &Sons
3. RPSingh,SDSapre'CommunicationSystem-Analog&Digital'IIndEdition– TataMcGraw Hill Publication
4. Blake"Electronic Communication Systems",2nd Edition CENGAGE learning
5. Louis E. Frenzel, "Principals of electronic communication system", IIIrd Ed., TMH Pub

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Name of subject: Programming Lab-I

Course Details:

Class S.Y. B. Tech. Sem-III

Course Code & Course Title	PCC-ETC-305
Prerequisites	Computer fundamentals
Teaching scheme: Lecture/Practical	**2/2**
Credits	**3**
Evaluation Scheme CIE/ESE for Theory	

Teaching Scheme		**Examination Scheme**
Lectures: 2hrs /week		Theory : Marks
Tutorial - /week		
Practical : 2hrs /week		TW: 25 Marks POE: 50 Marks

Course Objectives:

The course aims to:

1 To understand how to design flowchart and algorithms for procedure oriented programs.

2 To develop programming skills using the fundamentals and basics of C Language, control structures and looping statements.

3 To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

4 To design and implement programs using files handling and user defined types.

Course Outcomes:

Upon successful completion of this course

1 Student will be able to understand the basic concepts of procedure oriented programming language.

2 Student will be able to use the control statements, looping statements and functions concepts.

3 Student will be able to design programs using user defined functions and data type.

4 Student will be able to design & apply the skills for solving the engineering problems.

Course Contents

1. Programming Fundamentals,	Flow chart, Algorithm, Standard notations, Selection Procedure, Loops, Sub Algorithms, Compilers, Interpreters, The Library and Linking	04 Hrs
2. Introduction to C	Introduction to Constants, Variables, Data Types, Operators, Expressions, Structure of C Programming, Identifiers, Decision & Loop control statements	05 Hrs
3. Arrays and Structures	Arrays::Introduction to 1-Dimensional arrays, Declaration and Initialization of 1-Dimensional arrays, Declaration and Initialization of 2-Dimensional arrays, Declaration and Initialization of Multi-Dimensional arrays. Structures-Declaring of Structures, Accessing Structure elements, arrays of structures.	04 Hrs

4.	Functions and Pointers	Introduction of functions, Need for functions,, Multifunction Programming, Elements of functions, Definition and declaration of functions, return values and their types, function call, arguments, return value, nesting and recursion Pointers- Introduction to pointers, pointer variables, Declaration and initialization of pointer variable, accessing pointer	05 Hrs
5.	Strings	Declaration and Initialization of string, Reading from Terminal, Writing to screen, Standard library string functions	03 Hrs
6.	File handling	File operation, counting character tabs, spaces ,file copy program, file opening modes, text file- binary file, Real time case study.	03 Hrs

Text Books:

1 **Let Us C Yashawant Kanetkar, 13th Edition BPB Publications (unit II, VI)**

2 **Programming in ANSI C , E Balagurusamy, 5th edition, Tata Mc Graw Hill (unit III. IV, V)**

Reference Books:

1 **The C Programming Language, Brian W. Kernighan, Dennis M. Ritchi , IInd edition, Prentice Hall of India.**

List of Experiments (Minimum 10 + mini project):

1. Develop Program using decision control statements
2. Develop Program using control statements
3. Develop Program using loop control statements
4. Develop Program using functions
5. Develop Program using pointers
6. Develop Program using array
7. Develop Program using two dimensional arrays
8. Develop Program using structures
9. Develop Program using dynamic memory allocation
10. Develop Program using strings
11. Develop Program using any sorting technique
12. Develop Program using file handling.
13. Mini project

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ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Environmental Studies

Course Details:

Class	S.Y. B. Tech. Sem-IV
Course Code & Course Title	MC-ETC-301-Environmental Studies
Prerequisites	Basic knowledge about natural process and fundamentals of environmental aspects.
Teaching scheme: Lecture/Practical	3 lectures/week
Credits	3**

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Electronic Circuit Design - II

Course Details:

Class	S.Y.B. Tech. Sem-IV
Course Code & Course Title	PCC-ETC-401-Electronic Circuit Design - II
Prerequisites	**Basic Circuit Law's, Single Stage RC coupled amplifier**
Teaching scheme: Lecture/Practical	**4/2**
Credits	**4 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 04 Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks POE: 50 Marks

CourseObjectives:

The course aims to:

1 Provideanintroductionandbasicunderstanding of feedbackamplifiers,poweramplifiers, oscillators,multivibrators

2 Developstudentabilitytoapplybasicengineeringsciencestounderstandtheoperation & analysis of electronic circuits using diodes, bipolar junction transistors and field effecttransistors

3 Provideanalogelectroniccircuitdesigntechniquesusingdiodes,bipolarjunction transistorsandfieldeffecttransistors,andtodevelopanalyticalskills.

4 Design electronic circuits to meet desired specifications.

5 Applyknowledgeofmathematics,science,andengineeringtodesign,analyzeand implement electroniccircuits.

Course Outcomes:

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1 Analyze & Design Multistage Amplifier
2 Analyze & Design Feedback Amplifier
3 Analyze & Design Power Amplifier
4 Describe & Design Different types of Oscillators using BJT
5 Describe & Design Different types of Multivibrators using BJT
6 Describe & Design IC voltage Regulators

Course Contents

Unit No: 1	**Multistage Amplifiers** Need of cascading, Parameter evaluation such as Ri ,Ro, Av, Ai & bandwidth for general multistage amplifier, Design of two stage RC coupled, Direct coupled amplifier using BJT.	**7 Hrs**
Unit No: 2	**Feedback Amplifiers :** General theory of feedback, reasons for negative feedback. Analysis of Voltage series, Current series, Voltage shunt, Current shunt feedback amplifiers, Design of two stage Voltage series feedback amplifier.	**8 Hrs**
Unit No: 3	**Power Amplifiers:** Need of Power amplifier, classification of power amplifier, Power considerations, Distortion in power amplifiers: Phase, Frequency, amplitude/ harmonic / nonlinear distortion, amplitude distortion using Three point method.analysis and design of Class A single ended transformer coupled amplifier& class A Push pull amplifiers, Class B amplifier & class B push pull amplifier , crossover distortion, class AB Push pull amplifiers.Complementary symmetry push pull power amplifier.	**10 Hrs**
Unit No: 4	**Oscillators:** Barkhausen's criteria, Frequency and amplitude stability,Classification, RC oscillators : analysis & design of RC phase shift & Wein bridge oscillator using BJT. LC oscillators: analysis & design of Colpit's & Hartely's oscillators using BJT, Crystal oscillator.	**9 Hrs**
Unit No: 5	**Multivibrators :** Transistor as a switch, Different transistor switching parameters,overdrive factor, classification of multivibrators, Analysis and design of collector coupled -Astable, Monostable,fixed bias and self-bias Bistable multivibrator and Schmitt trigger using BJT considering overdrive factor. Triggering circuits forMultivibrators	**9 Hrs**
Unit No: 6	**IC voltage regulator** Study and design of regulators using IC's :78XX, 79XX,LM723,LM317, LM337.	**5 Hrs**

Text Books:

1 A Monograph on ElectronicsDesignPrinciplesN.C. Goyal & R.K. Khetan- Khanna Publishers

2 Electronic devices & circuits, Allen MottershedPrentice- Hall India

3 Electronic devices & circuitsG. K. Mittal
4 Pulse digital and switchingcircuits,Millman Taub, Tata McGraw Hill

Reference Books:

1 Electronic devices & circuits,David A. Bell ,Oxford University
2 Electronic devices & circuits', Salivahanan, N Sureshkumar, Tata McGraw HillPublication
3 Electronic devices & circuittheory, Robert L. Boylsted, LouisNashelsky,Pearson Education

List of Experiments (Minimum 08 experiment + 01 Simulation + 01 Miniproject compulsory):

1. Design and frequency response of direct coupled amplifier.
2. Design and frequency response of two stage RC coupled amplifier.
3. Design and frequency response of voltage series feedback amplifier.
4. Design of transformer coupled class A amplifier.
5. Design of RC phase shift oscillator using BJT
6. Design of wein bridge oscillator using BJT
7. Design of colpitts oscillator using BJT
8. Design of hartley oscillator using BJT
9. Design of Astable multivibrator
10. Design of monostable multivibrator using BJT
11. Design of bistable multivibrator using BJT

12 Design of Schmitt trigger using BJT

13 Design of voltage regulator using LM317

14 Design of voltage regulator using IC723

15 Simulation of Oscillator

16 Simulation of Multivibrator

17 Miniproject (PCB Design)

   c. Design of Astable Multivibrator or Schmitt trigger.
   d. Design of Power Supply using IC voltage Regulator.

Guidelines for Paper Setter: 70 marks.

Q.1. 10 MCQ's Based on complete syllabus. (10 Marks)

Q.2 & Q. 3 Based on unit no 1,2,3 (Each carries 15 marks)

Q.4 & Q. 5 Based on unit no 4,5,6 (Each carries 15 marks)

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ELECTRONICS AND TELECOMMUNICATION ENGINEERING

2.Linear Integrated Circuits

Course Details:

Class	S.Y B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-402 Linear Integrated Circuits
Prerequisites	**Basic knowledge of electronics**
Teaching scheme: Lecture/Practical	**4/2**
Credits	**4 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 04Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks POE: 50 Marks

CourseObjectives:
The course aims to:

1. Explain the internal circuit of operational amplifier and its parameters
2. Explain the application of Op-amps.
3. Design various Active filters.
4. Analyze and design of various wave generators

Course Outcomes:

CourseOutcomes:
Upon successful completion of this course, the student will be able to:

1. **Explain** operational amplifier with its parameters
2. **Classify** different configuration of op-amp
3. **Identify** and **explain** different applications of op-amp
4. **Design** and implement various filters
5. **Analyze** different waveform generator circuits
6. Apply knowledge of op-amp in various industrial applications

Course Contents

UnitNo: 1 **Introduction to op-amp** **9 Hrs**

Block diagram of op-amp in detail, Differential Amplifier configurations, Differential amplifier analysis (AC and DC) for dual-input balanced-output configuration, level shifter, current mirror circuits, ideal parameters and practical parameters of op-amp and their comparison.
(Numerical expected)

UnitNo: 2 **Op-amp configurations & frequency response** **6 Hrs**

Virtual ground concept, Open loop configuration, closed loop configuration, unity gain amplifier, frequency response of both configuration. slew rate equation

UnitNo: 3	**Applications of Op-amp** Summing, Scaling & Averaging Amplifiers using Op-amps, Differential amplifier using op-amp, Subtractor Circuit, Instrumentation amplifier, V to I & I to V Converter, Precision Rectifiers, Log & Anti-log Amplifiers, Study of comparator, Schmitt Trigger, Window Detector, Peak Detectors, Sample & Hold Circuits.	**9 Hrs**
UnitNo: 4	**Active Filters** Introduction, Analysis & Design of Butterworth filters: High Pass filter, Low Pass filter (First & Second order), Band Pass filter, Band Reject filter, All Pass Filter (Numerical expected)	**9 Hrs**
UnitNo: 5	**Waveform Generators** Analysis & Design of Square wave generator, Triangular wave generator, Sawtooth wave generator. Analysis & Design of RC phase shift oscillator, RC wein bridge oscillator, Colpitts oscillator, Hartley oscillator.	**7 Hrs**
UnitNo: 6	**Industrial applications of special OPAMP ICs** Introduction , block diagram, operating principal and applications of IC 555,IC 565,OP177,AD620	**7 Hrs**

Text Books:

1. Ramakant A. Gaikwad, "Op Amps and Linear Integrated Circuits", Pearson Education second and latest edition

Reference Books:

1. David Bell, "Operational Amplifiers and Linear ICs",Third ed, Oxford University Press
2. Robert Coughlin, Fredric Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Sixth edition,PE, 2006. (Ch-6)
3. B. Somanathan Nair, "Linear Integrated Circuits- Analysis, Design & Applications", Wiley India.
4. Datasheets

List of Experiments

1. Design of inverting , noninvertion amplifier & their frequency response
2. Design of Summing, scaling, and averaging amplifier
3. Design, build and test precision half & full wave rectifier
4. Design, build and test Comparator and Schmitt trigger
5. Design of Butterworth filters
6. Design, build and test square & triangular wave generator.
7. Design, build and test Integrator and Differentiator
8. Design and implement oscillator using Op-Amp.

Note: one small project based on OPAMP applications

3. Control System Engineering

Course Details:

Class	B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-403 Control System Engineering
Prerequisites	
Teaching scheme: Lecture/Practical/Tutorials	**3/0/1**
Credits	**3 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 03 Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Tutorial: 01 Hr /week		TW: 25 Marks

CourseObjectives:

The course aims to:

1 To provide an introduction and basic understanding of Control System

2 To develop time & frequency domain analysis

3 To analyze & compare different control systems

4 To understand the concept of stability & state space variables

Course Outcomes:

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1 Apply knowledge of mathematics, science, and engineering to design, analyze and control the different systems

2 Explain time & frequency domain analysis for different control systems

3 Demonstrate & compare different control systems

4 Describe state variables

5 Design model for control system

Course Contents

Unit No: 1 **Introduction :** **7 Hrs**

Need & classification of control system, Effects of feedback, Mathematical models – (Mechanical & Electrical systems) Differential equations, Transfer function , Block diagram algebra – Block diagram reduction, Representation by Signal flow graph – Reduction using Mason's gain Formula.

Unit No: 2 **Time Response Analysis :** **6Hrs**

Standard test signals – Time response of first& second order systems – Design specifications of 2nd order system & error compensation, Characteristic Equation of Feedback control systems, Transient response of second order systems – Time domain specifications, Steady state response – Steady state errors and error constants.

Unit No: 3 **Stability Analysis In S-Domain** **6 Hrs**

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

Root Locus Technique**:** The root locus concept – construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root locus.

Unit No: 4 **Frequency Response Analysis** **7 Hrs**

Introduction, Frequency domain specifications-Bode plots, Determination of Frequency domain specifications and transfer function from the Bode Plot – Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability Criterion, Nyquist plot & stability analysis.

Unit No: 5 **Compensators** **6Hrs**

Compensation techniques –Lag, Lead, Lead-Lag Controllers design in frequency Domain, Design of PID control system.

Unit No: 6 **State Space Analysis** **4 Hrs**

Concept of state, state variable & state model, state model for linear continuous time systems, Decomposition of Transfer Function,Transfer function from state model, Computation of state transition matrix, Controllability & Observability

Text Books:

1. Control Systems Engineering, I .J. Nagrath and M. Gopal, 5thEdition, Anshan Publishers.
2. A.Anandkumar,"Control System Engineering "PHI Publication 2nd edition
3. R.Aanandnatarajan,P.rameshbabu,"Control System Engineering",Scitech Publications.

Reference Books:

1. Norman S Nise "control system engineering"8th edition ,Wiley Publication
2. Sanarjjet Ghosh ,"Control system theory & application " 1st edition Pearson Education.

Note: Per Unit Two Tutorials

Note for Paper setters: Theory 40%

Numerical, Design &Derivations 60%

4. Digital Communication

Course Details:

Class	S.Y.B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-404- Digital Communication
Prerequisites	Analog communication
Teaching scheme: Lecture/Practical	**3/2**
Credits	**3 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 03 Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks

CourseObjectives:

The course aims to:

1. Study the random signal theory with its mathematical analysis base.
2. Understand the concept of information theory in detail with different coding theorems.
3. Elaborate the different source coding techniques with the help of their block diagrams and function.
4. Explain the different digital modulation techniques.
5. Describe the baseband transmission and reception system.

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1. Describe the probability of random signal
2. Solve the problem based on information theory
3. Classify different source coding technique
4. Explain different line coding techniques.
5. Compare different digital modulation technique

Course Contents

UnitNo: 1 **Probability Theory:** **6Hrs**

Introduction to digital communication system, probability and sample space, Bayes‟ rule, Joint & conditional Probability, PDF & CDF, Statistical averages

UnitNo: 2	**Information Theory:** Measure of Information, Entropy, Information Rate, Shannon's encoding theorem, communication channels –Discrete & Continuous, Shannon–Hartley theorem, Huffman's coding & Shannon-Fanno Coding techniques.	**7Hrs**
UnitNo: 3	**Source Coding:** Quantization–Uniform, Non-Uniform. Study of PCM, DPCM, ADPCM, DM, ADM	**5Hrs**
UnitNo: 4	**Digital Carrier Line Encoding :** Line codes: Unipolar, Bipolar, NRZ, RZ, RZ-AMI, Manchester Baseband pulse Shaping, Duo binary	**5Hrs**
UnitNo: 5	**Bandpass Modulation Techniques:** ASK, FSK, PSK, DPSK, QPSK, & QAM. Coherent, Non- Coherent detection. Introduction to Spread Spectrum techniques: DSSS, FHSS.	**7Hrs**
UnitNo: 6	**Baseband Transmission Of Digital Signals:** M-arySignaling, eyediagram, ISI, scrambler, Unscramble.OptimumReceivers-MatchedFilters,Correlationreceivers, Optimum detection using ML criteria.	**6Hrs**

Text Books:

1. K. Sam Shanmugam–Digital & Analog Communication (John Wiley)
2. Simon Haykin – Digital Communication(Wiley)
3. Communication Systems, Singh Sapre, TMH

Reference Books:

1. Wayne Tomasi- Electronic communications Systems, fifth edition, Pearson publication

List of Experiments (Minimum-8):

1. Perform PCM–TDM.
2. Perform Compander.
3. Perform DPCM.
4. Perform ADPCM.
5. Perform DM
6. Perform ADM.
7. Perform CVSD.
8. Perform ASK,FSK&PSK.
9. Perform QPSK.
10. Perform Spread Spectrum techniques.
11. Perform Eye Diagram using oscilloscope
12. Experiments on digital modulation techniques using MATLAB/Simulink Software.

5. Data Structures

Course Details:

Class	S.Y. B. Tech. Sem-IV
Course Code & Course Title	PCC-ETC-405 Data Structures
Prerequisites	Knowledge of Mathematics, Computer Resources.
Teaching Scheme: Lecture/Practical/Tutorial	3/0/1
Credits	3 + 1
Evaluation Scheme CIE/ESE for Theory	30/70

Teaching Scheme		**Examination Scheme**
Lectures : 03 Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Tutorial: 01Hr /week		TW: 25 Marks

CourseObjectives:

The course aims to:

1 Provide basic concept of data structure & it's types.
2 Provide the knowledge of arrays & records as well as relevant operations on it.
3 Provide the knowledge of linked list & relevant operations on it.
4 Provide the concept of stacks, queues & it's applications.
5 Provide the knowledge of various types of trees & relevant operations.
6 Provides the Knowledge of Graphs & Hashing techniques.

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1 Elaborate the basic concept of data structure & it's types.
2 Design and Implement the various algorithms on arrays & records.
3 Implement algorithms on linked list.
4 Understand the concept of stacks, queues & its applications.
5 Construct various types of trees & their applications.
6 Understand the concept of Graph & Hashing.

Course Contents

UnitNo: 1 Introduction & Overview: **(02 Hrs)**

Introduction to theory of data structures, data types, Classification of data structure, Algorithms: complexity, time space trade-off with example.

UnitNo: 2 **Arrays, Records & Pointers:** **(06 Hrs)**

Introduction, linear arrays, representation of linear array in memory, Algorithm for traversing linear arrays, inserting & deleting,
Sorting: bubble sort, searching: linear search, binary search,
Multi-dimensional arrays, Pointers: pointer arrays, Records: Record structures, representation of records in memory, parallel arrays, matrices, sparse matrices.

UnitNo: 3 **Linked Lists:** **(06 Hrs)**

Introduction, linked lists & its representation, Traversing & searching a linked list, memory allocation, Garbage collection, insertion & deletion of nodes of linked list, header linked list, two-way lists.

UnitNo: 4 **Stacks & Queues:** **(07 Hrs)**

Introduction to stacks, stack as an Abstract Data type, representation through Arrays & linked lists, arithmetic expressions, polish notation, Applications of stacks, stacks & recursion, Queue, representation of queue as an array and as a linked list, circular, double ended, priority, application of queues.

UnitNo: 5 **Trees :** **(07 Hrs)**

Binary Tree: introduction, types, definition, properties, representations, operations, binary tree traversal, reconstruction, counting number of binary trees, applications.
Advanced trees : AVL trees or height balanced trees, representation operation, Threaded binary trees, Expression trees. Multi way trees: trees, multi way search trees, B+ trees, Heaps, construction of a Heap.

UnitNo: 6 **Graphs &Hashing**: **(08 Hrs)**

Introduction, Graph theory terminology, sequential representation of graphs: Adjacency Matrix, Path matrix, Warshall's Algorithm, shortest paths, linked representation. Operations, Traversing, Posets, Topological sorting. Hashing, Hash functions, collision, chaining

Minimum Ten Tutorials Based on above syllabus

Text Books:

1	Data structure using C By ISRD group, published by Tata McGraw Hill
2	Data structures by Seymour Lipschutz, published by Tata McGraw Hill

Reference Books:

1	Data structure & algorithm analysis in C by Mark Allen Weiss published by Pearson Education (LPE)
2	Introduction to Data structure in C by A.N. Kathie published by Pearson Education (LPE)

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ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Name of Subject: Programming Lab-II

Course Details:

Class	S.Y. B. Tech. Sem-IV
Course Code & Course Title	PCC-ETC-406
Prerequisites	Computer fundamentals
Teaching scheme: Lecture/Practical	**2/2**
Credits	**3**
Evaluation Scheme CIE/ESE for Theory	

Teaching Scheme		**Examination Scheme**
Lectures: 2hrs /week		Theory : Marks
Tutorial - /week		
Practical :2hrs /week		TW: 25 Marks POE: 50 Marks

Course Objectives:

The course aims to:

1. To understand features of object-oriented programming and design C++ classes
2. To understand how to overload functions and operators in C++.
3. To learn how to implement copy constructors and class member functions.
4. To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
5. To learn how design inheritance for code reuse in C++.
6. To learn how to design and implement generic classes with C++ templatesand exception handling

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Student will be able to understand the basic concepts of procedure oriented programming language.
2. Student will be able to use the class, objects, function and operator overloading concepts
3. Student will be able to understand and implement the concept of inheritance, template and exception handling applications
4. Student will be able to design & apply the skills for solving the engineering problems.

Course Contents		
UNIT 1	**Introduction To Object Oriented Programming** Difference between procedure oriented programming and object oriented programming, basic concepts and features of object oriented programming, structures and classes, declaration of class, member functions, defining the object of class, accessing member of class, array of class objects**.**	**04**
UNIT : 2	**Overloading** Function overloading, assignment operator overloading, binary operator overloading, unary operator overloading.	**04**

UNIT : 3	**Constructors And Destructors** Constructors- copy constructor, default constructors, destructors, inline member function, friend function, dynamic memory allocation.	**04**
UNIT : 4	**Polymorphism** Polymorphism, early binding, polymorphism with pointers, virtual functions, late binding, pure virtual functions, abstract base classes, constructor under inheritance, destructor under inheritance, virtual destructors, virtual base classes.	**04**
UNIT : 5	**Inheritance** Introduction, Single Inheritance, Types Of Base Classes- Direct, Indirect, Array Of Class Object And Single Inheritance, Multiple Inheritances.	**04**
UNIT : 6	**Template And Exception Handling** Function template, class template, exception handling.	**04**

Text Books:

1 Programming with C++ D Ravichandran, II edition, Tata Mc Grow Hill

2 Object oriented Programming with C++, E Balagurusamy, Mc Grow Hill

Reference Books:

1 The C++ Programming Language, Brian W. Kernighan, Dennis M. Ritchi , IInd edition, Prentice Hall of India.

List of Experiments (Minimum 10 + mini project):

1. Develop a Program for implementation of array
   a) One-dimensional array
   b) Multi-dimensional array
2. Develop a Program for implementation of classes and Objects.
3. Develop a Program for implementation of types of constructor
   a. Default constructor
   b. Parameterized constructor
   c. Copy constructor
4. Develop a Program for implementation of polymorphism
5. Develop a Program for implementation of Friend Functions in Class
6. Develop a Program for implementation of types of inheritance
   a. Single level Inheritance
   b. Multi-level Inheritance
   c. Multiple Inheritance
   d. Hybrid Inheritance
   e. Hierarchical inheritance
7. Develop an Object oriented Program to Insert the Number in an Array
8. Develop an Object oriented program to Delete the Number in an Array
9. Develop an Object oriented program on Bubble Sort
10. Develop an Object oriented program to Perform Linear or binary search
11. Develop an Object oriented program to Insert and delete a Node in Link List
12. Develop an Object oriented program to implement stack using linked list.
13. Mini project.

SHIVAJI UNIVERSITY, KOLHAPUR

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Accredited by NAAC 'A' Grade

Syllabus for

Third Year, Bachelor of Technology (T.Y.B. Tech.)
Electronics & Telecommunication Engineering Program
(w. e. f. Academic Year: 2020-21)

Semester V

Sr. No	Code No.	Subject	Semester	Credits
1.	PCC-ETC501	Signal and Systems	5	5
2.	PCC-ETC502	Electromagnetic Engineering	5	4
3.	PCC-ETC503	Digital and VLSI Design	5	5
4.	PCC-ETC504	Optical Communication	5	5
5.	OEC-ETC501	Open Elective – I	5	4
6.	PCC-ETC505	Simulation and Modeling	5	2
		Total		25

Semester VI

Sr. No	Code No.	Subject	Semester	Credits
1.	PCC-ETC601	Digital Signal Processing	6	5
2.	PCC-ETC602	Microprocessor and Microcontrollers	6	5
3.	PCC-ETC603	Power Electronics	6	5
4.	PCC-ETC604	Antenna and Wave Propagation	6	5
5.	OEC-ETC601	Open Elective – II	6	4
6.	PCC-ETC605	Mini Project	6	1
		Total		25

- **For Theory CIE 30 marks,**
  Two tests of 30 marks at college should be conducted and best of two marks should be communicated to university.
- **Guidelines to paper setter:**

  In theory ESE examination of 70 marks following pointes should be considered,

  Q.1 MCQ's based on complete syllabus. (Carries 14 Marks)

  Q.2 based on unit no 1, 2, 3 (Carries 14 Marks)

  Q.3 based on unit no 1, 2, 3 (Carries 14 Marks)

  Q.4 based on unit no 4, 5, 6 (Carries 14 Marks)

  Q.5 based on unit no 4, 5, 6 (Carries 14 Marks)

Third Year ELECTRONICS & TELECOMMUNICATION ENGINEERING – CBCS PATTERN

SEMESTER – V																						
Sr. No	Course (Subject Title)	TEAETCING SETCEME									EXAMINATION SETCEME											
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL			TERM		
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	Min	Hours	Max	Min	Hours	Max	Min
1	PCC-ETC501	4	4	4	1	1	1	-	-	-		CIE	30	100	12	As per BOS Guidelines	-	-	2	25	10
												ESE	70		28						
2	PCC-ETC502	3	3	3	1	1	1	-	-	-		CIE	30	100	12		-	-	2	25	10
												ESE	70		28						
3	PCC-ETC503	4	4	4	-	-	-	1	2	2		CIE	30	100	12		50	20	2	25	10
												ESE	70		28						
4	PCC-ETC504	4	4	4	-	-	-	1	2	2		CIE	30	100	12		50	20	2	25	10
												ESE	70		28						
5	OEC-ETC501	3	3	3	1	1	1	-	-	-		CIE	30	100	12		-	-	2	25	10
												ESE	70		28						
6	PCC-ETC505	1	1	1	-	-	-	1	2	2							50	20	2	25	10
	TOTAL	**19**	**19**	**19**	**3**	**3**	**3**	**3**	**6**	**6**				**500**			**150**			**150**	
SEMESTER –VI																						
1	PCC-ETC601	4	4	4	-	-	-	1	2	2		CIE	30	100	12	As per BOS Guidelines	-	-	2	25	10
												ESE	70		28						
2	PCC-ETC602	4	4	4	-	-	-	1	2	2		CIE	30	100	12		50	20	2	25	10
												ESE	70		28						
3	PCC-ETC603	4	4	4	-	-	-	1	2	2		CIE	30	100	12		-	-	2	25	10
												ESE	70		28						
4	PCC-ETC604	4	4	4	-	-	-	1	2	2		CIE	30	100	12		50	20	2	25	10
												ESE	70		28						
5	OEC-ETC601	3	3	3	1	1	1	-	-	-		CIE	30	100	12		-	-	2	25	10
												ESE	70		28						
6	PCC-ETC605	-	-	-	-	-	-	1	2	2							50	20	2	25	10
	TOTAL	**19**	**19**	**19**	1	1	1	**5**	**10**	**10**				**500**			**150**			**150**	
	TOTAL	**38**	**38**	**38**	**4**	**4**	**4**	**8**	**16**	**16**				**1000**			**300**			**300**	

CIE- Continuous Internal Evaluation
ESE – End Semester Examination

Note:

1. **PCC-ETC:** Professional Core course –Electronics & Telecommunication Engineering are compulsory.
2. **OCE-ETC:** Open Elective Course – Electronics & Telecommunication Engineering**:**
3. **Winter/Summer Internship/Industrial Training of minimum 15 day's compulsory and evaluation of the same will be carried out in Final year Project Phase internal assessment by respective Guide**

• Candidate contact hours per week : 30 Hours (Minimum)	• Total Marks for T.Y. Sem V& VI: **1600**
• Theory and Practical Lectures : 60 Minutes	• Total Credits for T.Y. Sem V & VI : **50**
• There shall be separate passing for theory and practical (term work) courses.	
(A) Non-Credit Self Study Course : Compulsory Civic Courses (CCC) For Sem I: CCC – I : Democracy, Elections and Good Governance **(B) Non-Credit Self Study Course : Skill Development Courses (SDC) For Sem II: SDC – I :** Any one from following (i) to (v) i) Business Communication & Presentation ii) Event management iii) Personality Development, iv) Yoga & Physical Management v) Resume, Report & proposal writing	

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: SIGNALS AND SYSTEMS

Course Details

Class	**T. Y. B. Tech. Sem - V**
Course Code and Course Title	**PCC-ETC 501: Signals and Systems**
Prerequisites	**Engineering Mathematics**
Teaching scheme :Lectures + Tutorial	**4 Hrs. + 1 Hr.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures : 4 Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Tutorial : 1 Hr. / Week	**TW: 25 Marks**

Course Objectives: The course aims to :	
1	To understand basic of CT & DT signals and their representation.
2	To understand basic of CT & DT system and their representation
3	To analyze CT & DT signals using Fourier transform
4	To compute DFT and IDFT
5	To analyze signals using Z-transform
6	To apply realization techniques for systems

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	Demonstrate use of signals and their representation.
2	Represent CT & DT system
3	Use Fourier transform for analysis of CT & DT signals
4	Compute DFT and IDFT
5	Analyze signals using Z-transform
6	Realize the systems

Course Contents		
Unit No: 1	**Signals and Classification of Signals** Continuous time signals & discrete time, analog & digital, even &odd signals, periodic &non-periodic, deterministic &non-deterministic, energy & power, Basic CT & DT signals: unit impulse, unit step, unit ramp, complex exponential & sinusoidal, Basic operations on signals, sampling and reconstruction of signal	**8 Hrs.**
Unit No: 2	**System and Classification of Systems** System Representation, properties of systems : continuous time Systems & discrete Systems, system with and without memory, causal and non-causal system, linear and nonlinear system, Time invariant and time variant system, Stability of system, Impulse response representation, convolution integral , convolution sum, properties of convolution .	**8 Hrs.**

Unit No: 3	**Fourier Transform** Fourier Transform , Fourier Transform of CT and DT signals, Properties of Fourier Transform, Fourier transform using properties, Limitations of Fourier Transform	**8 Hrs.**
Unit No: 4	**Discrete Fourier Transform** Discrete Time Fourier Transform , Discrete Fourier Transform , Inverse Discrete Fourier Transform(IDFT): Direct method, DFT using Twiddle factor, Properties,	**7 Hrs.**
Unit No: 5	**Z transform:** Introduction of Z-transform, ROC, properties of ROC, Unilateral Z-transform, properties of Z transform, Inverse Z-transform: long division method, PFE method, residue method.	**7 Hrs.**
Unit No: 6	**System Realization** Continuous time system representation by differential equation, discrete time system representation by difference equation , transfer function in Z-domain, Realization of discrete time systems by Direct from I and Direct Form II	**6 Hrs.**

Text Books:

1	S. Palani, " Signals and Systems", Ane Books Pvt. Ltd
2	P. Ramesh Babu, R. Anandanatarajan, " Signals and Systems " 4th Edition, SCITECH publication
3	A.Anand Kumar, "Signals and Systems", PHI publication

Reference Books:

1	Alan Oppenheim, Alan S. Willsky , "Signals and Systems ", 2nd Edition , PHI Publication.

2	Simon Haykin, Barry Van Veen, "Signals and Systems", 2nd Edition, Wiley Publication
3	Michael J. Roberts, "Fundamentals of signals & systems", Tata McGraw Hill Publication Publication, 2007.

Note: Minimum Ten Tutorials based on above syllabus.

Guidelines to paper setter:

In theory ESE examination of 70 marks following points should be considered:

Question paper should contain 70% numerical and 30% theory.

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: ELECTROMAGNETIC ENGINEERING

Course Details

Class	**T. Y. B. Tech. Sem - V**
Course Code and Course Title	**PCC-ETC502: Electromagnetic Engineering**
Prerequisites	**Engg. Mathematics, Physics**
Teaching scheme :Lectures + Tutorial	**3 Hrs.+ 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures : 3 Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Tutorial : 1 Hr. / Week	**TW: 25 Marks**

Course Objectives: The course aims to :	
1	Explain basic of Vector calculus & co-ordinate systems.
2	Define & derive different laws in steady electric & magnetic fields.
3	Apply Maxwell's equations in different forms to Develop wave equations.
4	Explain concepts of transmission lines

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	Explain the fundamentals of mathematical skills related with differential, integral and vector calculus.
2	Apply and analyze the concepts of steady electric & magnetic fields.
3	Develop field equations from understanding of Maxwell's Equations.
4.	Extend the knowledge of basic properties of transmission lines to analyze electromagnetic wave propagation in generic transmission line geometries.

Course Contents		
Unit No: 1	**Vector Algebra** Review of vector Analysis and coordinate systems, Basic vector algebra, Dot product, Cross product, curl, divergence, Gradient	**4 Hrs.**
Unit No: 2	**Electrostatics** Coulomb's law & electric field (Numerical Expected) , field due to distributed charges (Numerical Expected), Flux density (Numerical Expected), Gauss's law, divergence theorem, Electrostatic potential, potential gradient, electric dipole, Electrostatic energy density, Boundary conditions for electrostatic field.	**6 Hrs.**
Unit No: 3	**Steady Magnetic Field** Biot Savarts law (Numerical Expected), Ampere's circuital law (Numerical Expected), Stoke's Theorem, Magnetic flux density & Vector magnetic potential ,Current carrying conductors in magnetic fields, Torque on loop, Energy stored in magnetic field, Boundary conditions for magneto static field.	**7 Hrs.**
Unit No: 4	**Maxwell's Equations**	**3 Hrs.**

	Inconsistency of Ampere's law, Faraday's law, Maxwell's equations for static field, time varying field & harmonically varying fields, Comparison of field & circuit theory.	
Unit No: 5	**Electromagnetic Waves** Wave equation for free space and conducting medium, uniform plane wave equation ,general solution of uniform plane wave equation, intrinsic impedance, wave equation in phasor form, wave propagation in lossless medium, propagation characteristics of EM waves in free space ,conducting medium, good dielectrics and good conductors.	**8 Hrs.**
Unit No: 6	**Transmission Lines** Transmission line equations, Transmission line parameters, Infinite line, terminated uniform transmission line, Reflection coefficient, VSWR, group velocity, phase velocity, Smith chart (Numerical expected on Reflection coefficient, VSWR and impedance matching using Smith chart)	**8 Hrs.**

Text Books:

1	John D. Kraus, "Electromagnetics", Tata Mc Graw Hill
2	William Hayt, Buck, "Engineering Electromagnetics", Tata Mc Graw Hill.
3	G.S.N. Raju, "Antenna and Wave Propagation", Pearson Education.
4	Sadiku, "Elements of Electromagnetics", 4th edition, Oxford University Press

Reference Books:

1	Jordan & Balmain, "Electromagnetic Fields & Radiation Systems", 2nd edition, PHI
2	G.S.N. Raju, "Electromagnetic field theory & Transmission lines", 1st edition, Pearson Education.

Note: Minimum Eight Tutorials based on above syllabus.

1) Guidelines to paper setter:

A) In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

2) Question paper should include 70% theory and 30% numerical.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: DIGITAL AND VLSI DESIGN

Course Details

Class	**T. Y. B. Tech. Sem - V**
Course Code and Course Title	**PCC-ETC503 : Digital and VLSI Design**
Prerequisites	**Fundamentals of Electronics**
Teaching scheme : Lectures + Practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures : 4 Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Practical : 2 Hrs. / Week	**TW: 25 Marks** **POE: 50 Marks**

Course Objectives: The course aims to :	
1	Understand principles and operations of combinational & sequential logic circuits.
2	Design & implement digital circuits (combinational & sequential) using VHDL
3	Explain students the fundamental concepts of Hardware Description Language and design flow of digital system design.

Course Outcomes:

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

1	Apply Boolean laws/K-Map-method, to reduce a given Boolean function
2	Design & realize combinational logic circuits using logic gates.
3	Demonstrate the operation of flip-flops, counters , shift registers Synchronous sequential machine using Moore and Mealy machine
4	Design combinational and sequential logic circuits using various description techniques in VHDL

Course Contents		
Unit No: 1	**Basics of digital systems:** Generation of Switching Equations from Truth Table , Canonical forms ,K-map(Karnaugh map) 2,3,4 and 5 variables, K map with Don't care terms - Quine Mc-Cluskey minimization technique, Quine Mc-Cluskey using Don't Care Terms ,Binary codes, Code Conversion.	**7 Hrs.**
Unit No: 2	**Introduction to VHDL:** Level of abstraction. Need of HDL,VLSI Design flow, Features and capabilities of VHDL, Elements of VHDL (Entity Architecture, Library, Package, and Configuration), Modeling styles in VHDL, Identifiers, operators , Data objects, data types, literals, Delay Models, Concurrent and sequential statement.	**7 Hrs.**
Unit No: 3	**Combinational logic Design :** Adder, Subtractor, Code converters (binary to gray & gray to binary, BCD to Excess 3 and vice versa, BCD to 7 segment display),Multiplexer and Demultiplexer , Encoder, Priority encoder, Decoder, Comparator , ALU, Barrel shifter. VHDL coding for combinational circuits.	**7 Hrs.**
Unit No: 4	**Sequential logic Design:** 1-Bit Memory Cell, Latches (SR, JK, D and T), Clocked latches (SR,	**7 Hrs.**

	JK, D and T), flips flop (SR, JK, T and D). Use of preset and clear, Excitation Table for flip flops, and Conversion of flip flops, Timing parameters of FF, Shift registers (SISO, SIPO, PIPO, and PISO). VHDL coding for Sequential circuits.	
Unit No: 5	**Counters and Finite State Machines:** Counter – ripple counters ,synchronous counters , Up/down counters, Ring counters, Johnson Counter, MOD-N counter, FSM, Moore/Mealy machines, state diagram, state table, state assignment and state reduction, Sequence detector. VHDL coding for Counters and FSM.	**7 Hrs.**
Unit No: 6	**Semiconductor Memories and Programmable Logic Devices** Memory devices: ROM, PROM, EPROM, EEPROM, RAM, SRAM, DRAM, NVRAM, Programmable logic devices: PAL ,PLA,CPLD and FPGA .Logic implementation using Programmable Devices (ROM, PLA)	**7 Hrs.**

Text Books:

1	A. Anand Kumar, "Fundamentals of digital circuits", 4th edition, PHI publication, 2016
2	Stephen Brown and ZvonkoVranesic, "Fundamentals of Digital Logic with VHDL design", Tata Mc-graw Hill

Reference Books:

1	Wakerly, "Digital Design Principles and Application", Pearson Education
2	M. Morris Mano, " Digital Design", 3rd Edition , Pearson Education
3	Roth John, "Principals of Digital System Design using VHDL", Cengage Learning.
4	R. P. Jain, "Modern digital electronics", 3rd edition, 12th reprint TATA Tata McGraw Hill Publication, 2007

List of Experiments (Minimum 8 experiment):

1	Implementation of Boolean function using IC.
2	Design and simulate half adder and full adder using VHDL.
3	Design and simulate Multiplexer and Demultiplexer using VHDL.
4	Design and simulate Comparator adder using VHDL.
5	Design and simulate 3to8 decoder using VHDL.
6	Design and simulate flip-flops using VHDL.
7	Design and simulate 4-bit up-down counter using VHDL.
8	Design and simulate Shift register using VHDL.
9	Design and simulate Sequence detector using VHDL.
10	Mini project based on above syllabus.

Note:

1) **Guidelines to paper setter: (30 % weightage to VHDL codes and 70% theory)**

2) **In theory ESE examination of 70 marks following points should be considered,**

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: OPTICAL COMMUNICATION

Course Details

Class	**T. Y. B. Tech. Sem - V**
Course Code and Course Title	**PCC-ETC504:Optical Communication**
Prerequisites	**Physics, Optoelectronics**
Teaching scheme : Lectures + Practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures : 4 Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Practical : 2 Hrs. / Week	**TW: 25 Marks** **POE: 50 Marks**

Course Objectives:	
The course aims to :	
1	Describe the basics optical communication along with optical fiber structure and light propagating mechanisms in detail.
2	Analyze the signal degradation mechanisms
3	Explain the construction and working of optical sources and detectors.

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	Differentiate the different types of optical fiber structures and light propagating mechanisms.
2	Acquire knowledge of signal degradation mechanism in optical fiber.
3	Understand the construction of and working of optical sources and detectors.

Course Contents		
Unit No: 1	**Overview of Optical Fiber Communication** Motivation for light wave communication, Basic Network Information Rates, The evolution of Optic System, Elements of Optical Fiber Transmission Link, optical spectral band, The nature of Light, Basic Optical Laws and Definitions, Single Mode Fibers, Graded Index fiber structures.	**6 Hrs.**
Unit No: 2	**Optical Fibers: Structures and Wave guiding** Optical Fiber Modes and Configurations, Mode theory for waveguides, Fiber Materials, Fiber Optic cables.	**6 Hrs.**
Unit No: 3	**Transmission characteristics of optical fibers.** Attenuation, material absorption losses, Scattering losses, bending losses, dispersion, polarization, nonlinear effects.	**8 Hrs.**
Unit No: 4	**Optical Sources** Attenuation, material absorption losses, Scattering losses, bending losses, dispersion, polarization, nonlinear effects.	**7 Hrs.**
Unit No: 5	**Optical Receiver** Physical Principal of Photodiodes, Photo detector Noise, Detectors Response Time, Structure for InGaAsAPDs, Temperature effect of Avalanche Gain, Comparison of Photo detectors , Fundamental	**7 Hrs.**

	Receiver Operation, Digital Receiver Performance	
Unit No: 6	**Advances in Optical Fiber System** Operational Principles of WDM, Passive Components, Tunable Sources, Tunable Filters, optical switching, SONET/SDH, Performance of WDM+EDFA Systems, optical CDMA	**8 Hrs.**

Text Books:

1	Gerd Keiser, "Optical Fiber Communication", 5th Edition, Tata Mcgraw Hill Publication.

Reference Books:

1	Senior, "Optical Communication", 3rd Edition, Pearson Education.
2	Agarwal, "Optical Fiber Communication", 3rd edition, Wiley India.
3	Ramaswamy, "Optical Networks" , Elsevier India
4	R. P. Khare, "Fiber optics and optoelectronics", Oxford University Press
5	Anuradha, "Optical fiber and laser principles and applications", New Age Publications.
6	Dr .R .K .Singh "Fiber optic communication systems", Willey India.

List of Experiments (Minimum 8 experiment):

1	Study of optic fiber communication system.
2	Transmission and reception of analog signal using optical fiber.
3	Transmission and reception of digital signal using optical fiber.
4	Frequency modulation using optic fiber link.

5	Calculation of bending loss in the optic fiber link.
6	Study of numerical aperture.
7	Study & calculation of attenuation loss in optic fiber link.
8	PC to PC communication by using optical cable
9	Study of characteristics of LED.
10	Study of characteristics of LASER.
11	Frequency modulation by using voice link.
12	Study of Pulse width modulation using optic fiber.
13	Two experiment based on simulation.
14	Study of coupling light into fiber.

Note:

Guidelines to paper setter:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: INDUSTRIAL AUTOMATION (Open Elective-I)

Course Details

Class	**T. Y. B. Tech. Sem - V**
Course Code and Course Title	**OEC-ETC 501: Industrial Automation**
Prerequisites	**Basics of Control System Engineering & Mathematics.**
Teaching scheme: Lectures + Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching Scheme

Teaching scheme	**Examination scheme**
Lectures : 3 Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Tutorial : 1 Hr. / Week	**TW: 25 Marks**

Course Objectives : **The course aims to**	
1	Understand the fundamentals and importance of industrial automation systems
2	Learn to develop a PLC program for an automatic control system and its applications
3	Understand the mechanism, architecture, working principles and applications of DCS and SCADA

Course Outcomes : **Upon successful completion of this course, the students will be able to:**	
1	Demonstrate the working of PLC,DCS and SCADA
2	Apply the concept; analyze the importance and application of industrial automation.
3	Compile ideas into new different solutions with the help of programming languages as per IEC 61131-3.
4	Apply the knowledge of automation for design and development of Graphical user interface for different process.
5	Use the advanced software tools for Industrial Automation such Codesys ,GX Works 2, RS logix 5000 , Delta V Explorer etc.

Course Content		
Unit No:1	**Introduction to PLC** Part A: Automation: fundamentals of industrial automation, need and role of automation, evolution of automation. PLC introduction :types of processes, comparison, evolution of PLC, definition, functions, advantages, Architecture, DI-DO-AI-AO examples and ratings, I/O module, working of PLC, scan time, Installation of PLC, Rack installation, Grounding and shielding, physical, electrical, maintenance requirements, planning, verifying. Troubleshooting, Fault diagnosis techniques. Part B: Choosing PLC for application, Types and Specifications of PLC	**8 Hrs.**
Unit No:2	**PLC Programming and Interfacing** Part A: PLC programming: Development of Relay Logic Ladder Diagram, Introduction to PLC Programming, Programming devices and	**7 Hrs.**

	languages as per IEC 61131-3 like IL, ST, FBD, CFC, SFC, PLC Timers and Counters, Installation and Troubleshooting. PLC Interfacing: PID Control using PLC, PID instruction. PLC Interface to Hydraulic/Pneumatic circuits, solid-state devices, Need of interfacing Part B: PLC Selection, PLC interface to temperature control loop.	
Unit No:3	**SCADA System** SCADA Concept of SCADA systems, Programming techniques for : Creation of pages, Sequencing of pages, Creating graphics & animation, Dynamos programming with variables, Trending, Historical data storage & Reporting, Alarm management, reporting of events and parameters. Comparison of different SCADA packages.	**7 Hrs.**
Unit No:4	**Introduction to DCS** Part A: DCS Introduction, Location of DCS in Plant, functions, advantages and limitations, Comparison of DCS with PLC,.DCS components/ block diagram, Architecture, Functional requirements at each level, Database management Part B: Latest trends and developments of DCS and its specifications.	**8 Hrs.**
Unit No:5	**DCS Hardware** Part A: Layout of DCS, Controller Details, Redundancy, I/O Card Details, Junction Box and Marshalling Cabinets, Operator Interface, Workstation Layout, different types of control panels, types of Operating Station,. Programming as per IEC 61131-3, Advantages, Overview of Programming Languages, Device Signal Tags, Configuration, Programming for Live Process Part B: Power supply cards details, various display configurations.	**7 Hrs.**

Text Books

1	John Webb, “Programmable Logic Controllers”, Prentice Hall of India.
2	Gary Dunning, “Introduction to Programmable Logic Controllers”, Delmar Thomson Learning.

3	Popovik -Bhatkar, "Distributed Computer Control for Industrial Automation", Dekkar Publications.
4	S. K. Singh, "Computer Aided Process Control", Prentice Hall of India.
5	Krishna Kant, "Computer Based Process Control", Prentice Hall of India.

References Books

1	Richard Cox, "Programmable Controllers", International Thomson Computer Press
2	B. G. Liptak, "Instrument Engineer's Handbook – Process Software and Digital Network", CRC Press

Note:

Guidelines to paper setter:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: BIOMEDICAL INSTRUMENTATION (Open Elective-I)

Course Details

Class	**T. Y. B. Tech. Sem - V**
Course Code and Course Title	**OEC-ETC 501: Biomedical Instrumentation**
Prerequisites	**Fundamentals of Anatomy & Physiology, Scientific Knowledge of Sensors & Actuators**
Teaching scheme: Lectures + Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching Scheme

Teaching scheme	**Examination scheme**
Lectures : 3 Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Tutorial : 1 Hr. / Week	**TW: 25 Marks**

Course Objectives:

The course aims to,

1	Understand the anatomy and physiology of human body.
2	Study biomedical and physiological information.
3	Implement the application of electronics in diagnostic and therapeutic processes by considering all safety measures.

Course Outcomes: **Upon successful completion of this course, the students will be able to,**	
1	Express the anatomy and physiology of human body.
2	Explain the process to capture Bioelectric signal.
3	Apply knowledge of Diagnostic and Therapeutic equipment's.
4	State medical safety aspects

Course Content		
Unit No:1	**Anatomy And Physiology** Human Anatomy & Physiology: Anatomy & Physiology Of Heart And Brain. Principles Of Generation And Propagation Of Bioelectric Potentials. Electrical Activity Of Heart, Propagation Of Action Potential. Study Of Bioelectric Signals ECG,EMG, ERG,EOG, EEG	**7 Hrs.**
Unit No:2	**Medical Instrumentation System** Generalized Medical Instrumentation System, Basic Requirements Of Bio Potential Amplifiers, Bio Potential Amplifiers For ECG, EMG And EEG. Biopotential Electrodes: Polarizable & Non Polarizable Electrodes, Body Surface Recording Electrodes, Internal Electrodes, Microelectrodes, Electrodes For Electric Stimulation Of Tissue, Ph-Electrodes Theory Of Electrode-Skin Interface And Motion Artifact, Transducers: Classification, Transducers For Biomedical Applications.	**7 Hrs.**
Unit No:3	**Bioelectric Signal Capture Process** ECG: working principles, electrode systems and clinical applications:	**7 Hrs.**

	EEG: working principles lead systems and clinical applications EMG: working principles and clinical applications. Evoked potential systems, Phono cardiology graph – principle and clinical applications, bio potential recording- noise, motion artifact.	
Unit No:4	**Diagnostic Equipment** Diagnosis and therapeutic equipment's: diagnostic equipment- electronic BP monitors, pulse monitors, electro cardio scope , Spiro meter, pulse oxy-meter, ECG machine, EEG machine, EMG machine, EOG machine, ERG machine, PH meter, auto analyzer, gas analyzer.	**6 Hrs.**
Unit No:5	**Therapeutic Equipment** Therapeutic equipment's- pacemakers, defibrillator, heart- lung machine, nerve and muscle stimulators, dialysis machines surgical diathermy equipment, micro wave- short wave and ultrasound diathermy equipment's, nebulous, inhalator, aspirator humidifier and ventilators.	**6 Hrs.**
Unit No:6	**Safety Aspects of Patient** Electric shock hazards, leakage currents, Testing of Biomedical Equipment, biological effects of X-rays and precautions	**6 Hrs.**

Text Books

1	Leslie Cromwell, "Biomedical instrumentation and Measurements", 2nd Edition, Pearson Prentice Hall.
2	RS Khandpur, "Handbook of Biomedical Instrumentation", 3nd Edition, Tata McGraw Hill Publication.
3	John G. Webster , "Medical Instrumentation Application and Design", 3rd Edition, Wiley

References Books

1	Tatsuo Togawa, Toshiyo Tamura, P.Ake Oberg, "Biomedical Transducers and Instruments", CRC.
2	Jacob Klime, "Handbook of Biomedical Engineering", Academic press Inc.

Note:

Guidelines to paper setter:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: SIMULATION & MODELING

Course Details

Class	**T. Y. B. Tech. Sem - V**
Course Code and Course Title	**PCC-ETC505:Simulation and Modeling**
Prerequisites	**C, C++ Programming**
Teaching scheme : Lectures + Practical	**1 Hr. + 2 Hrs.**
Credits	**1 + 1**
Evaluation Scheme ESE + CIE for Theory	**NIL**

Teaching scheme	**Examination scheme**
Lectures : 1 Hr. / Week	**Theory :NIL**
Practical: 2 Hrs. / Week	**TW: 25 Marks** **OE: 50 Marks**

Course Objectives:	
The course aims to :	
1	To develop problem solving skills and their implementation through basic Python
2	To understand and implement concepts of decision making statements
3	To implement programs based on looping statements
4	To understand & implement programs based on built in functions
5	To develop simulations using python Simpy package

Course Outcomes:	
Upon successful completion of this course, the students will be able to:	
1	Understand the python programming basics
2	Able to solve programs on decision making & looping statements in python
3	Understand python list, tuple, and dictionary collection concepts
4	Understand simulation programs using SimPy Library
5	Design & Apply Simpy library functions to model real time problems.

Course Contents		
Unit No: 1	**Introduction to Python** Introduction to Python: Why high level language, Scope of python, interactive mode and script mode. Variables, Operators and Operands in Python. Arithmetic, relational and logical operators, Operator precedence, Taking input using raw_input() and input() method and displaying output - print statement, Comments in Python.	**2Hrs.**
Unit No: 2	**Conditional and Looping** if - else statement and nested if – else while, for, use of range function in for, Nested loops, break, continue, pass statement Use of compound expression in conditional constructs, Nested conditional statements, Nested Looping structures	**2Hrs.**
Unit No: 3	**Functions** Built-In Function, Functions from math, random, time & date module. Composition User Define Function : Defining , invoking functions, passing parameters, Intra-package References, Packages in Multiple Directories	**2Hrs.**
Unit No: 4	**List:** Lists Concept of mutable lists, creating, initializing and accessing the elements of list, List operations, Concatenation, Membership, list slices,	**2Hrs.**

	List comprehensions List functions & methods: len, insert, append, extend, sort, remove, reverse, pop functions	
Unit No: 5	**Tuples& sets**: Immutable concept, creating, initializing and accessing the elements in a tuple; Tuple functions: cmp(), len(), max(), min(), tuple() Sets Concept of Sets , creating, initializing and accessing the elements of Sets operation Membership, union, intersection, difference, and symmetric difference Dictionaries Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, Traversing, appending, updating and deleting elements	**2Hrs.**
Unit No: 6	**Simulations using Simpy** Basic Concepts, understanding of SimPy's capabilities, Process Interaction, Waiting for a Process, Interrupting Another Process, Real-time simulations.	**2Hrs.**

Text Books:

1	Martin C. Brown , "Python: The Complete Reference", Tata McGraw Hill Publication, 2018
2	Mark Lutz, "Learning Python" , O'Reilly Publication edition 2013
3	Michael Dawson, "Python Programming for Absolute Beginner", Cengage Learning edition 2010

Reference Books:

1	David Beazley, "Python Essential Reference", 4th edition, Developers library.
2	Web reference SimPy: https://simpy.readthedocs.io/

List of Experiments (Minimum 8 experiment):

1	Write a python program to demonstrate basic data types in python
2	Write python program to study Arithmetic, relational and logical operators and Operands in Python.
3	Write python programs to study if, if else , if else if statements
4	Write python programs to study looping statements while & for
5	Write python programs to study built in functions of string and math packages
6	Write python programs to study list access using membership operators.
7	Write python programs to study tuple using inbuilt functions
8	Write python programs to study set operations and dictionary traversing
9	Write python programs to study Discrete event simulation using SimPy

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: DIGITAL SIGNAL PROCESSING

Course Details

Class	**T. Y. B. Tech. Sem - VI**
Course Code and Course Title	**PCC-ETC 601: Digital Signal Processing**
Prerequisites	**Signals and Systems**
Teaching scheme :Lectures + Practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures : 4 Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Practical: 2 Hrs. / Week	**TW: 25 Marks**

Course Objectives: The course aims to :	
1	To understand Fast Fourier Transform and Fast Convolution
2	To understand design of digital FIR filters using various methods
3	To understand design of digital IIR filters using various methods
4	To understand the key architectural features of DSP Processor
5	To understand the basic concept of Multirate digital signal processing
6	To understand the basic concept of wavelet transform

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	Make use of FFT algorithm for filtering of long duration sequences
2	Design digital FIR filters
3	Design digital IIR filters
4	Implement FIR and IIR filters using DSP Processor
5	Apply the basic concept of Multirate digital signal processing
6	Apply the basic concept of wavelet transform

Course Contents		
Unit No: 1	**Discrete Fourier Transform & FFT Algorithms** Computational Complexity of DFT, Fast Fourier transform algorithms – Radix -2 DIT and DIF for DFT and IDFT computations, Circular convolution, Fast Convolution : Overlap-Add and Overlap-save algorithm.(Numerical)	**8 Hrs.**
Unit No: 2	**FIR Filter Design** Characteristic of FIR filter, properties of FIR filter, type of FIR filter Fourier series method, frequency sampling, Fourier series & windowing method.	**8 Hrs.**
Unit No: 3	**IIR Filter Design** Analog filters approximations, mapping of S-plane to Z-plane, Design of IIR using Impulse Invariance Method, Bilinear Transformation method, Frequency Transformation, Filter design methods: Butterworth filters, Chebyshev filters and its conversion to digital filter.	**8 Hrs.**

Unit No: 4	**Realization of Digital filters** FIR and IIR filter realization in cascade form and parallel form .Effect of finite word length on realization. Introduction to DSP processors: TMS320C67XX, Architecture, Functional Units, pipelining, Registers, Addressing modes.	**8 Hrs.**
Unit No: 5	**Multirate digital signal processing** Need of Multirate digital signal processing , decimation by factor D, two stage decimator, interpolation by factor I , two stage Interpolator , sampling rate conversion by rational factor I/D , applications of multirate signal processing	**6 Hrs.**
Unit No: 6	**Wavelet Transform** Fourier Transform and its limitations , short time Fourier transform, continuous wavelet Transform , Discretization of the continuous wavelet Transform, Multiresolution Approximations ; mother wavelet and Scaling functions, Haar wavelets and Daubechies wavelets, Applications of wavelet transform	**6 Hrs.**

Text Books:

1	John G Prokis, Manolakis, "Digital Signal Processing Principles, Algorithms and Application", Pearson Education publication
2	Salivahanam, A Vallavaraj, C. Guanapriya, "Digital Signal Processing", Tata McGraw Hill Publication.
3	A. Anand Kumar, " Digital Signal Processing", PHI Publications

Reference Books:

1	P. Ramesh Babu, "Digital Signal Processing" , SciTech Publication
2	Sanjeet Mitra, " Digital Signal Processing", Tata McGraw Hill Publication.

3	Alan Oppenheim, Schafer, "Digital Signal Processing ", PHI Publication

List of Experiments (Minimum 8 Experiments)

1	Generation of DT signals a) Study of Unit impulse sequence b) Study of Unit step sequence c) Study of Exponential sequence d) Study of Sinusoidal sequence
2	Convolution and correlation of signals
3	Computation of DFT & IDFT using standard formula
4	Computation of DFT using FFT algorithms
5	Computation of circular convolution
6	Design of FIR LPF, HPF, BPF, BRF filter using Kaiser window
7	Design of FIR filter using frequency sampling method
8	Design of IIR LPF, HPF, BPF, BRF filter using impulse invariance method
9	Design of IIR LPF, HPF, BPF, BRF filter using bilinear transformation method
10	Computation of DCT
11	Computation of DWT
12	To implement FIR & IIR filter using TMS320C67XX processor

Note:

Guidelines to paper setter:

In theory ESE examination of 70 marks following points should be considered:

Question paper should contain 50% numerical and 50% theory.

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: MICROPROCESSOR AND MICROCONTROLLER

Course Details

Class	**T. Y. B. Tech. Sem - VI**
Course Code and Course Title	**PCC-ETC 602: Microprocessor and Microcontroller**
Prerequisites	**Digital Electronics, Fundamentals of 'C' Programming**
Teaching scheme :Lectures + Practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures : 4 Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Practical : 2 Hrs. / Week	**TW: 25 Marks** **POE: 50 Marks**

Course Objectives:	
The course aims to :	
1.	Understand fundamentals of 8085 Architecture and Programming.
2.	To apply the knowledge of Interrupts and interfacing of memory, 8255with 8085.
3.	Understand fundamentals of 8051 Architecture and Programming.
4.	Analyze Real time requirements using ON-Chip resources of 8051.
5.	Evaluate need of I/O peripherals to satisfy system design requirements.
6.	Develop Embedded 'C' Programs for I/O Peripherals

Course Outcomes:	
Upon successful completion of this course, the students will be able to:	
1.	Describe Architecture of 8085 and write various Programs.
2.	Implement Interrupts and interfacing of memory, 8255 with 8085.
3.	Describe Architecture of 8051 and write various Programs.
4.	Perform experiment using ON-Chip resources of 8051.
5.	Select I/O peripherals to satisfy system design requirements.
6.	Design Embedded 'C' Programs for I/O Peripherals

Course Contents		
Unit No: 1	**Introduction to 8085 Microprocessor** Functional Pin out, CPU Architecture, Register Organization, Reset Circuit, Clock Circuit, De- multiplexing of Address/Data bus, Generation of control signals, Addressing Modes, Instruction set and programming, Timing diagrams.	**9 Hrs.**
Unit No: 2	**8085 Stack, Interrupts and Interfacing** Stack &Subroutines, Interrupts structure of 8085, Memory mapped I/O, I/O mapped I/O, Memory interfacing with 8085, Study of 8255 PPI : Block diagram, I/O and BSR Mode and Interfacing to 8085	**7 Hrs.**
Unit No: 3	**Introduction to MCS51** Introduction to MCS51Family, Functional Pin out diagram, Architecture, Register Organization, Memory Organization, Reset Circuit, Machine Cycle, Oscillator Circuit, Addressing Modes, Instruction Set, Assembly Language Programming.	**9 Hrs.**
Unit No: 4	**Hardware overview** Input / Output Ports, Interrupts, Timers/Counters, Serial Communication (Mode-1), (Structure, Related S.F.R and Programming).	**7 Hrs.**

Unit No: 5	**Interfacing & Assembly Language Programming with 8051 Microcontroller** Keyboard, Seven Segment display, ADC, DAC, stepper motor .	**6 Hrs.**
Unit No: 6	**Embedded 'C' Programming for 8051** Data types, Programs on Arithmetic & Logical operations, Input / Output Ports, Timer/Counter, Serial communication, ADC, LCD	**6 Hrs.**

Text Books:

1	Ramesh Gaonkar " Microprocessor Architecture Programming and Applications with the 8085", , 5th Edition , Penram International Publication
2	Muhammad Ali Mazidi, Janice Gillispie, Rolin D. McKinlay "The 8051 Microcontroller & Embedded Systems Using Assemble and C", 2nd Edition, Pearson Education,
3.	Kenneth Ayala, "The 8051 Microcontroller" , 3rd Edition , Cengage Learning India Private Limited

Reference Books:

1	Douglas V Hall, "Microprocessors and Digital Systems"
2	I.Scott Mackenzie, Raphael C.W.Phan, "The 8051 Microcontroller" , 4th Edition, Pearson
3	Ajay V. Deshmukh, "Microcontrollers [Theory and Applications]", Tata McGraw Hill Publication.

List of Experiments (Minimum 10 experiment):

1	Arithmetic & Logical operations using 8085
2	Data transfer & Exchange using 8085

3	Data conversions using 8085
4	Interrupt's Programming for 8085
5	Arithmetic & Logical operations using 8051
6	Ascending/ Descending order sorting using 8051
7	Interface ADC using 8051
8	Interface DAC using 8051
9	Interface Stepper motor using 8051
10	Use of Timer & counter operation in 8051 using Embedded C
11	Serial Communication with 8051 using Embedded C
12	Interface LCD to 8051 using Embedded C

Note:

Guidelines to paper setter:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME- POWER ELECTRONICS

Course Details

Class	**T. Y. B. Tech. Sem - VI**
Course Code and Course Title	**PCC-ETC603: Power Electronics**
Prerequisites	**Semiconductor Theory**
Teaching scheme :Lectures + Practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures : 4 Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Practical : 2 Hrs. / Week	**TW: 25 Marks**

Course Objectives: The course aims to :	
1	Make students aware of semiconductor power devices with its firing circuits.
2	Prepare students to design and simulate Controlled rectifier circuits.
3	Make students aware to the Utilization of Choppers and Inverters
4	Explain Industrial applications of Power Electronics Circuits.

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	Understand the characteristics of various power electronics devices and Compare the different firing circuits.
2	Analyze converters, Inverters and Choppers.
3	Understand the Industrial applications of Power circuits.

Course Contents		
Unit No: 1	**Semiconductor Power Devices** Construction and V-I Characteristics, Dynamic Characteristics during turn on, turn off, SCR Turn off methods: Class A, Class B, Class C, Class D, Class E, & Class F, dv/dt & di/dt protection circuits. Construction, working, & V-I Characteristics of Diac, Triac, GTO, Power MOSFET and IGBT.	**8 Hrs.**
Unit No: 2	**Firing Circuits of SCR** Turn On methods of SCR, UJT triggering circuits with design, PUT, Diac and Triac triggering circuits, Cosine based firing for bridge controlled converter. Need of Isolation. Pulse transformer & Opto-coupler based isolation techniques.	**6 Hrs.**
Unit No: 3	**Controlled Rectifiers** Single Phase Half wave, Full wave, Half controlled and Full controlled	**7 Hrs.**

	converters with R & RL Load, effect of Freewheeling Diode. Calculations of performance parameters and Numerical expected.	
Unit No: 4	**Inverters using MOSFET/IGBT's** Principle and operation of Single phase half bridge and full bridge inverters. Harmonic reduction techniques of inverter: Quasi square wave, Multiple PWM and sine wave PWM. (Analytical treatment not expected)	**6 Hrs.**
Unit No: 5	**Choppers and its Applications** a)Basic principles of choppers, time ratio control and current limit control techniques, voltage commutated chopper circuit, Jones chopper, Morgan's chopper, step-up chopper and AC chopper. b) Speed control of DC series motors using chopper, speed control of DC shunt motor using phase controlled rectifiers.	**8 Hrs.**
Unit No: 6	**Industrial Applications** Static circuit breakers, over voltage protectors, zero voltage switch, integral cycle triggering, time delay method, soft start method. Non-drive applications using induction heating and Dielectric heating, Switched mode power supply (SMPS), Uninterrupted power supply (UPS), Battery charger, light dimmer using triac and diac, A.C. voltage stabilizer –Relay type, Servo type	**8 Hrs.**

Text Books:

1	P. S. Bhimbra , "Power Electronics", Khanna Publication.
2	P. C. Sen, "Power Electronics", MGH publication
3	M. D. Singh & Khan Chandani, "Power Electronics", McGraw Hill publication,

Reference Books:

1	Ned Mohan: Power Electronics; Wiley Pub.
2	M. H. Rashid, "Power Electronics", Pearson.
3	V. R. Moorthi, "Power Electronics: Devices, Circuits and Industrial Applications", Oxford University Press

List of Experiments (Minimum 8 experiments):

1	Study of V-I Characteristics of SCR TRIAC, DIAC.
2	Study of V-I Characteristics of MOSFET/IGBT/GTO
3	Study of Firing circuits using UJT as relaxation oscillator/RAMP- Pedestal Circuit
4	Study of Firing circuits using TRIAC, DIAC
5	Study of Half controlled Bridge rectifier
6	Study of Fully controlled Bridge rectifier
7	Study of AC voltage Regulator

8	Study of Jones chopper and Morgan's chopper
9	Study of Single phase Inverter
10	Study of SMPS/UPS
11	Study of Light dimmer using Diac/Triac
12	Study of A.C. Voltage stabilizer

Note:

Guidelines to paper setter:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: ANTENNA AND WAVE PROPAGATION

Course Details

Class	**T. Y. B. Tech. Sem - VI**
Course Code and Course Title	**PCC-ETC604: Antenna and Wave Propagation**
Prerequisites	**Basics of Electromagnetic theory, Maxwell's equations and concepts of transmission lines**
Teaching scheme : Lectures + Practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures : 4Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Practical : 2 Hrs. / Week	**TW: 25 Marks** **POE:50 Marks**

Course Objectives:	
The course aims to :	
1	Basic parameters of antennas and their principle of operation
2	Different Antenna types to know their applications in various domains.
3	Different types of wave propagation Techniques

Course Outcomes:	
Upon successful completion of this course, the students will be able to:	
1	Realize the importance of basics of antenna systems to differentiate the applicability of each type of antenna
2	Analyze the utilization of Antenna systems in wide areas like wireless communication, fixed line communication, computer communication etc.
3	Discuss radio wave propagation

Course Contents		
Unit No: 1	**Fundamentals of Antenna** Basic Antenna parameters, pattern , beam area, radiation intensity, beam efficiency, directivity, gain and resolution, antenna aperture, effective height, radio communication link, field from oscillating dipole, field zones. Linear, Elliptical and Circular polarization, Front to back ratio, Antenna impedance.	**7 Hrs.**
Unit No: 2	**Antenna array and Frequency independent antenna** Array of two isotropic point sources, non-isotropic but similar point source and the principle of pattern multiplication, examples of pattern synthesis by pattern multiplication, non-isotropic and dissimilar point sources, linear array of isotropic point source of equal amplitude and spacing. Broadband basics, frequency-independent concept: Rumsey's principle, the frequency independent planner log-spiral antenna, frequency independent conical-spiral	**9 Hrs.**

	antenna, the log periodic antenna, the composite yagi-uda corner-log-periodic array.	
Unit No: 3	**Antenna Measurement and Microstrip Antenna:** Antenna measurement: Antenna ranges, Radiation pattern, Gain measurements, Directivity measurements Microstrip Antenna: Introduction, Basic characteristics, Feeding methods, Rectangular patch, Circular patch	**6 Hrs.**
Unit No: 4	**Ground Wave Propagation** Potential Functions and the Electromagnetic Field, Potential Functions for sinusoidal oscillations, Plane earth reflection, space wave and the surface wave, elevated dipole antennas above a plane earth, wave tilt of the surface wave, spherical earth propagation, troposphere wave	**8 Hrs.**
Unit No: 5	**Ionospheric Wave Propagation** The ionosphere, effective permittivity and conductivity of an ionized gas, reflection and refraction of the waves by the ionosphere, regular and irregular variations of ionosphere, attenuation factor, sky wave transmission calculations, effect of earth magnetic field, wave propagation in ionosphere, Faraday rotation and measurement of total electron content, other ionosphere phenomena.	**8 Hrs.**
Unit No: 6	**Radar System:** Fundamentals, RADAR performance factors, basic pulsed radar system, antennas and scanning, display methods, pulsed radar	**6 Hrs.**

	systems, moving target indication, radar beacons, CW Doppler radar, frequency modulated CW radar, phase array radars, planar array radars	

Text Books:

1	John D Kraus, "Antenna for all Application", 3rd edition, Tata McGraw Hill Publication
2	Constantine A. Balanis, "Antenna Theory", 3rd edition, Wiley Publication
3	Jordan and Balmain, "Electromagnetic Waves and Radiation Systems", 2nd edition, PHI publication
4	Kennedy Davis, "Electronics Communication System", 5th edition, Tata McGraw Hill Publication

Reference Books:

1	G. S. N. Raju, "Antennas and Wave Propagation", 4th edition, Pearson publication
2	K.D. Prasad, "Antennas and Wave Propagation", 3rd edition, Satya prakashan publication

List of Experiments (Minimum 8 experiment):

1	Calculation of beam width, front to back ratio & gain of simple dipole antenna..
2	Calculation of beam width, front to back ratio & gain of log periodic antenna
3	Calculation of beam width, front to back ratio & gain of Yagi-Uda antenna.

4	Calculation of beam width, front to back ratio & gain of Horn antenna
5	Calculation of beam width, front to back ratio & gain of micro strip /patch antenna.
6	To determine effect of varying distance between transmitter & receiver on received power
7	Calculation of angle of reflection for varying angle of incidences
8	Calculation of angle of refraction for varying angle of incidences
9	Observe standing waves and measure the wavelength of microwave
10	Determination of velocity of object moving in RADAR range.
11	Measurement of time & frequency of RADAR using moving pendulum
12	Write a program to find radiation pattern of Broadside array antenna using MATLAB
13	Write a program to find radiation pattern of End fire array antenna using MATLAB
14	Write a program to compare radiation pattern of uniform linear array and non-uniform linear array using MATLAB

Note:

1) Guidelines to paper setter:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

2) 40% theory and 60% numerical and Design.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: ROBOTICS ENGINEERING (Open Elective-II)

Course Details

Class	**T. Y. B. Tech. Sem - VI**
Course Code and Course Title	**OEC-ETC601:Robotics Engineering**
Prerequisites	**Basics of Sensors, Fundamental Knowledge of Electronics**
Teaching scheme :Lectures + Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures : 3 Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Tutorial : 1 Hr. / Week	**TW: 25 Marks**

Course Objectives:	
The course aims to :	
1	Understand the history, concept development and key components of robotics technologies
2	Understand implementation of control strategy , sensors & electronics devices
3	Understand different types of effectors and actuators
4	Understand methods of robot programming
5	Development of Robot for particular applications

Course Outcomes: On completion of the course of this course, the students will be able to:	
1	Understand the concept, development and key components of robotics technologies.
2	Select different sensors, electronics systems for Robot
3	Classify different types of effectors and actuators
4	Analyze the system & develop software for particular robotic applications
5	Understand robot applications & develop robot for particular applications

Course Contents		
Unit No: 1	**Introduction To Basic Concepts** Definition; Automation and robotics, a brief history of Robotics, Anatomy of robot, Classification of robot. Overview of robot subsystems, specifications of different industrial robots.	**5 Hrs.**
Unit No: 2	**Robotic Technology and Machine Vision** Drives: Electric, hydraulic and pneumatic. Sensors: Non optical position sensors, Optical position sensors, Velocity sensors, Accelerometers, Proximity sensors, Touch and Slip sensors Vision: Introduction to techniques, Image processing and Analysis	**6 Hrs.**

Unit No: 3	**End Effectors and Actuators** Different types of grippers- Mechanical ,Magnetics, vacuum, Adhesive, Gripper force Analysis &Gripper Design , overview of actuators, Power and torque, Acceleration and velocity Specifications and characteristics of Stepper motors, AC motors, DC motors and servomotors.	**7 Hrs.**
Unit No: 4	**Workspace Analysis and Trajectory planning** Introduction to Workspace Analysis and Trajectory Planning, General overview on trajectory planning, one-dimensional trajectory and multi-dimensional trajectory, Work Envelop and examples, Pick and place operations, Continuous path motion	**6 Hrs.**
Unit No: 5	**Programming methods** Robot Programming Method of Robot programming, Lead through programming methods, Robot program as a path and space, Motion Interpolation, WAIT, SIGNAL, and DELAY commands, Branching, Capabilities and Limitation of Lead through methods, Textual Robot language, Generation of Robot programming language.	**6 Hrs.**
Unit No: 6	**Applications of Robotics** Robot Application in material handling, Material Transfer, Machine loading and unloading, Spot welding, Spray coating, Other processing operations using robots.	**6 Hrs.**

Text Books:

1	Mikell P Groover, Nicholas G Odrey, et.al "Industrial Robotics, Technology programming and Applications", Tata McGraw Hill Publication, 2012.

2	S.K.Saha , "Introduction to Robotics", Tata McGraw Hill Publication
3	K.S. Fu, R.C .Gonzalez, C.S.G.Lee , "Robotics Control ,Sensing ,Vision and Intelligence", Tata McGraw Hill Publication
4	R.K. Mittal & I.J. Nagrath, "Robotics & Control",Tata McGraw Hill Publication, 2007.

Reference Books:

1	John J Craig, "Introduction to Robotics", Pearson, 2009.
2	S.R. Deb, "Robotics Technology and flexible automation", Tata McGraw-Hill Education, 2009.
3	P.A. Janaki Raman, "Robotics and Image Processing an Introduction", Tata McGraw Hill Publication 1995
4	Carl D. Crane and Joseph Duffy, "Kinematic Analysis of Robot manipulators", Cambridge University press, 2008

Note:

2) Guidelines to paper setter:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: MOBILE TECHNOLOGY (Open Elective-II)

Course Details

Class	**T. Y. B. Tech. Sem - VI**
Course Code and Course Title	**OEC-ETC 601: Mobile Technology**
Prerequisites	**Analog and Digital Communication**
Teaching scheme: Lectures + Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching Scheme

Teaching scheme	**Examination scheme**
Lectures : 3 Hrs. / Week	**Theory : 100 Marks,** **70 (ESE) + 30 (CIE)**
Tutorial : 1 Hr. / Week	**TW: 25 Marks**

Course Objectives :

The course aims to,

1	Realize importance of cellular concepts and its propagation mechanism.
2	Nurture students with knowledge of traffic engineering in cellular networks.
3	Understand the importance of services and Channels in GSM.
4	Understand architecture of GSM, 4G and 5G.

Course Outcomes : **Upon successful completion of this course, the students will be able to:**	
1	Apply multiple access techniques to mobile communication.
2	Explore the architecture of GSM.
3	Apply and make use of GSM Services.
4	Differentiate thoroughly the routing protocols and generations of mobile technologies

Course Content		
Unit No:1	**Introduction to Mobile Communication & Multiple Access Technique** Mobile and Personal Communication, mobile and wireless devices, Specialized packet and mobile radio networks, circuit switched data services on cellular networks, packet switched data services on cellular networks, Multiple Access Technique- FDMA, TDMA, SDMA, and CDMA.	**6 Hrs.**
Unit No:2	**Cellular Concept** Introduction to cellular telephone system: Expansion of mobile system capacity through frequency reuse, Cell geometry, Selection of cluster size, Cell splitting and sectoring, Coverage and capacity in cellular system and Handoff strategies. Propagation Mechanism: Free space and two ray propagation model, Basic propagation mechanism. Hata outdoor propagation model. Small Scale Fading and Multipath: Types of Small-scale fading, Small scale multipath	**8 Hrs.**

	propagation, Impulse response model of multipath channel and Small-scale multipath measurements.	
Unit No:3	**Introduction to GSM** Introduction, Architecture of GSM, characteristics of GSM standards, services, Radio transmission parameters in GSM System.	**4 Hrs.**
Unit No:4	**GSM Services and Channels** Traffic and Logical Channels in GSM, GSM time hierarchy, Description of call setup procedure, Handover mechanism in GSM, Security in GSM. Data transmission in GSM: Data Services, SMS, HSCSD, GPRS, EDGE.	**7 Hrs.**
Unit No:5	**Routing Protocols** Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm.	**5 Hrs.**
Unit No:6	**Evolution of Mobile Technologies** Evolution of Mobile Generation and its comparison (GSM & CDMA) LTE basics, LTE frame structure, LTE Design parameters with Standardization and Architecture of LTE. Overview of 5 G Networks, Comparison of 4G and 5G technology, Opportunities and requirements in 5G network, Open Wireless Architecture of 5G network.	**6 Hrs.**

Text Books

1	Jachen Schiller, "Mobile Communications", Pearson Education.
2	Theodore Rappaport, "Wireless Communications Principles and Practice‖", Pearson Education.
3	Savo Glisic, "Advanced Wireless Networks", Wily India.

References Books

1	William Stallings , "Wireless Communication & Networks", Pearson Education
2	Manvi , "Wireless and Mobile Network", Wiley India
3	Sudip Misra, Sumit Goswami, "Network Routing: Fundamentals, Applications, and Emerging Technologies", Wiley India

Note:

Guidelines to paper setter:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)

Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)

Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)

Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS & TELECOMMUNICATION ENGINEERING

SUBJECT NAME: MINI PROJECT

Course Details

Class	**T. Y. B. Tech. Sem - VI**
Course Code and Course Title	**PCC-ETC605: Mini Project**
Prerequisites	**Basics of Electronics**
Teaching scheme : Practical	**2 Hrs.**
Credits	**1**
Evaluation Scheme	**-**

Teaching scheme	**Examination scheme**
Practical : 2 Hrs. / Week	**OE: 50 Marks**
	TW: 25 Marks

Course Objectives:	
The course aims to :	
1	Provide students for knowledge of Electronics Components and soldering techniques and its package information for electronics circuit design
2	Provide students for knowledge of the assembling of electronics circuit with components on PCB (Printed Circuit Board) of circuit design.
3	Design and development of Small electronic project based on hardware and software for electronics systems**.**

Course Outcomes:	
Upon successful completion of this course, the students will be able to:	
1	Practice acquired knowledge within the chosen area of technology for project development.
2	Identify, discuss and justify the technical aspects of the chosen project with a

	Comprehensive and systematic approach.
3	Reproduce, improve and refine technical aspects for engineering projects
4	Work as an individual or in a team in development of technical projects.
5	Communicate and report effectively project related activities and findings.

Mini project work should consist of following steps.

1. Students should propose project ideas & finalize the project idea in consultation with guide.
2. Students should submit implementation plan in the form of PERT/CPM chart. This will cover weekly activity of project report.
3. Problem definition and specification development in the form of synopsis.
4. Design of circuit with calculation & should include a) Analog part b) digital part c) Power supply d) Test strategy if firmware is required produce flow chart.
5. Simulation of design using tools like OrCAD, Matlab, etc.
6. Design of enclosure & PCB.
7. Fabrication & assembly of PCB & enclosure.
8. Testing & calibration.
9. Measurement of specifications.

Note:-

1. Project report should include report of all above steps and conclusion.
2. Project group should demonstrate and deliver seminar on project.
3. A mini project should not exceed three students per group.

SHIVAJI UNIVERSITY, KOLHAPUR

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Accredited by NAAC 'A' Grade
Syllabus for

Final Year Bachelor of Technology

(B. Tech)

Electronics and Telecommunication Engineering Program

(w. e. f. Academic Year: 2021-22)

Semester VII

Sr. No.	Code No.	Subject	Semester	Credits
1	PCC-ETC701	Satellite Communication	7	4
2	PCC-ETC702	Embedded Systems	7	5
3	PCC-ETC703	Computer Networks	7	5
4	PCC-ETC704	Image Processing	7	5
5	PCE-ETC701	Elective-I	7	4
6	PW-ETC701	Project Phase-I	7	2
Total				**25**

Semester VIII

Sr. No.	Code No.	Subject	Semester	Credits
1	PCC-ETC801	Microwave Engineering	8	5
2	PCC-ETC802	Wireless Communication	8	5
3	PCC-ETC803	Video Engineering	8	5
4	PCE-ETC801	Elective-II	8	4
5	PW-ETC801	Project Phase-II	8	6
Total				**25**

Elective-I	Elective-II
Speech Processing	High Performance Communication Network
Radar and Navigation	Advance Network Security
Java Script	Electrical Automobiles
Information Theory And Coding Techniques	Big Data Analytics

*****For Theory CIE 30 Marks,**

Two tests of 30 marks at college should be conducted and best of two marks should be communicated to university.

*****Guidelines to paper setter:**

In theory ESE examination of 70 marks following pointes should be considered,

1. First question of 10 marks should be allotted to Objective type questions.
2. In Remaining 60 marks, four questions of 15 marks should be considered.

FINAL YEAR ELECTRONICS & TELECOMMUNICATION ENGINEERING –CBCS PATTERN
Semester Examination

Sr. No	Course (Subject Title)	TEAETING SETEME									EXAMINATION SETEME										
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL			TERM WORK		
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	Min	Hours	Max	Min	Hours	Max	Min
SEMESTER –VII																					
1	PCC-ETC701	3	3	3	1	1	1	-	-	-		CIE	30	100	40	As per BOS Guidelines	-	-	2	25	10
												ESE	70								
2	PCC-ETC702	4	4	4	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10
												ESE	70								
3	PCC-ETC703	4	4	4	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10
												ESE	70								
4	PCC-ETC704	4	4	4	-	-	-	1	2	2		CIE	30	100	40		-	-	2	25	10
												ESE	70								
5	PCE-ETC701	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10
												ESE	70								
6	PW-ETC701	-	-	-	-	-	-	2	4	4		-	-	-	-		25	10	2	50	10
	TOTAL	**18**	**18**	**18**	**2**	**2**	**2**	**5**	**10**	**10**				**500**			**125**			**175**	
SEMESTER –VIII																					
1	PCC-ETC801	4	4	4	-	-	-	1	2	2		CIE	30	100	40	As per BOS Guidelines	50	20	2	25	10
												ESE	70								
2	PCC-ETC802	4	4	4	-	-	-	1	2	2		CIE	30	100	40		-	-	2	25	10
												ESE	70								
3	PCC-ETC803	4	4	4	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10
												ESE	70								
4	PCE-ETC801	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10
												ESE	70								
5	PW-ETC801	-	-	-	-	-	-	6	8	8		-	-	-	-		150	60	2	50	20
	TOTAL	**15**	**15**	**15**	**1**	**1**	**1**	**9**	**14**	**14**				**400**			**250**			**150**	
	TOTAL	**33**	**33**	**33**	**3**	**3**	**3**	**14**	**24**	**24**				**900**			**375**			**325**	

CIE- Continuous Internal Evaluation
ESE – End Semester Examination

• Candidate contact hours per week : 30 Hours (Minimum)	• Total Marks for B.E. Sem VII & VIII : **1600**
• Theory and Practical Lectures : 60 Minutes Each	• Total Credits for B.E. Sem VII & VIII : **50**
• In theory examination there will be a passing based on separate head of passing for examination of CIE and ESE.	
• There shall be separate passing for theory and practical (term work) courses.	

Note:

1. **PCC-ET:** Professional Core course –Electronics & Telecommunication Engineering is compulsory.
2. **PCE-ET:** Professional Core Elective –Electronics & Telecommunication Engineering is compulsory.
3. **SI-ET:** Summer Internship-Electronics & Telecommunication Engineering is compulsory.
4. **PW-ET**: Project work- Electronics & Telecommunication Engineering is compulsory.
5. **MC-ET:** Mandatory Course- Electronics & Telecommunication Engineering is compulsory

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: SATELLITE COMMUNICATION

Course Details

Class	**Final Year B.Tech. Sem-VII**
Course Code and Course Title	**PCC-ETC701: Satellite Communication**
Prerequisites	**Analog Communication & Digital Communication**
Teaching scheme: Lectures + Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 3 Hrs. /Week	**Theory: 100 Marks, 70 (ESE) +30 (CIE)**
Tutorial: 1 Hr./Week	**TW: 25 Marks**

Course Objectives: The course aims to :	
1	To introduce the fundamental concept in the field of satellite communication.
2	To provide understanding of satellite communication system operation, launching Techniques.
3	To analyse, design and evaluate satellite communication subsystem.
4	To examine concept of satellite networking.
5	To outline applications of Satellite Systems in various fields

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	Understand Orbital aspects involved in satellite communication.
2	Understand various subsystems in satellite communication system
3	Explain and Analyse Link budget calculation.
4	Understand Satellite Network System
5	Explain Non Geostationary Satellite Systems
6	Explain different applications of Satellite Systems

COURSE CONTENTS		
Unit No.1	**INTRODUCTION OF SATELLITE COMMUNICATION:** Introduction, basic concept of satellite communication, Orbital Mechanics, Look angle determination, Orbital perturbation, Orbital determination Launchers and Launch vehicles, Orbital effects in communication system performance.	**7 Hrs.**
Unit No.2	**SATELLITE SUBSYSTEM:** Introduction, Attitude and control system(AOCS), Telemetry, Tracking, Command and Monitoring, Power systems, Communication subsystem, Satellite antennas, Equipment reliability and space qualification.	**7 Hrs.**
Unit No.3	**SATELLITE LINK DESIGN:** Introduction, Basic transmission Theory, System Noise Temperature and G/T Ration, Design of Downlinks, Uplink Design, Design of specified C/N : Combining C/N and C/I values in Satellite Links. **(Numerical Expected)**	**6 Hrs.**
Unit No.4	**SATELLITE NETWORKS**: Reference architecture for satellite networks, basic characteristics of satellite networks, Onboard connectivity with transparent processing, analogue transparent switching, Frame organization, Window organization, On board connectivity with beam scanning.	**6 Hrs.**
Unit No.5	**LOW EARTH ORBIT AND NON GEO-STATIONARY SATELLITE SYSTEM:** Introduction, Orbit considerations, Coverage and Frequency Consideration, Delay and Throughput Consideration, Operational NGSO constellation design: Iridium, Teledesic.	**4 Hrs.**
Unit No.6	**SATELLITE APPLICATIONS:** Communication Satellite-Digital DBS TV, Satellite Radio Broadcasting, Navigation Satellite, GPS Position Location Principles, GPS Receivers and codes. Military Satellite- Directed Energy Laser Weapons, Weather Forecasting Satellite Application	**6 Hrs.**

TEXT BOOKS:

1	Satellite Communications-Timothy Pratt, Charles Bostian, Jeremy Allnut John Wiley &Sons (II Edition) (For Unit 1,2,3,5)
2	Satellite Communications-Anil k. Maine and VarshaAgaraval, Wiley Publications (All Units)
3	Satellite Technology Principles and ApplicationsAnil K. Maini and VarshaAgarawal, Wiley Publications, Third Edition (Unit 6)

REFERENCE BOOKS:

1	Satellite Communications- Dennis Roody McGraw Hill Fourth Edition (All Units)
2	Satellite Communications- Gerard Maral and Michel Bousquet, Wiley Publication (5^{th}Edition For Unit 4)
3	Satellite Communications systems Engineering, 2nd edition- Wilbur L. Pritchard, Henri G.Suyderhoud and Robert A. Nelson. (Unit I)

NOTE:

1. **Students, as a part of their term work, should visit satellite earth station and submit a report of visit.**
2. **Minimum 8 tutorials / assignment based on above syllabus**.

Note for question paper setter: 64 marks theory + 6 marks problem.

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered:

Q.1 MCQ's based on complete syllabus. (Carries14 Marks)
Q.2 based on unit no 1, 2, 3 (Carries 14 Marks)
Q.3 based on unit no 1, 2, 3 (Carries 14 Marks)
Q.4 based on unit no 4, 5, 6 (Carries 14 Marks)
Q.5 based on unit no 4, 5, 6 (Carries 14 Marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: EMBEDDED SYSTEMS

Course Details

Class	**Final Year B. Tech. Semester - VII**
Course Code and Course Title	**PCC-ETC 702: Embedded Systems**
Prerequisites	**Fundamentals of Microprocessor and Microcontroller and 'C' Programming**
Teaching scheme :Lectures + Practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures : 4 Hrs./ Week	**Theory : 100 Marks, 70 (ESE) + 30 (CIE)**
Practical : 2 Hrs./ Week	**TW: 25 Marks POE: 50 Marks**

Course Objectives: The course aims to :	
1.	Study different concepts and programming of PIC 16F877
2.	Study different on-chip resources of PIC 16F877
3.	Study different concepts of ARM7
4.	Study Programming of ARM7
5.	Study different on chip resources of LPC 2148
6.	Understand basic concepts of RTOS

Outcomes: Upon successful completion of this course, the students will be able to:	
1.	Develop programs using PIC 16F877
2.	Apply on-chip resource facility of PIC 16F877.
3.	Understand Embedded systems and concepts of ARM7.
4.	Develop programs using ARM7
5.	Apply on chip resource facility of LPC 2148.
6.	Understand RTOS concept

COURSE CONTENTS		
Unit No.1	**INTRODUCTION TO PIC MICROCONTROLLER** Difference between RISC and CISC architecture, Features of PIC 16F877, Functional Pinout, CPU Architecture, Memory organization, Register file structure, CPU Registers: Status Word, FSR, INDF, PCLATH, PCL, Instruction set, Addressing modes and Simple assembly language Programming.	**8 Hrs.**
Unit No.2	**ON-CHIP RESOURCES OF PIC 16F877** I/O Ports, Timers, CCP Module, ADC, I2C, SPI, Associate registers and programming, Interrupt structure, Configuration word, Oscillator configuration, Reset alternatives.	**8 Hrs.**
Unit No.3	**INTRODUCTION TO EMBEDDED SYSTEM AND ARM PROCESSOR EMBEDDED SYSTEM:** Embedded System definition, Types of Embedded System, Characteristics and Design issues of Embedded systems. **ARM:** Embedded system Hardware, ARM data flow model, Register set, CPSR, Pipelining, Exceptions Interrupts & Vector Table, Cache and Tightly coupled memory, ARM Nomenclature.	**8 Hrs.**
Unit No.4	**INSTRUCTION SET AND PROGRAMMING** ARM Instruction set, Thumb Instruction set, Simple assembly language programming.	**7 Hrs.**
Unit No.5	**LPC 2148 MICROCONTROLLER** Features, Architecture details, Port structure, Timer/Counter, UART**,** ADC module, Embedded 'C' programming for interfacing LED's, LCD, Keyboard.	**9 Hrs.**
Unit No.6	**REAL TIME OPERATING SYSTEM (RTOS)** Introduction to RTOS concept, Embedded software architectures: Round robin, Round robin with interrupts, Function queue scheduling and Real time operating system, Tasks and Task states, Task scheduling, Shared data and Reentrancy, Semaphores and shared data using semaphores, Protecting shared data.	**8 Hrs.**

Text Books:

1.	Design with PIC Microcontrollers by John B. Peatman, Pearson
2.	Embedded System Design By Frank Vahid / Tony Givargis, Wiley Publication
3.	An Embedded Software Primer, David E. Simon Pearson Education, Asia Publication
4.	ARM System Developers Guide Designing & Optimizing System Software by Andrew N., Dominic Sloss, and Chris Wright.
5.	Datasheet of PIC16F877 and LPC 2148

REFERENCE BOOKS:

1.	Embedded systems by Raj Kamal, McGraw Hill
2.	Real- Time Systems Design and Analysis by Phillips A. Laplante, Wiley insia Edition.
3.	Embedded/ Real-Time Systems: Concepts, Design & Programming By Dr. K V K K Prasad, Dreamtech Press
4.	Embedded Systems (A contemporary design tool) by James K Peckol, Wiley Publication.

LIST OF EXPERIMENTS : (MINIMUM EIGHT (8) EXPERIMENTS)

Sr. No.	Title of Experiment
1.	To study Arithmetic and Logical instructions in PIC 16F877.
2.	To study Indirect Addressing mode in PIC 16F877.
3.	To Flash LED connected to Port using Timer delay in PIC 16F877
4.	To study any application using CCP Module in PIC 16F877
5.	To demonstrate serial communication in PIC 16F877
6.	To study Arithmetic and Logical instructions in LPC 2148
7.	To study Load and Store instructions in LPC 2148
8.	To flash the Port pin of LPC 2148 using Embedded 'C'.
9.	To demonstrate input/ output device interfacing related programs in LPC 2148 using Embedded 'C'.
10.	To demonstrate serial communication in LPC 2148 using Embedded 'C'.

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered:

Question paper should contain 30% programming and 70% theory.

Q.1 MCQ's based on complete syllabus. (14 Marks)
Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)
Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: COMPUTER NETWORKS

Course Details

Class	**Final Year B. Tech. Sem-VII**
Course Code and Course Title	**PCC-ETC703: Computer Networks**
Prerequisites	**Digital Communication**
Teaching scheme: Lectures + Practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 4 Hrs. /Week	**Theory: 100 Marks, 70 (ESE) + 30 (CIE)**
Practical: 2 Hrs./Week	**TW: 25 Marks, OE: 50 Marks**

Course Objectives: The course aims to :	
1	To provide students with an overview of the concepts and fundamentals of data communication and computer networks
2	Review the state of art in open research area such as LAN, MAN, WLAN & applications Computer Networking
3	Acquire the required skill to design simple computer networks.
4	Describe various functions and protocols at each layer of OSI and TCP/IP reference models.

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	State the evolution of Computer network, classifies different types of Computer Networks.
2	Design, implements, and analyzes simple computer networks.
3	Identify, formulate, and solve network engineering problems.
4	Illustrate different OSI and TCP/IP protocols.

COURSE CONTENTS		
Unit No.1	**INTRODUCTION TO COMPUTER NETWORK** History and development of computer network, network application, network software and hardware components, reference models: layer details of OSI,TCP/IP models., Network topology, Transmission media and types, Network Devices: Network Connectors, Hubs, Switches, Routers, Bridges.	**6 Hrs.**
Unit No.2	**DATA LINK LAYER** Design issues, sliding window protocols. HDLC – types of stations, modes of operation & frame formats, Random access Protocols, IEEE 802.3 frame formats.	**6 Hrs.**
Unit No.3	**NETWORK LAYER** Design issues, Routing algorithms – shortest path, distance vector routing, link state routing. Routing protocols - RIP, OSPF, IP Addressing, Subnetting/super netting, IPv4, IPv6 header format and basic address mode, DHCP, Congestion control, traffic shaping algorithms.	**8 Hrs.**
Unit No.4	**TRANSPORT LAYER** Transport layer-Process to process delivery, UDP, TCP, TCP services, TCP Segment, TCP Timers, Flow control, congestion control and Quality of Service.	**8 Hrs.**
Unit No:5	**APPLICATION LAYER** DNS, HTTP, SMTP, Telnet, FTP	**8 Hrs.**
Unit No.6	**MULTIMEDIA IN INTERNET** Streaming stored audio/video, Real-time interactive audio/video, Real-time transport protocol (RTP),Real-time transport control protocol (RTCP), Voice over IP (VoIP)	**6 Hrs.**

TEXT BOOKS:

1	Forouzan, , “Data Communication and Networking” IIndedition,TataMc-Graw Hill, Publication
2	Tanenbaum, “Computer Neworks”, IVth Edition, pearson Education

REFERENCE BOOKS:

1	Wayne Tomasi, "Introduction to Data communications and Networking" Pearson Education.
2	Forouzan, "TCP/IP Protocol Suite", IIIrd Edition Tata Mc-Graw Hill publication.

NOTE: Minimum Eight Practical's based on above syllabus.

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered:

Q.1 MCQ's based on complete syllabus. (Carries14 Marks)
Q.2 based on unit no 1, 2, 3 (Carries 14 Marks)
Q.3 based on unit no 1, 2, 3 (Carries 14 Marks)
Q.4 based on unit no 4, 5, 6 (Carries 14 Marks)
Q.5 based on unit no 4, 5, 6 (Carries 14 Marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: IMAGE PROCESSING

Course Details

Class	**Final Year B. Tech. Sem-VII**
Course Code and Course Title	**PCC-ETC704: Image processing**
Prerequisites	**Digital Signal processing**
Teaching scheme: Lectures + practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 4 Hrs. /Week	**Theory: 100 Marks, 70 (ESE) + 30 (CIE)**
Practical: 2 Hr./Week	**TW: 25 Marks**

Course Objectives: The course aims :	
1	To study fundamentals of Digital Image Processing.
2	To acquaint students with mathematical transforms for image processing.
3	To familiarize students with image filtering techniques.
4	To understand different morphological operations.
5	To introduce various image segmentation techniques.
6	To explain different image compression techniques and color image processing.

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	List fundamental steps involved in Digital Image Processing.
2	Apply different transforms and filtering techniques on an image.
3	Apply morphological operations
4	Perform image segmentation
5	Apply compression techniques.
6	Perform various operations on color image.

COURSE CONTENTS		
Unit No.1	**DIGITAL IMAGE FUNDAMENTALS** Fundamentals steps in DIP, Components of image processing system, Elements of Visual Perception, Image sensing and acquisition, image sampling and quantization, basic relations between pixels	**8 Hrs.**
Unit No.2	**IMAGE TRANSFORMS** Basic intensity transformation: image negation, Log transformation, power law transformation, Piecewise linear transformation functions, arithmetic and Logic operation, Histogram processing (equalization and matching), sine cosine, Hadamard, Haar, Slant transform .	**8 Hrs.**
Unit No.3	**IMAGE FILTERING** Fundamentals of spatial filtering, smoothening and Sharpening in spatial domain, smoothening and Sharpening in frequency domain.	**7 Hrs.**
Unit No.4	**MORPHOLOGICAL IMAGE PROCESSING** Dilation & erosion, opening and closing operation, Hit- or –miss transformation. Basic morphological algorithms: Boundary extraction, region filling, thinning and thickening, skeletons	**8 Hrs.**
UnitNo.5	**IMAGE SEGMENTATION** Detection of discontinuities: Point detection, line detection, edge detection, (Sobel, Prewitt, Laplacian), global and adaptive thresholding, Region based segmentation (region growing, region splitting and merging).	**8Hrs.**
Unit No.6	**IMAGE COMPRESSION** Fundamentals, Coding redundancy , interpixel redundancy, fidelity criteria , image compression model, lossless predictive coding, Lossy predictive coding **Color Image Processing** Color fundamentals, Color models , psudocolor, image processing, full color image processing, Color transformations	**9 Hrs.**

TEXT BOOKS:

1	Digital image processing : Rafael C Gonzalez , Richard E. Woods: Pearson Publication
2	Digital image processing and Analysis- B. Chanda , D. Datta , majnudar
3	Fundamentals of digital Image Processing- Anil K.Jain.

REFERENCE BOOKS:

1	Digital image processing- S. Jayraman, S Esakkiarajan , Veerakumar:MGH
2	Digital image processing and Analysis- B. Chanda , D. Datta, majnudar:PHI
3	Digital image processing using Matlab- Rafael C Gonzalez
4	Fundamentals of Digital Image Processing-S.Annadurai, R. Shanmugalaxmi : Pearson Publication
5	Digital Image Processing- S.Shridhar 6 Digital Image Processing – Pratt

Practical based on MATLAB/Scilab programs: Any Eight experiments based on above syllabus

1	Reading and displaying of image (Various image file format) and to understand the notion of connectivity and neighborhood defined for a point in an image.
2	Simple gray level transformation
3	Histogram processing
4	Image transforms
5	Image arithmetic operations
6	Image smoothening operation
7	Edge detection
8	Morphological operation
9	Segmentation using thresholding
10	image compression
11	Color image Processing

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered:

Q.1 MCQ's based on complete syllabus. (Carries 14 Marks)
Q.2 based on unit no 1, 2, 3 (Carries 14 Marks)
Q.3 based on unit no 1, 2, 3 (Carries 14 Marks)
Q.4 based on unit no 4, 5, 6 (Carries 14 Marks)
Q.5 based on unit no 4, 5, 6 (Carries 14 Marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: SPEECH PROCESSING (Elective-I)

Course Details

Class	**Final Year B. Tech. Sem-VII**
Course Code and Course Title	**PCE-ETC701: Speech Processing (Elective-I)**
Prerequisites	**Digital Signal Processing**
Teaching scheme: Lectures +Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 3 Hrs. /Week	**Theory: 100 Marks, 70 (ESE) + 30 (CIE)**
Tutorial: 1 Hr./Week	**TW: 25 Marks**

Course Objectives: The course aims to	
1	To understand basic acoustic theory and time domain models for speech processing..
2	To Understand sampling, quantization and different modulation techniques.
3	To Understand STFT analysis , Homomorphic Speech processing and speech synthesis
4	To Understand Linear predictive coding to enhance speech quality
5	To Understand different techniques to enhance speech quality

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	Explain the acoustic theory.
2	To Apply sampling, quantization and different modulation techniques.
3	To perform STFT analysis , Homomorphic Speech processing and speech synthesis
4	To Apply Linear predictive coding to enhance speech quality
5	To Apply different techniques to enhance speech quality

COURSE CONTENTS		
Unit No.1	**DIGITAL MODELS FOR THE SPEECH SIGNAL**: Process of speech production, Acoustic theory of speech production, Lossless tube models, and Digital models for speech signals. Time domain models for speech processing: Time dependent processing of speech, Short time energy and average magnitude, Short time average zero crossing rate, Speech vs silence discrimination using energy & zero crossings, Pitch period estimation, Pitch period estimation using autocorrelation function, Median smoothing.	**6 Hrs.**
Unit No.2	**DIGITAL REPRESENTATIONS OF THE SPEECH WAVEFORM:** Sampling speech signals, Instantaneous quantization, Adaptive quantization, Differential quantization, Delta Modulation, Differential PCM, Comparison of systems, direct digital code conversion.	**5 Hrs.**
Unit No.3	**SHORT TIME FOURIER ANALYSIS:** Linear Filtering interpretation, Filter bank summation method, Overlap addition method, Design of digital filter banks, Implementation using FFT, Spectrographic displays, Pitch detection, Analysis by synthesis, Analysis synthesis systems.	**6 Hrs.**
Unit No.4	**HOMOMORPHIC SPEECH PROCESSING**: Homomorphic systems for convolution, complex cepstrum, Pitch detection, Formant estimation, Homomorphic vocoder.	**6 Hrs.**
Unit No.5	**LINEAR PREDICTIVE CODING OF SPEECH:** Basic principles of linear predictive analysis, Solution of LPC equations, Prediction error signal, Frequency domain interpretation, Relation between the various speech parameters, Synthesis of speech from linear predictive parameters, Applications.	**6 Hrs.**
Unit No.6	**SPEECH ENHANCEMENT:** Spectral subtraction & filtering, Harmonic filtering, parametric re-synthesis, Adaptive noise cancellation. **SPEECH SYNTHESIS:** Principles of speech synthesis, Synthesizer methods, Synthesis of intonation, Speech synthesis for different speakers, Speech synthesis in other languages, Evaluation, Practical speech synthesis.	**7 Hrs.**

TEXT BOOKS:

1	L. R. Rabiner and R. W. Schafer, “Digital Processing of Speech Signals," Pearson Education (Asia) Pte. Ltd., 2004.
2	Z. Li and M.S. Drew, “Fundamentals of Multimedia,” Pearson Education (Asia) Pvt. Ltd., 2004.
3	L. R. Rabiner and B. Juang, “Fundamentals of Speech Recognition,” Pearson Education (Asia) Pte. Ltd., 2004

REFERENCE BOOKS:

1	C Becchetti& L P Ricotti, “Speech Recognition Theory & C++ Implementation” John Wiley & Sons.
2	Speech and audio processing by Dr. Shaila D. Apte
3	B. Gold & N. Morgan “Speech & Audio Signal Processing”, John Wiley & Sons.
4	D. O’Shaughnessy, “Speech Communication Human & Machine”, Universities Press.

NOTE: Minimum Eight (8) Tutorials based on above syllabus.

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered:

Q.1 MCQ’s based on complete syllabus. (Carries14 Marks)
Q.2 based on unit no 1, 2, 3 (Carries 14 Marks)
Q.3 based on unit no 1, 2, 3 (Carries 14 Marks)
Q.4 based on unit no 4, 5, 6 (Carries 14 Marks)
Q.5 based on unit no 4, 5, 6 (Carries 14 Marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: RADAR & NAVIGATION (Elective-I)

Course Details

Class	**Final Year B. Tech. Sem-VII**
Course Code and Course Title	**PCE-ETC701: RADAR & NAVIGATION (Elective-I)**
Prerequisites	**Antenna Wave Communication**
Teaching scheme: Lectures +Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 3 Hrs. /Week	**Theory: 100 Marks, 70 (ESE) + 30 (CIE)**
Tutorial: 1 Hr./Week	**TW: 25 Marks**

Course Objectives: The course aims :	
1	To gain in depth knowledge about fundamental of radar
2	To study different types of radar and their operations
3	To gain knowledge radar's measurement and tracking
4	To become familiar with radar networking

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Acquired knowledge about radar and radar equation
2	Understanding the working principal of Doppler radar
3	Ability to work for measurement and tracking signal
4	Foster ability to work instrument landing system

COURSE CONTENTS		
Unit No.1	**ELEMENTARY CONCEPTS:** Fundamental Elements of Radar, Function Performed by Radar, Overall System Considerations, Types of Radar Targets, Radar Waveform, Power and Energy, Some Basic Principles, Some Definitions	**6 Hrs.**
Unit No.2	**ANTENNAS:** Aperture Antennas, Radiation Intensity Pattern, Pattern Function Relationship, Fundamental Pattern Parameters, Apertures with constant Polarization, Factorable Illumination Function, Side lobe Control in One-Dimensional Apertures, Cirularly Symmetric Illumations, Some Example Antennas, Of The Reflector, Array Antennas, Rectangular Planner Array, Linear Array	**7 Hrs.**
Unit No.3	**RADAR EQUATION:** Radar Equation, Important Networks Definition, Incremental Modeling Of Noise Sources, Incremental Modeling Of Noisy Networks, Practical Modeling Of Noisy Sources and Networks	**6 Hrs.**
Unit No.4	**RADAR SIGNALS AND NETWORKS:** Real Radar Signals, Complex Radar Signals, Analytic Radar Signals, Frequency and Bandwidth Of Signals, Transmission Of Signals through Networks, Matched Filter For Nonwhite and white Noise, Ambiguity Function, Examples Of Uncertainty Functions.	**6 Hrs.**
Unit No.5	**RADAR RESOLUTION:** Range Resolution, Doppler Frequency Resolution, Simultaneous Range and Doppler Resolution, Resolution and RMS Uncertainty, Overall Radar and Angle Resolution.	**5 Hrs.**
Unit No.6	**FREQUENCY MEASUREMENT AND TRACKING:** Definition Of Optimum Frequency Measurement, Optimum Filter For Doppler Measurement, Some Practical Considerations, Practical Noncoherent Implementation For Doppler, Optimum Coherent Doppler Measurement	**6 Hrs.**

REFERENCE BOOKS:

1	"Radar Principles" By Peyton Z., Peebles, Jr. Wiley India
2	Introduction of Radar system By Skolnik (McGraw Hill)

NOTE: Minimum Eight (8) Tutorials based on above syllabus.

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70marks following points should be considered:

Q.1 MCQ's based on complete syllabus.(14Marks)

Q.2 Based on unit no1,2,3 (Carries14marks)

Q.3 Based on unit no1,2,3 (Carries14 marks)

Q.4 Based on unit no 4,5,6 (Carries14 marks)

Q.5 Based on unit no 4,5,6 (Carries14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: JAVA SCRIPT (ELECTIVE-I)

Course Details

Class	**Final Year B. Tech. Sem-VII**
Course Code and Course Title	**PCE-ETC701: JAVA SCRIPT (ELECTIVE-I)**
Prerequisites	**C, C++ and Python Programming**
Teaching scheme: Lectures +Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 3 Hrs. /Week	**Theory: 100 Marks** **70 (ESE) + 30 (CIE)**
Tutorial: 1 Hr./Week	**TW: 25 Marks**

Course Objectives: The course aims to :	
1	To introduce students to emerging web technologies.
2	To enable students to use and apply JS objects in web applications.
3	To introduced students to create and demonstrate user define functions.
4	To teach students to understand and perform user – browser interactions.
5	To teach principles of object oriented programming paradigm.
6	To facilitate students to learns events, cookies and exceptions handling.

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	Identity and apply JS objects in web applications.
2	Articulate and write user define functions.
3	Describe and develop user – browser interactions.
4	Explain the principles of object oriented programming paradigm.
5	Use and illustrate the events, cookies and handling exceptions.

COURSE CONTENTS		
Unit No.1	**INTRODUCTION TO JAVASCRIPT** Overview of JS, Client-Side JS, Advantages and Limitation of JS, JS development tools, Keywords, Syntax, Comments, Variables, Global variable, Data types(Primitive and Non-primitive), Operators, if, if...else, if...else if...statements, Switch, Break, Continue statements, For loop, For-in loop, While loop, do...while loop.	**6 Hrs.**
Unit No.2	**OBJECTS OF JAVASCRIPT** Methods for creating objects, Object properties, JS Objects- Events, Date, Math, Number, Boolean, String and Array.	**6 Hrs.**
Unit No.3	**JAVASCRIPT FUNCTION** Function definition, Syntax, Parameters, Arguments, Invocation function, Function with return value, Function objects. Function Methods, Nested Functions, Function Constructor.	**6 Hrs.**
Unit No.4	**JAVASCRIPT BOM, DOM AND VALIDATION** **Browser objects**- Methods of browser objects, Window, History, Navigator, Screen objects. **Documents objects**-Properties, Methods of document objects, DOM Compatibility. **JS Validation-** JS form validation and JS email validation.	**6 Hrs.**
Unit No.5	**JAVASCRIPT OBJECT ORIENTED PROGRAMMING** JS class, Objects, Objects methods, Prototype, Constructor methods, Static method, Encapsulation, Inheritance, Polymorphism and Abstraction.	**5 Hrs.**
Unit No.6	**JAVASCRIPT EVENT, COOKIES AND EXCEPTION HANDLING** Types of events, operations using events, cookies and its fields, cookies operations, Page redirection, Exception handling, Types of errors, Debugging, Hoisting, JS Strict Mode.	**7 Hrs.**

TEXT BOOKS:

1.	Javascript for Beginners- by Mark Lassoff 's
2.	JavaScript: The Definitive Guide- by David Flanagan, Kindle Edition
3.	Eloquent JavaScript-by MarijnHaverbeke

REFERENCE BOOKS:

1.	The Principles of Object-Oriented JavaScript –by Nicholas C. Zakas.
2.	JavaScript and JQuery: Interactive Front-End Web Development 1st Edition- by Jon Duckett.
3.	HTML, CSS, and JavaScript- by Meloni Julie C.Person Publication.

TUTORIALS: Minimum Eight (8) tutorials to be conducted out of 12, each tutorial Should demonstrate at-least 2-3 different programs to the concern Statement.

Sr. No.	Tutorials
1.	Write a program to use and demonstrate the operators.
2.	Write a program using looping statements (For, While, do-While, For-In).
3.	Write a program to demonstrate the applications of Array.
4.	Write a program to demonstrate the use of Boolean and Math objects.
5.	Write a program using user define functions.
6.	Write a program to create registration form and perform Validation.
7.	Write a program to create class with Objects.
8.	Write a program to perform Constructers.
9.	Write a program to demonstrate Inheritance.
10.	Write a program to demonstrate the Exception handling.
11.	Write a program to demonstrate Cookies.
12.	Write a program to perform Event handling.

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered:

Q.1 MCQ's based on complete syllabus. (Carries14 Marks)
Q.2 based on unit no 1, 2, 3 (Carries 14 Marks)
Q.3 based on unit no 1, 2, 3 (Carries 14 Marks)
Q.4 based on unit no 4, 5, 6 (Carries 14 Marks)
Q.5 based on unit no 4, 5, 6 (Carries 14 Marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: INFORMATION THEORY AND CODING TECHNIQUES

(Elective-I)

Course Details

Class	**Final Year B. Tech. Sem-VII**
Course Code and Course Title	**PCE-ETC701: INFORMATION THEORY AND CODING TECHNIQUES (Elective-I)**
Prerequisites	**Digital Communication, Probability, Mathematics**
Teaching scheme: Lectures +Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 3 Hrs. /Week	**Theory: 100 Marks** **70 (ESE) + 30 (CIE)**
Tutorial: 1 Hr./Week	**TW: 25 Marks**

Course Objectives: The course aims to :	
1	To understand information theory, estimate information content of a random variable from its probability distribution.
2	To understand the types of communication channels, their capacities and construct efficient codes for data on imperfect communication channels.
3	To understand the need & objective of error control coding with encoding & decoding procedure to analyze error detecting & correcting capability of different codes.

Course Outcomes: After the completion of the course the student should be able to:	
1	Explain basic concepts of information theory and entropy coding.
2	Mathematically analyze communication channel models & Channel capacity.
3	Analyze the error detecting and correcting capability of different coding schemes.
4	Design encoder and decoder for various coding techniques as per the need and Specifications.

COURSE CONTENTS		
Unit No.1	**INFORMATION THEORY** Introduction, Concept of information: Unit, Properties, Entropy (Average Information) : Definition, Mathematical expression of Entropy, Entropy of Binary Source, Properties and Information Rate, Joint Entropy, Conditional entropy, relation between Joint & Conditional Entropies, Mutual Information: Average Mutual Information, Expression for Mutual information, Relation between Mutual Information & Entropy	**6 Hrs.**
Unit No.2	**CHANNAL CAPACITY AND CODING** Channel Capacity, Redundancy and Efficiency of channel, Discrete memory less channel – Channel Matrix, Classification of channels: lossless Channel, Deterministic Channel, Noise free channel, Binary Symmetric Channel (BSC), Cascaded Channels and Binary Erasure Channel (BEC), Calculation of channel capacity of all channels, Shannon's fundamental theorem, Entropy Coding: Shannon Fano Coding, Huffman's Coding, Coding Efficiency Calculations.	**6 Hrs.**
Unit No.3	**LINEAR BLOCK CODES** Introduction: Error Control Coding: Need, Objectives & Approaches of Error Control Coding Classification, Error Detection and Error Correction Techniques, Linear Block Code: Structure, Terms Related to Block Code, Matrix Description of Linear Block Code, Generator and Parity Check Matrices, Encoder and Syndrome decoder for (n, k) block Code.	**6 Hrs.**
Unit No.4	**CYCLIC CODES** Algebraic structure, Properties, Polynomial representation of Codeword, Generator Polynomial, Generation of Code Vector in Nonsystematic and Systematic form, Generator and Parity check matrices in Systematic form, Encoding of Cyclic Code, Syndrome decoding for Cyclic code, Hardware Representation of (n, k) cyclic code. Cyclic Redundancy Check Code.	**6 Hrs.**
Unit No.5	**BCH & RS CODE** Binary Field Arithmetic, BCH Code: Properties, Primitive element and primitive polynomial, Primitive BCH Code, Construction of Galois Field GF (2^m), Addition & Multiplication of GF (2^m), Properties of Galois Field GF (2^m), Minimal & Generator Polynomial for BCH Code, Decoding of BCH Code, Reed-Solomon code: Introduction, Error correction capability of RS code, RS code in Nonsystematic & Systematic form, Decoding of RS code.	**6 Hrs.**

Unit No.6	**CONVOLUTIONAL CODE** Introduction, Encoding of Convolutional Codes, Generation of Output code sequence : Time Domain Approach, Transform Domain Approach, Generator Matrix, Graphical Approach – Code Tree, State diagram and Trellis Diagram, Decoding of Codes : Maximum Likelihood Decoding -Viterbi Algorithm, Sequential Decoding .	**6 Hrs.**

Text Books:

1	R.P Singh & S.D.Sapre , "Communication Systems Analog & Digital", Mc-Graw Hill, IInd Edition, 2001.
2	Muralidhar Kulkarni, K.S. Shivprakasha , "Information Theory & Coding", Wiley (India) Publication 2014
3	Arijit Saha,Surajit Mandal, "Information Theory, Coding & Cryptography", Pearson Education, Ist Edition, 2013.

Reference Books:

1	Simon Haykin, "Communication Systems ", John Wiley & Sons, Inc, IVth Edition
2	Ranjan Bose, "Information Theory Coding & Cryptography", Tata McGraw-Hill Publishing Company Ltd, IInd Edition 2008
3	Salvatore Gravano, "Introduction to Error Control Codes", Oxford University Press, I st Edition, 2001

TERM WORK: (MINIMUM 8 TUTORIALS/ ASSIGNMENTS)

Minimum Eight tutorials /assignments based on above syllabus covering all units.

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered:

Q.1 MCQ's based on complete syllabus (Carries 14 Marks)
Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)
Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: PROJECT PHASE-I

Course Details

Class	**Final Year B. Tech. Sem-VII**
Course Code and Course Title	**PW-ETC701 : Project Phase-I**
Prerequisites	
Teaching scheme: Lectures + Practical	**0 Hrs. + 4 Hrs.**
Credits	**0 + 2**
Evaluation Scheme ESE + CIE for Theory	**-**

Teaching scheme	**Examination scheme**
Practical: 4 Hrs. /Week	**-**
-	**TW: 50 Marks OE: 25 Marks**

Course Objectives: The course aims to :	
1	Allow students to demonstrate a wide range of the skills learned at the College of Engineering during their course of study by asking them to deliver a product that has passed through the design, analysis, testing and evaluation
2	Encourage multidisciplinary research through the integration learned in a number of courses.
3	Provide a student the opportunities to apply and integrate his/her knowledge acquired throughout the undergraduate study.

Course Outcomes: After the completion of the course the student should be able to:	
1	Identify the problem statement through literature survey for project work.
2	Develop design strategy for the project work.
3	Develop presentation and interpersonal communication skills through project work.
4	Develop the ability to learn independently and to find/integrate information from different sources required in solving real-life problems.
5	enhance technical report writing skills with proper organization of materials;

1. The project is to be carried out in two semester of Final Year B. Tech (Electronics and Tele communications) Part-I and Part-II.
2. The practical batch size for project will be of 15 students. The project batch will be preferably divided into groups each consisting of not more than 3 students.
3. In semester I, group will select a project with the approval of guide and submit the synopsis of project in the first month of Semester I. The group is expected to complete detail system design, layout etc. in semester I, as a part of the term work in the form of joint report.
4. In addition all students of project groups will deliver the seminar on the proposed project only.
5. Hardcopy of project diary should be maintained Group wise, where report of every week activity should be maintained. This should be presented at the time of examination.
6. Winter/Summer Internship/Industrial Training report should be submitted along with Seminar report on Project-I and evaluation of the same will be carried out in Final year Project Phase-I as internal assessment and marks should considered in term work by respective Guide
7. Guide of the project batch should take presentation on report of Project Phase –I along with Winter/Summer Internship/Industrial Training report. They should consider marks of the same in term work of project phase-I. and give marks out of 50.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: MICROWAVE ENGINEERING

Course Details

Class	**Final Year B. Tech. Sem-VIII**
Course Code and Course Title	**PCC-ETC-801:Microwave Engineering**
Prerequisites	**Electromagnetic Engg., Communication Engg.**
Teaching scheme: Lectures + Practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 4 Hrs. /Week	**Theory: 100 Marks, 70 (ESE) + 30 (CIE)**
Practical: 2 Hrs./Week	**Term Work :25 Marks, OE: 50 Marks**

Course Objectives: The course aims to:	
1	Understand the basic concept of microwave engineering, and apply EM wave theory to understand the nature of microwave signal.
2	Understand the theoretical and experimental design and analysis of microwave tube devices and circuits
3	Learn the basics of Monolithic Microwave Integrated Circuits (MMIC).
4	Study Microwave semiconductor devices & applications
5	To understand various microwave measurement techniques
6	Expose students to different microwave antennas.

Course Outcomes: Upon successful completion of this course ,the students will be able to:	
1	Analyze the microwave waveguides and passive circuit components.
2	Identify and differentiate the state of art in microwave tubes and their uses in real life
3	Identify materials used in MMIC and microwave hazards
4	Differentiate solid state devices used in microwave based on their characteristics and operations
5	Measure the output power, VSWR, impedance, frequency and wavelength of microwave signal
6	Apply the microwave antenna knowledge for industrial and scientific purposes

COURSE CONTENTS		
Unit No.1	**WAVE GUIDES AND MICROWAVE COMPONENTS** Rectangular wave guides: TE and TM mode wave, power transmission in wave guide, power losses in wave guide, excitation of modes in wave guide. Microwave cavities, microwave hybrid circuits, directional coupler, Circulators and Isolators, microwave attenuators. (Numerical Expected).	**8 Hrs.**
Unit No.2	**MICROWAVE TUBES** Microwave linear beam Tubes: Klystrons, Reentrant Cavities, Velocity-Modulation Process, Bunching Process in Klystrons, reflex klystron, slow wave structures, principle of operation of Helix Traveling-Wave Tubes (TWTs).Microwave CROSSED-FIELD TUBES: Magnetron Oscillators, Cylindrical Magnetron, Forward and backward wave crossed field amplifier(CFA).	**8 Hrs.**
Unit No.3	**MONOLITHIC MICROWAVE INTEGRATED CIRCUITS AND HAZARDS** Materials: substrate, conductor dielectric & resistive MMIC growth, thin film formation,hybrid microwave I.C. fabrication, Electromagnetic compatibility, plane wave propagation in shielded rooms, anechoic chambers, microwave clean rooms, microwave hazards.	**6 Hrs.**
Unit No. 4	**MICROWAVE SOLID STATE DEVICES** Microwave bipolar transistor, microwave FETs, Microwave tunnel diodes, Gunn Effect diodes, RWH Theory, LSA diodes, InP diodes, CdTe diodes, IMPATT diodes, PIN diodes, MESFETs and HEMT**.**	**8 Hrs.**
Unit No. 5	**MICROWAVE MEASUREMENTS AND MICROWAVE APPLICATIONS** Detection of microwave power: measurement of microwavepower bridge circuit, thermistor parameters, waveguide thermistor mounts, barraters,theory of operation of barreters,direct reading barreters bridges, Measurement of wavelengths: single line cavity coupling system, Transmission cavity wavemeter & reaction wavemeter, measurement of VSWR, measurements of attenuation, free space attenuation,	**8 Hrs.**
Unit No: 6	**MICROWAVE ANTENNAS** Antenna parameters: antenna gain, directivity and beam width, Horn antenna, parabolic reflector with all types of feeding methods, slotted antenna, Lens antenna, Microstrip antennas, Corner reflector. Equations for antenna gain, directivity and beam width of all above antenna types. **(Numerical Expected)**	**6 Hrs.**

TEXT BOOKS:

1	Samuel Liao, “Microwave Devices and Circuit”, Prentice Hall of India

2	Annapurna Das & S K Das, "Microwave Engineering", Tata Mc-Graw Hill.
3	G.S.N. Raju, "Antennas and wave propagation", Pearson Education

REFERENCE BOOKS:

1	K. T. Matthew, "Microwave Engineering", Wiley India, 2011
2	Shrushut Das, "Microwave Engineering", Oxford Press.
3	M. Kulkarni, "Microwave and Radar Engineering", Umesh Publications.

TERM WORK: (MINIMUM 8 EXPERIMENTS)

Minimum 8 experiments based on above syllabus covering all units.

LIST OF EXPERIMENTS:

1	Study of Reflex Klystron Characteristics.
2	Study of GUNN Diode Characteristics.
3	Study of VSWR Measurement (Using Vmax / Vmin Method).
4	Study of Frequency and wavelength measurement.
5	Study of Input impedance measurement.
6	Study of E plane /H plane and magic Tee.
7	Study of Directional coupler, coupling factor.
8	Study of Horn Antenna (Gain, Radiation Pattern and beam width).
9	Study of Parabolic Antenna (Gain, Radiation Pattern and beam width).
10	Study of Measurement of attenuation (Fixed and variable).

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered:

Q.1 MCQ's based on complete syllabus (Carries 14 Marks)
Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)
Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: WIRELESS COMMUNICATION

Course Details

Class	**Final Year B. Tech. Sem-VIII**
Course Code and Course Title	**PCC-ETC 802: Wireless Communication**
Prerequisites	**Communication**
Teaching scheme : Lectures +Practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) +30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 4 Hrs. /Week	**Theory: 100 Marks, 70 (ESE) + 30 (CIE)**
Practical: 2 Hrs./Week	**TW: 25 Marks**

Course Objectives: The course aim is to :	
1	Focus on basic fundamentals of wireless communication.
2	Explain large & small scale radio wave propagation
3	Understand basic wireless technology
4	Understand various wireless protocols

Course Outcomes: Upon successful completion of this course ,the students will be able to:	
1	List basic fundamentals of wireless communication
2	Analyze large & small scale radio wave propagation
3	Able to understand basic wireless technologies
4	Able to understand and analyze wireless concepts

Course Contents		
Unit No.1	**FUNDAMENTALS OF WIRELESS COMMUNICATION:** Wireless communication system, wireless media, Frequency spectrum, Technologies in digital wireless communication, WCOM channel specifications, Types of wireless communication, challenges in WC. Cellular concept: Introduction, frequency reuse ,Channel Assignment strategies, Handoff strategies, interface and system capacity, Trunking &grade of service, Improving coverage & capacity in cellular system	**8 Hrs.**
Unit No.2	**MOBILE RADIO PROPAGATION. LARGE SCALE PATH LOSS:** Introduction to Radio Wave propagation, Free Space propagation model, Relating Power to Electric Field, The three Basic Propagation Mechanisms, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering, Outdoor Propagation Models, Indoor Propagation Models.	**8 Hrs.**
Unit No.3	**MOBILE RADIO PROPAGATION SMALL-SCALE FADING AND MULTIPATH :** Small-Scale Multipath Propagation, Impulse Response Model of a Multipath Channel, Small-Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of small-Scale Fading.	**8 Hrs.**
Unit No.4	**WIRELESS NETWORKING: INTRODUCTION TO WIRELESS NETWORKS** Difference Between Wireless and Fixed Telephone Networks, Development of Wireless Networks, Fixed Network Transmission Hierarchy, Traffic Routing in Wireless Networks, Common Channel Signaling (CCS),Architecture of B-ISDN & services,	**9 Hrs.**
Unit No.5	**WIRELESS LAN & BLUETOOTH** Introduction, Infrared radio transmission infrastructure and adhoc networks, Detailed study of IEEE 802.11, Bluetooth, Wireless ATM.	**7 Hrs.**
Unit No.6	**WIRELESS ACCESS PROTOCOL** WAP (Wireless Application Protocol) architecture, Wireless Datagram, Wireless Transport layer security, wireless transaction, Wireless Session, Wireless Application Environment ,WML	**8 Hrs.**

TEXT BOOKS:

1	Wireless Communications Principals & Practice- Theodore S. Rappaport, (P.E.)
2	Mobile Communications: Jachen Schiller (Addison Westy)

3	Wireless and Mobile Networks Concept and protocols – Dr. Sunil kumar S Manvi Wiley India

REFERENCE BOOKS:

1	Wireless Networks by P. Nicopolitidis, M. S. Obaidat, G. I. Papadimitriou, A. S.Pomportsis; Wiley Pub.
2	Wireless Communication & Networks by William Stallings(Pearson Edition)
3	Wireless communication and Networks by Upena Dalal(Oxford)

LIST OF EXPERIMENTS: (ANY EIGHT (8) EXPERIMENTS)

1	Study of ISDN Trainer kit Hardware & Software Setup.
2	Study of Architecture of ISDN kit.
3	Study of Analog & Digital Subscriber Link establishment using ISDN trainer kit.
4	Study of numbering plans in ISDN trainer kit.
5	Study of Establishment point to point & Multidraft Links using ISDN.
6	Study of Protocol Analysis (based on any protocol).
7	Study of Mobile Communication Set up (Study of Link Mobile Trainer Kit , Handset).
8	Study of Multiple Access Techniques (Any one).
9	Visit to Mobile Company Like BSNL , AIRTEL , Idea.
10	Implementation of outdoor propagation Model (Any one) using Matlab.
11	Implementation of Free Space propagation model using Matlab

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered:

Q.1 MCQ's based on complete syllabus (Carries 14 Marks)
Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)
Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: VIDEO ENGINEERING

Course Details

Class	**B.Y. B. Tech. Sem-VIII**
Course Code and Course Title	**PCC- ETC 803: Video Engineering**
Prerequisites	**Electronics all basic circuits.**
Teaching scheme: Lectures + Practical	**4 Hrs. + 2 Hrs.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 4 Hrs. /Week	**Theory: 100 Marks, 70 (ESE) + 30 (CIE)**
Practical : 2 Hrs./Week	**TW: 25 Marks, POE: 50 Marks**

Course Objectives: The course aims to :	
1	Provide basics information of TV system
2	Know color TV transmission and reception
3	Understand basic concept of digital TV system
4	Understand high definition TV
5	Know advanced TV systems like LCD, plasma, LED, CCTV
6	Provide the knowledge of digital video systems like video conferencing and video phone.

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	Describe picture and sound transmission and reception
2	Explain color composite video signal
3	Describe principle of digital TV system
4	Explain high definition television system
5	Elaborate concept of video conferencing and videophone.
6	Describe advanced TV system like LCD, plasma, LED, CCTV, etc..

COURSE CONTENTS		
Unit No.1	**ELEMENTS OF A TELEVISION SYSTEM** Modulation of picture and sound signals, positive and negative modulation, aspect ratio, kell factor, horizontal and vertical resolution, video bandwidth, progressive and interlaced scanning, composite video signal, horizontal & vertical sync details, vestigial sideband correction, channel bandwidth, CCIR-B standards, monochrome TV receiver block diagram	**8 Hrs.**
Unit No.2	**COLOR SIGNAL TRANSMISSION AND RECEPTION** Color mixing theory (additive and subtractive), compatibility considerations, frequency interleaving process, luminance, hue and saturation, color difference signals, color composite video signals, chromaticity diagram, Color TV receiverblock diagram.	**7 Hrs.**
Unit No.3	**TV CAMERA TUBE, PICTURE TUBE AND COLOR TELEVISION STANDARDS** NTSC, PAL & SECAM TV standards: Introduction, Coder, decoders, Comparison, Simple PAL and delayed PAL,TV camera tubes- Vidicon, Plumbicon; Color Picture Tubes- PIL, Delta gun, Trintron; picture tubes, purity & convergence, automatic degaussing.	**7 Hrs.**
Unit No.4	**DIGITAL TV & HDTV** Merits of digital technology, digital TV signals, digitized video parameters ,digital transmission and reception, codec functions, ITT Digit 2000 IC system, MAC signals, D2- MAC/Packet signals, advantages of MAC signals, HDTV systems, HDTV standards & compatibility, the MUSE system	**8 Hrs.**
Unit No.5	**ADVANCED DISPLAY & STUDIO SYSTEMS** Stereo sound system, flat panel display TV receivers, 3-D TV picture, digital equipment for TV studios, construction & working of LED TV.	**7 Hrs.**
Unit No.6	**ADVANCED TELEVISION SYSTEM** CATV, CCTV, DTH receiver, IR remote control, Satellite TV: satellite communication system, satellite electronics	**7 Hrs.**

TEXT BOOKS:

1	Monochrome and Color TV – R.R. Gulati, 2nd revised edition, New Age International Publication
2	Modern Television Practice – Principles, Technology and Service – R.R. Gulati, 4th edition, New Age International Publication
3	Television and Video Engineering - A.M. Dhake, 2nd Edition.

REFERENCE BOOKS:

1.	Digital Video Processing-A. Murat Tekalp, Prentice Hall Signal Processing Series, BS publications.
2.	Audio-Video Engineering – R.C.Jaiswal

3.	Consumer Electronics –S P Bali, Pearson

LIST OF EXPERIMENTS: (Minimum 8 experiments)

1	Study of circuit diagram of monochrome and color a TV receiver
2	CVS for different test patterns
3	RF tuner
4	Video IF & detector
5	Sync separators (V & H)
6	Sound section
7	Horizontal section
8	Vertical section
9	DTH
10	LED TV
11	CATV
12	Trouble shooting of color TV
13	Industrial Visit

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)
Q.2 Questions based on unit no 1, 2, 3 (Carries 14 marks)
Q.3 Questions based on unit no 1, 2, 3 (Carries 14 marks)
Q.4 Questions based on unit no 4, 5, 6 (Carries 14 marks)
Q.5 Questions based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: HIGH PERFOMANCE COMMUNICATION NETWORKS

Course Details

Class	**Final Year B.Tech. Sem-V**
Course Code and Course Title	**PCE-ETC 801: High Performance Communication Networks (Elective II)**
Prerequisites	**Computer Networks, Digital Communication**
Teaching scheme: Lectures + Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 3 Hrs. /Week	**Theory: 100 Marks** **70 (ESE) + 30 (CIE)**
Tutorial: 1 Hr./Week	**TW: 25 Marks**

Course Objectives: The course aims to :	
1	To provide students with an overview of the concepts and fundamentals of different communication networks
2	To study and utilize the frame formats used in communication networks.
3	Acquire the knowledge of the interoperability of networks.
4	To understand the different advanced networks architecture and functionality.

Course Outcomes: Upon successful completion of this course ,the students will be able to:	
1	Illustrate the different communication networks using the architecture and frames format
2	Design and analyzes simple communication networks.
3	Compare various high performance networks.
4	Develop and research on various networks and its interoperability.

COURSE CONTENTS		
Unit No.1	**HISTORY OF COMMUNICATION NETWORK** History of Communication Networks, Networking principles, Review ofTCP/IP, Switching, Routing. Future networks Internet, FDDI-DQDB- SMDS, Overview of ISDN & BISDN	**6 Hrs.**
Unit No.2	**NETWORK SERVICES AND LAYERED ARCHITECTURE** Traffic characterization and quality of services, Network services, High performance networks, Network Elements., Layered applications, Open data network model, Network architectures, Network bottlenecks.	**6 Hrs.**
Unit No.3	**ATM** Main features of ATM, Addressing, signaling and Routing, ATM headerstructure, ATM AAL, Internetworking with ATM.	**5 Hrs.**
Unit No.4	**ADVANCED NETWORKS CONCEPTS** VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN.MPLS -operation, Routing, Tunneling and use of FEC, Traffic Engineering, MPLS based VPN, overlay networks-P2P connections.	**6 Hrs.**
Unit No.5	**OPTICAL NETWORKS** Optical Links, WDM system, Optical cross-connects, Optical LANs, Opticalpaths and networks	**5 Hrs.**
Unit No.6	**VEHICULAR NETWORKS** Basic Principles and Challenges, Enabling Technologies - Communication requirements, Vehicular positioning, Vehicle sensors, Cooperative System Architecture, Routing Protocols for VANET, VANET-enabled Active SafetyApplications - Infrastructure-to-vehicle applications, Vehicle-to-vehicle applications, Pedestrian-to-vehicle applications	**8 Hrs.**

TEXT BOOKS:

1	William Stallings, **"ISDN and Broadband ISDN with Frame Relay and ATM"**, 4thEdition Pearson.
2	Leon Gracia, Indra Widjaja, **"Communication Networks-Fundamental conceptsand Key architectures"**, McGraw Hill Companies.
3	H. Hartenstein and K. P. Laberteaux, **"VANET: Vehicular Applications andInterNetworking Technologies"**, Wiley, 2010.

REFERENCE BOOKS:

1	Behrouz Forouzan, **"Data Communications and Networking"**, 4th Edition, McFrawHill Companies .
2	Forouzan, **"TCP/IP Protocol Suite",** III$_{rd}$ Edition Tata Mc-Graw Hill publication.
3	P. H.-J. Chong, I. W.-H. Ho, **"Vehicular Networks: Applications, Performance Analysis and Challenges"**, Nova Science Publishers, 2019.

NOTE: Minimum Eight (8) assignments based on above syllabus.

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (Carries 14 Marks)
Q.2 Questions based on unit no 1, 2, 3 (Carries 14 marks)
Q.3 Questions based on unit no 1, 2, 3 (Carries 14 marks)
Q.4 Questions based on unit no 4, 5, 6 (Carries 14 marks)
Q.5 Questions based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: ADVANCED NETWORK SECURITY (Elective II)

Course Details

Class	**Final Year B. Tech. Sem-VIII**
Course Code and Course Title	**PCE-ETC 801:Advanced Network Security (Elective II)**
Prerequisites	**Modular Arithmetic, Number theory, Computer network**
Teaching scheme: Lectures + Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 3 Hrs. /Week	**Theory: 100 Marks, 70 (ESE) + 30 (CIE)**
Tutorial: 1 Hr./ Week	**TW: 25 Marks**

Course Objectives: The course aims to :	
1	Introduce students to security challenges, access control models, authentication and authorization
2	Introduce students to malware and social engineering attacks, network authentication and identity management
3	Familiarize students with physical security and hardware security.
4	Familiarize students with web application attacks and Internet browsers, wireless network security attacks, vulnerabilities and solutions.

Course Outcomes: Upon successful completion of this course ,the students will be able to:	
1	Develop Concept of Security needed in Communication of data through computers and networks along with Various Possible Attacks.
2	Understand Various Encryption mechanisms for secure transmission of data and management of key required for required for encryption.
3	Understand authentication requirements and study various authentication mechanisms.
4	Understand network security concepts and study different Web security mechanisms.

COURSE CONTENTS		
Unit No.1	**INTRODUCTION** Need for Security , Security Attacks ,Services and Mechanisms ,Network Security Mode	**5 Hrs.**
Unit No.2	**SYMMETRIC CIPHERS** Substitution &Transposition Techniques , Block Cipher , DES , Triple DES , AES ,Stream Ciphers , RC4	**6 Hrs.**
Unit No.3	**PUBLIC KEY CRYPTOGRAPHY** Need and Principles of Public Key Cryptosystems , RSA Algorithm , Key Distribution and Management , Diffie-Hellman Key Exchange , Digital Signatures	**7 Hrs.**
Unit No.4	**AUTHENTICATION** Authentication Requirements , Message Authentication Codes , Hashes, MD5 & SHA ,User Authentication: Password, Certificate based & Biometric Authentication , Kerberos	**7 Hrs.**
Unit No.5	**NETWORK SECURITY** Firewalls , IP Security , Electronic Mail Security , Intrusion Detection , Web Security , SSL, TLS	**6 Hrs.**
Unit No.6	**NETWORK TOOLS** Network security Monitoring Tools, Encryption Tools, Web Vulnerability Scanning Tools, Packet Sniffers and Password Auditing Tools, Network Defense Wireless Tools, Network Intrusion & Detection Tools, One case Study using Tools.	**5 Hrs.**

TEXT BOOKS:

1	William Stallings, “Cryptography and network security principles and practices”, Pearson, 6th Edition, ISBN : 978-93-325-1877-3
2	Atul Kahate, “Cryptography and Network Security”, Mc Graw Hill Publication, 2nd Edition, 2008, ISBN : 978-0-07-064823-4
3	Forouzan, “Cryptography and Network Security (SIE)”, Mc Graw Hill, ISBN, 007070208X, 9780070702080

REFERENCE BOOKS:

1	Wenbo Mao "Modern Cryptography, Theory & Practice", Pearson Education
2	Hoffstein, Pipher, Silvermman "An Introduction to Mathematical Cryptography",Springer.
3	J. Daemen, V. Rijmen "The Design of Rijndael", Springer.
4	A. Joux "Algorithmic Cryptanalysis", CRC Press.
5	S. G. Telang "Number Theory", Tata Mc Graw Hill.
6	C. Boyd, A. Mathuria "Protocols for Authentication and Key Establishment", Springer.

7	Matt Bishop "Computer Security", Pearson Education.
8	Christof Paar, Jan Pelzl “Understanding Cryptography”, Springer-Verlag Berlin Heidelberg

NOTE: Minimum Eight (8) Tutorials based on above syllabus.

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ’s based on complete syllabus. (carries 14 Marks)
Q.2 Questions based on unit no 1, 2, 3 (Carries 14 marks)
Q.3 Questions based on unit no 1, 2, 3 (Carries 14 marks)
Q.4 Questions based on unit no 4, 5, 6 (Carries 14 marks)
Q.5 Questions based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: ELECTRICAL AUTOMOBILES (Elective II)

Course Details

Class	**Final Year B. Tech Sem - VIII**
Course Code and Course Title	**PCE-ETC 801: Electrical Automobiles (Elective-II)**
Prerequisites	**Basic Electrical &Electronics, Engineering Mathematics**
Teaching scheme :Lectures + Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures : 3 Hrs. / Week	**Theory : 100 Marks, 70 (ESE) + 30 (CIE)**
Tutorial : 1 Hr. / Week	**TW: 25 Marks**

Course Objectives: The course aims to :	
1	To understand basics of EVs & HEVs.
2	To understand basics of battery, battery charging Systems in EVs & HEVs
3	To analyze power management and grid technology
4	To understand the construction and working principle of various motors used in electric vehicles
5	To analyze design of EV and HEV
6	To analyze the effect of changing of parameters on vehicle performance

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	Know Concept of Electric Vehicles, Hybrid Electric Vehicles & Plug in Hybrid Electric Vehicles
2	Analyze the battery management system& PHEV design
3	Analyze different power converter topology used for electric vehicle application
4	Develop the electric propulsion unit and its control for application of electric vehicles

5	Design issues of EVs & HEVs
6	How to model EVs & HEVs

COURSE CONTENTS		
Unit No.1	**INTRODUCTION TO EVS & HEVS** A brief history of EV & HEV, Basics of EV & HEV, Architectures of EV & HEV, HEV fundamentals.	**6 Hrs.**
Unit No.2	**PLUG-IN HEVS** Introduction to PHEVs, PHEV architectures, Power management of PHEVs, Fuel economy of PHEVs, PHEV design & component sizing, Vehicle-to-grid technology.	**6 Hrs.**
Unit No.3	**POWER ELECTRONICS IN EVS & HEVS** Introduction, Principles of power electronics, Rectifiers, Converters, Inverters, Battery chargers used in EVs & HEVs, Emerging power electronic devices	**6 Hrs.**
Unit No.4	**ELECTRIC MACHINES & DRIVES IN EVS & HEVS** Introduction, Induction motor drives, Permanent magnet motor drives, Brushed & Brushless DC motor, Switched reluctance motors.	**6 Hrs.**
Unit No.5	**COMPONENTS & DESIGN CONSIDERATIONS OF EVS & HEVS** Batteries, Ultra capacitors, Fuel Cells, Controls, Aerodynamic considerations, Consideration of rolling resistance, Transmission efficiency, Consideration of vehicle mass, Electric vehicle chassis & body design, General issues in design.	**7 Hrs.**
Unit No. 6	**MODELLING& CASE STUDIES OF EVS & HEVS** Introduction, Fundamentals of vehicle system modelling, HEV modelling, Case studies - Rechargeable battery vehicles, Hybrid vehicles.	**5 Hrs.**

Text Books:

1	Chris Mi, M. Abul Masrur, David WenzhongGao, “Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives”, 2011, Wiley publication.

Reference Books:

1	MehrdadEhsani,YiminGao, Sebastien E. Gay, Ali Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles”, CRC PRESS
2	Allen Fuhs, “Hybrid Vehicles and the future of personal transportation”, 2009, CRC Press.
3	James Larminie, John Lowry, “Electric Vehicle Technology Explained”, 2003, Wiley publication.

NOTE: Minimum Eight (8) Tutorials based on above syllabus.

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)
Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)
Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: ELECTIVE-II (BIG DATA ANALYTICS)

Course Details

Class	**Final Year B. Tech.Sem-VIII**
Course Code and Course Title	**PCE-ETC 801: BIG DATA ANALYTICS (Elective-II)**
Prerequisites	**Data Base Management System**
Teaching scheme: Lectures+ Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	**Examination scheme**
Lectures: 3 Hrs./Week	**Theory: 100Marks, 70 (ESE) + 30 (CIE)**
Tutorial: 1 Hr./Week	**TW: 25Marks**

Course Objectives: The course aims to:	
1	To Provide an Overview of an exciting growing field of Big Data Analytics.
2	To introduce the tools required to manage and analyze big data like Hadoop, No SQL, Map Reduce.
3	To teach the fundamental techniques in achieving big data analytics with scalability and streaming capability

Course Outcomes: Upon successful completion of this course, the students will be able to:	
1	Understand the key issues in big data management.
2	Acquire fundamental enabling techniques using tools in big data analytics.
3	Achieve adequate perspectives of big data analytics in various applications like sensor, recommender systems, social media applications etc.

COURSE CONTENTS		
Unit No.1	**INTRODUCTION TO BIG DATA ANALYTICS:** Introduction to Big Data, Big Data characteristics, types of Big Data, Traditional vs. Big Data business approach. Technologies Available for Big Data, Infrastructure for Big Data, Big Data Challenges, Case Study of Big Data Solutions.	**4 Hrs.**
Unit No.2	**INTRODUCTION TO HADOOP:** Introduction to Hadoop. Core Hadoop Components, Hadoop Ecosystem, Physical Architecture, Hadoop limitations.	**5 Hrs.**
Unit No.3	**NOSQL:** Introduction to NoSQL, NoSQL business drivers, NoSQL case studies. NoSQL data architecture patterns: Key-value stores, Graph stores, Column family (Big table) stores, Document stores, Variations of NoSQL architectural patterns. Using NoSQL to manage big data: What is a big data NoSQL solution? Understanding the types of big data problems; Analyzing big data with a shared-nothing architecture; Choosing distribution models: master-slave versus peer-to-peer; Four ways that NoSQL systems handle big data problems	**6 Hrs.**
Unit No.4	**MAP REDUCE:** Map Reduce and The New Software Stack: Distributed File Systems, Physical Organization of Compute Nodes, Large Scale File-System Organization .Map Reduce: The Map Tasks, Grouping by Key, The Reduce Tasks, Combiners, Details of Map Reduce Execution, Coping with Node Failures. Algorithms Using Map Reduce: Matrix-Vector Multiplication by Map Reduce, Relational-Algebra Operations by Map Reduce, Matrix Operations, Matrix Multiplication by Map Reduce.	**6 Hrs.**
Unit No.5	**TECHNIQUES IN BIG DATA ANALYTICS:** Finding Similar Item: Nearest Neighbor Search, Similarity of Documents, Mining Data Streams: Data Stream Management Systems, DataStream Model, Examples of Data Stream Applications: Sensor Networks, Network Traffic Analysis, Link Analysis: Page Rank Definition, Structure of the web, dead ends, Using Page rank in a search engine, Efficient computation of Page Rank: Page Rank Implementation Using Map Reduce Frequent Item set Mining : Market-Basket Model, Apriori Algorithm, Algorithm of Park-Chen-Yu	**9 Hrs.**
Unit No.6	**BIG DATA ANALYTICS APPLICATIONS:** Recommendation Systems: Introduction, A Model for Recommendation Systems, Collaborative-Filtering System: Nearest Neighbor Technique, Example. Mining Social-Network Graphs: Social Networks as Graphs, Types of Social-Networks. Clustering of Social Graphs: Applying Standard Clustering Techniques, counting triangles using Map Reduce.	**6 Hrs.**

TEXT BOOKS:

1	Radha Shankarmani and M Vijayalakshmi ―Big Data Analytics‖, Wiley
2	Alex Holmes ―Hadoop in Practice‖, Manning Press, Dreamtech Press
3	Dan McCreary and Ann Kelly ―Making Sense of NoSQL‖ – A guide for managers and therest of us, Manning Press

REFERENCE BOOKS:

1	Bill Franks , ―Taming The Big Data Tidal Wave: Finding Opportunities In Huge DataStreams With Advanced Analytics‖, Wiley
2	Chuck Lam, ―Hadoop in Action‖, Dreamtech Press

NOTE: Minimum Eight (8) Tutorials based on above syllabus.

GUIDELINES TO PAPER SETTER:

In theory ESE examination of 70 marks following points should be considered,

Q.1 MCQ's based on complete syllabus. (14 Marks)
Q.2 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.3 Based on unit no 1, 2, 3 (Carries 14 marks)
Q.4 Based on unit no 4, 5, 6 (Carries 14 marks)
Q.5 Based on unit no 4, 5, 6 (Carries 14 marks)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT NAME: PROJECT PHASE-II

Course Details

Class	**Final Year B. Tech. Sem-VIII**
Course Code and Course Title	**PW-ETC-801 : Project Phase-II**
Prerequisites	
Teaching scheme: Lectures +Tutorial/Practical	**0 Hrs. + 8 Hr.**
Credits	**0 + 6**
Evaluation Scheme ESE + CIE for Theory	**-**

Teaching scheme	**Examination scheme**
Practical: 8 Hrs. /Week	**-**
-	**TW: 50 Marks OE: 150 Marks**

Course Objectives: The course aims to :	
1	Allow students to demonstrate a wide range of the skills learned at the College of Engineering during their course of study by asking them to deliver a product that has passed through the design, analysis, testing and evaluation
2	Encourage multidisciplinary research through the integration learned in a number of courses.
3	Provide a student the opportunities to apply and integrate his/her knowledge acquired throughout the undergraduate study.

Course Outcomes: After the completion of the course the student should be able to:	
1	Identify the problem statement through literature survey for project work.
2	Develop design strategy for the project work.
3	Develop presentation and interpersonal communication skills through project work.
4	Develop the ability to learn independently and to find/integrate information from different sources required in solving real-life problems.
5	enhance technical report writing skills with proper organization of materials;

- The each project group of semester one will continue the project work in semester II and complete the project in all respect (assembly, testing, fabrication, tabulation, test results etc).
- Hardcopy of project diary should be maintained group wise, where report of every week activity should be maintained, which should be presented at the time of examination
- The project work along with project report should be submitted as part of Semester II on or before the last day of the semester -II.