N.B.K.R. INSTITUTE OF SCIENCE & TECHNOLOGY

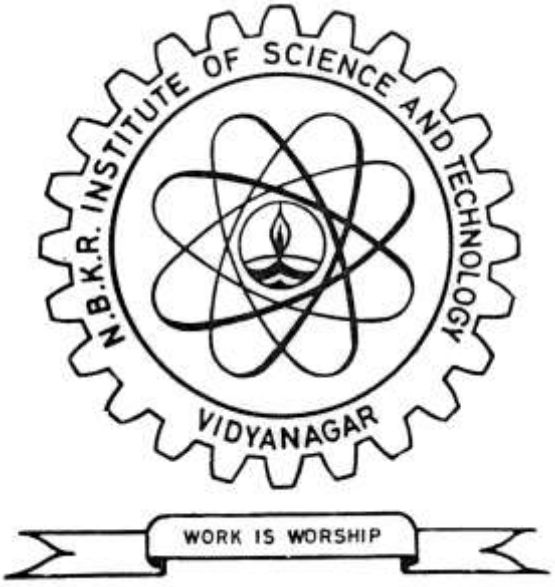
(AUTONOMOUS)

COLLEGE WITH POTENTIAL FOR EXCELLENCE (CPE)

Affiliated to JNTUA, Anantapuramu

Re-Accredited by NAAC with 'A' Grade

B.Tech. Courses Accredited by NBA under TIER-I



SYLLABUS

B.TECH. DEGREE COURSE

I B.TECH

I & II Semesters

ELECTRONICS AND COMMUNICATION ENGINEERING

(With effect from the batch admitted in the academic year 2017-2018)

VIDYANAGAR - 524413

SPSR Nellore-Dist. Andhra Pradesh

www.nbkrist.org

INSTITUTE:

Vision:

To emerge as a comprehensive Institute that provides quality technical education and research thereby building up a precious human resource for the industry and society.

Mission:

1. To provide a learner-centered environment that challenges individuals to actively participate in the education process.

2. To empower the faculty to excel in teaching while engaging in research, creativity and public service.

3. To develop effective learning skills enabling students pick up critical thinking thus crafting them professionally fit and ethically strong.

4. To reach out industries, schools and public agencies to partner and share human and academic resources.

VISION AND MISSION OF THE DEPARTMENT

Vision:

To develop high quality engineers with sound technical knowledge, skills, ethics and morals in order to meet the global technological and industrial requirements in the area of Electronics and Communication Engineering.

Mission:

1. To produce high quality graduates and post-graduates of Electronics and Communication Engineering with modern technical knowledge, professional skills and good attitudes in order to meet industry and society demands.
2. To develop graduates with an ability to work productively in a team with professional ethics and social responsibility.
3. To develop highly employable graduates and post graduates who can meet industrial requirements and bring innovations.
4. Moulding the students with foundation knowledge and skills to enable them to take up postgraduate programmes and research programmes at the premier institutes.

Programme Educational Objectives (PEOs):

1. To provide the students with strong fundamental and advanced knowledge in mathematics, Science and Engineering with respect to Electronics and Communication Engineering discipline with an emphasis to solve Engineering problems.

2. To prepare the students through well - designed curriculum to excel in bachelor degree programme in Electronics and Communication Engineering in order to engage in teaching or industrial or any technical profession and to pursue higher studies.

3. To train students with intensive and extensive engineering knowledge and skill so as to understand, analyze, design and create novel products and solutions in the field of Electronics and Communication Engineering.

4. To inculcate in students the professional and ethical attitude, effective communication skills, team spirit, multidisciplinary approach and ability to relate engineering issues to broader social context.

5. To provide students with an excellent academic environment to promote leadership qualities, character molding and lifelong learning as required for a successful professional career.

Program Outcomes (POs):

PO1: Ability to acquire and apply knowledge of science and engineering fundamentals in problem solving.

PO2: Acquire in-depth technical competence in a specific information technology discipline.

PO3: Ability to undertake problem identification, formulation and providing optimum solution.

PO4: Ability to utilize systems approach to design and evaluate operational performance.

PO5: Understanding of the principles of inter-disciplinary domains for sustainable development.

PO6: Understanding of professional & ethical responsibilities and commitment to them.

PO7: Ability to communicate effectively, not only with engineers but also with the community at large.

PO8: Ability to Communicate effectively on complex engineering activities with the engineering community and with society at large.

PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO11: Understanding of the social, cultural, global and environmental responsibilities as a professional engineer.

PO12: Recognizing the need to undertake life-long learning, and possess/acquire the capacity to do so.

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY: VIDYANAGAR

(AUTONOMOUS)

(AFFILIATED TO JNTU ANANTAPUR: ANANTHAPURAMU)

SPSR NELLORE DIST

I YEAR OF FOUR YEAR B.TECH DEGREE COURSE – I SEMESTER

ELECTRONICS AND COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the academic year 2017-2018)

(For the batch admitted in the academic year 2017-2018)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Duration In Hours	Max. Marks	Duration In Hours	Max. Marks		Duration In Hours	Max. Marks	100
1	17SH1101	Functional English**	3	-	-	3	2	40	2	40	0.8*Best of two+0.2*least of two	3	60	100
2	17SH1103	Numerical Analysis**	3	1	-	3	2	40	2	40		3	60	100
3	17SH1102	Engineering Physics**	3	-	-	3	2	40	2	40		3	60	100
4	17CS1104	Basic Computer Engineering**	3	-	-	3	2	40	2	40		3	60	100
5	17EE1101	Basic Electrical Sciences**	3	2	-	4	2	40	2	40		3	60	100
		PRACTICALS												
6	17ME1103	Computer Aided Engineering Drawing**	-	-	6	3	-	-	-	40	Day to Day Evaluation and a test (40 Marks)	3	60	100
7	17SH11P1	English Language Lab**	-	-	3	2	-	-	-	40		3	60	100
8	17SH11P2	Engineering Physics Lab**	-	-	3	2	-	-	-	40		3	60	100
9	17CS11P1	Basic Computer Engineering Lab**	-	-	2	1	-	-	-	40		3	60	100
		TOTAL	15	03	14	24	-	-	-	360		-	540	900

**Common to ECE, EEE, CSE, IT

17SH1101- FUNCTIONAL ENGLISH

(Common to all Branches)

Course Category:	Basic Sciences	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-0-0
Pre-requisite:	Basic Level of LSRW skills	**Sessional Evaluation:** **External Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected: 1. To develop their basic communication skills in English 2. To achieve specific linguistic and communicative competence 3. To acquire relevant skills and function efficiently in a realistic working context 4. To inculcate the habit of reading	
Course Outcomes	On successful completion of this course students will be able to:	
	CO1	Correct the error of the sentence; improve language proficiency and face competitive exams; GATE, GRE, TOEFL, GMAT etc
	CO2	Comprehend the advanced level of reading comprehensions
	CO3	Write clear and coherent passages for social and professional contexts
	CO4	Write proposals, business letters
	CO5	Acquire considerable flair in using broad range of vocabulary.
	CO6	Drafting Speech-building critical thinking
Course Content	**Unit –I** **GRAMMAR**: Parts of Speech & Subject- Verb Agreement **WRITING-PARAGRAPH WRITING:** Expressions of ideas, concepts etc., in unambiguous grammatically acceptable and logically coherent manner (in general items); In particular skills in sentence construction emphasizing on function of word and Basic sentence patterns- (framing sentences leading to effective paragraph) **Unit-II** **GRAMMAR:** Pronoun - Agreement & Usage, Articles: Kinds & Omission of Article **READING:** Different Reading Strategies: Skimming, Scanning, Inferring, Predicting and Responding to content –Guessing from Context and Vocabulary Extension. **WRITING:** Letter writing - Formal and Informal Writing	

	Unit-III **GRAMMAR:** Tenses, Conditional Sentences, Non-Finite Verbs: Kinds of Non-Finite: Infinitives, Gerund & Participle. **WRITING**: Dialogue writing: Communicating and presenting ideas effectively and coherently, Exchanging conversation in a group or between two persons directed towards a particular subject. **Unit-IV** **GRAMMAR:** Prepositions: Kinds, Position, Adverb usage, Question tags & Transformation of sentences-Degrees of comparison Writing: Telephonic conversations and Etiquettes **Unit-V** **GRAMMAR:** Transformation of sentences- Direct- Indirect Speech, Active- Passive Voice & Modifiers **WRITING:** Story Writing **Unit –VI** **GRAMMAR:** Simple, Complex, Compound Sentences - Parallelism **WRITING:** Drafting of Public Speech**:** Ideas / Content Generation, Structure
Textbooks & Reference books	**REFERENCE BOOKS:** 1. Essential English Grammar: Raymond Murphy, Cambridge University Press 2. Advanced Grammar in Use: Martin Hewings, Cambridge University Press 3. High School English Grammar: Wren and Martin, S Chand Publications 4.Effective Technical Communication: Ashraf Rizvi, Tata Mc Graw Hill Publication

17SH1103-NUMERICAL ANALYSIS

(Common to all Branches)

Course Category:	Basic Sciences	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-1-0
Pre – requisite:	Intermediate Mathematics	**Sessional Evaluation:**	40
		External Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to understand: 1. The Bisection, False Position, Iteration and Newton-Raphson Methods. 2. The basic concepts of numerical solutions of simultaneous linear and non-linear algebraic equations. 3. The concepts of Interpolation. 4. The concepts of Numerical Differentiation and Integration. 5. The numerical methods to solve Ordinary Differential Equations by using Taylor's series method, Picard's method, Euler's and Modified Euler's Methods and Runge-Kutta methods of 2^{nd} and 4^{th} order. 6. The concepts of Curve Fitting and Regression Analysis.	
Course Outcomes	After completing the course the student will be able to	
	CO1	Acquire knowledge in solving algebraic and transcendental equations by using the appropriate numerical methods.
	CO2	Develop skills in analyzing the simultaneous linear and non-linear algebraic equations by various numerical methods.
	CO3	Attains skills in analyzing the methods of interpolating the given data.
	CO4	Acquire knowledge in Numerical Differentiation by Newton's formula and Numerical Integration by Trapezoidal, Simpson's 1/3 and Simpson's 3/8 rules.
	CO5	Apply appropriate numerical methods to solve Ordinary Differential Equations.
	CO6	Develop skills in designing mathematical models for fitting geometrical curves to the given data and also acquire knowledge in Regression Analysis.
Course Content	**UNIT – I** **SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS:** Bisection - False position- Iteration - Newton-Raphson Methods. **UNIT - II** **SOLUTION OF SIMULTANEOUS LINEAR AND NON-LINEAR ALGEBRAIC EQUATIONS:** Gauss Jordon method - Gauss Elimination with Pivotal condensation method - Triangular Factorization method - Gauss-Seidal method - Newton-Raphson method.	

	UNIT – III **INTERPOLATION:** Newton's forward and backward interpolation formula - Lagrange's interpolation - Gauss forward and backward formulae - Stirling's formula. **UNIT – IV** **NUMERICAL DIFFERENTIATION AND INTEGRATION:** First and Second Order Derivatives at given points by Newton's formula. Trapezoidal rule - Simpson's 1/3 rule and Simpson's 3/8 rule. **UNIT – V** **NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS:** Solution by Taylor's Series - Picard's Method of Successive Approximations - Euler's and Modified Euler's Methods - Runge-Kutta Method of 2^{nd} order and 4^{th} order. **UNIT - VI** **CURVE FITTING:** Introduction - Method of least squares - Linear and Non-linear equations. Correlation coefficient - Lines of regression - Rank correlation coefficient (Spearman's Rank-Correlation).
Text Books and Reference Books	**TEXTBOOKS:** 1. Higher Engineering Mathematics - B.S. Grewal, Kanna Publishers, New Delhi. 2. Mathematical Methods - Dr.T.K.V. Iyengar, Dr.B. Krishna Gandhi, S.Ranganatham, Dr.M.V.S.S.N. Prasad, S. Chand Publication, New Delhi. **REFERENCE:** 1. Introductory Methods of Numerical Analysis - S.S. Sastry, Prentice Hall India Learning Private Limited, New Delhi. 2. Numerical Methods - E. Balagurusamy,Tata McGraw-Hill Education Pvt. Ltd, New Delhi. 3. Numerical Methods - E. Balagurusamy,Tata McGraw-Hill Education Pvt. Ltd, New Delhi

17SH1102-ENGINEERING PHYSICS

(Common for ECE, EEE, CSE & IT Branches)

<table>
<tr><td>Course Category:</td><td>Basic Sciences</td><td>Credits:</td><td>3</td></tr>
<tr><td>Course Type:</td><td>Theory</td><td>Lecture-Tutorial-Practical:</td><td>3-0-0</td></tr>
<tr><td>Pre-requisite:</td><td>Fundamental Concepts of Physics</td><td>Sessional Evaluation:
External Exam Evaluation:
Total Marks:</td><td>40
60
100</td></tr>
<tr><td>Course Objectives</td><td colspan="3">Students undergoing this course are expected to
1. Explain the classification to study structure of crystalline solids and X-ray diffraction techniques.
2. Basic properties of magnetic materials and their uses in Science & Technology.
3. Explain and provide the knowledge about physics of semiconductors and working of semiconductor.
4. Describe the basic principles of communication system and their uses in communication filed.
5. Describe the characteristics, working of lasers & optical fiber properties and their applications in Science & Technology.
6. Understand the behavior of superconductors & nanomaterials, quantum phenomena and the limitations of basic physical laws.</td></tr>
<tr><td rowspan="7">Course Outcomes</td><td colspan="3">Upon the successful completion of the course, the students will be able to:</td></tr>
<tr><td>CO1</td><td colspan="2">Understand the structure of Crystalline solids and X-ray diffraction methods to study crystals.</td></tr>
<tr><td>CO2</td><td colspan="2">Understand the origin of magnetism and polarization and applications of magnets and dielectric materials in various disciplines.</td></tr>
<tr><td>CO3</td><td colspan="2">To know the properties of semiconductor materials and devices by projecting the view of energy bands.</td></tr>
<tr><td>CO4</td><td colspan="2">Understand the concept of communication system with its applications in the field of Science & Technology.</td></tr>
<tr><td>CO5</td><td colspan="2">Understand the utilization of laser technology in various disciplines and know the concept of optical fiber and its applications.</td></tr>
<tr><td>CO6</td><td colspan="2">Basic ideas about superconductors and nano materials with their uses in various fields of Science & Technology</td></tr>
<tr><td>Course Content</td><td colspan="3"><u>UNIT-I</u>
CRYSTALLOGRAPHY: Introduction – Space lattice – Unit cell – Lattice parameters – Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC – planes in crystals – Miller indices – Interplanar spacing in cubic crystals.
X-RAY DIFFRACTION: X-ray diffraction in crystals - Bragg’s law of diffraction – X-ray diffraction techniques - Laue method - powder method (Debye-Scherer method).
<u>UNIT-II</u>
DIELECTRIC PROPERTIES: Basic definitions, Electronic, Ionic (Quantitative) and Orientation polarizations (Qualitative) – Internal Fields in Solids, Classius – Mossotti Equation.
MAGNETIC MATERIALS: Introduction and basic definitions – Origin of magnetic moments – Classification of magnetic materials into dia, para, ferro, antiferro and ferri</td></tr>
</table>

	magnetic materials – Hysteresis – Soft and Hard magnetic materials – Applications of magnetic materials. **UNIT-III** **SEMICONDUCTORS:** Intrinsic and extrinsic semiconductors –Electrical Conductivity in Semiconductors – Drift and diffusion currents – Einstein relations – Hall Effect and its applications – Direct and indirect band gap semiconductors. **PHYSICS OF SEMICONDUCTOR DEVICES:** Formation of PN Junction, I-V Characteristics of PN Junction Diode, LED, Photo Diode, Solar Cell. **UNIT-IV** **COMMUNICATION SYSTEM** – Principles of Basic Communication System – Digital Communication System – Analog Communication System - Basic Steps for Analog/Digital Conversion – Sampling Theorem. System-Signal Bandwidth of signal – Signal impairment – Modulation – Different Types - Demodulation Process **UNIT-V** **LASERS:** Introduction – Characteristics of lasers – Spontaneous and stimulated emission of radiation – Condition for Population inversion – Ruby Laser - He-Ne Laser – Applications of Lasers. **OPTICAL FIBERS:** Introduction – Construction and working principle of optical fiber – Acceptance angle –Numerical Aperture – Types of optical fibers – Block diagram of optical fiber communication system – Applications of optical fibers. **UNIT VI** **SUPERCONDUCTIVITY:** Introduction – effect of magnetic field – Meissener Effect – Type I and Type II superconductors – Flux quantization – BCS theory (Qualitative treatment) –Applications of super conductors. **PHYSICS OF NANO MATERIALS:** Introduction – Significance of Nano scale and types of Nano materials – Physical properties: Optical, thermal, mechanical and magnetic properties – Synthesis of Nano materials by Top down and bottom up approaches: ball mill, chemical vapour deposition and sol gel – Applications of nanomaterials.
Text Books & References	**TEXT BOOKS:** 1. Principles of electronics by V.K.Mehtha, Tata Mc Graw Hill. 2. Solid State Physics by S.O.Pillai, New Age Publications (Labs edition). 3. Introduction to Solid State Physics by Charles Kittel, Wiley India Pvt Ltd, 7th Edition. 4. Engineering Physics by R.K.Gaur & S.L.Gupta, Dhanpat Rai Publications. **REFERENCES:** 1. Modern Engineering Physics by Dr. K. Vijaya Kumar, Dr. S. Chandralingam, S.CHAND & COMPANY LTD. 2. Applied Physics by P.K. Palanisamy : Scitech Publishers. 3. Engineering Physics by Dr. K.T. Tyagarajan, V.Rajendran, Tata Mc Graw-Hill

17CS1104 -BASIC COMPUTER ENGINEERING

(Common to ECE, EEE, CSE &IT)

Course Category:	Core	**Credits:**	3
Course Type:	Theory	**Lecture – Tutorial – Practical:**	3-0-0
Prerequisite:	Basic usage of computer may be required and a few terms must be known in advance.	**Sessional Evaluation:** **Univ. Exam Evaluation:** **Total Marks:**	40 60 100
Course Objectives	• Understanding the basics of computer fundamentals, identification of various components and their need. • Creating awareness regarding various I/O and storage devices. • Gaining knowledge about programming languages and methodologies. • Getting fundamental ideas about core concepts of computer domains.		

Course Outcomes	Upon the successful completion of the course, the students will be able to:	
	CO1	Identify Physical components of a computer and their functionalities and to learn various interactive mechanisms through different devices.
	CO2	Understand storage media and strengthen the data processing concepts.
	CO3	Explore the basic software programming and development concepts.
	CO4	Acquire the knowledge on operating system basics.
	CO5	Understand the essential networking concepts.
	CO6	Gain the basic knowledge in core concepts of computers such as Databases and Security issues.

Course Content

PREREQUISITE::
Computers for individual users – Desktop, Workstations, Notebook computers, Tablet and Handheld computers, Smart phones, Computers for organizations – Network servers, mainframes, mini and super computers, Computers in society – why are so important, home, Education, Small Business, Industry, Government, Healthcare, Banking and Communication.

UNIT – I

INSIDE THE COMPUTER: Various parts of a Computer System - Software, Hardware, Data and Users, Information processing cycle, Essential Computer hardware - processor, Memory, I/O and Storage, Software and major categories- system software and application software.

I/O DEVICES: The Keyboard – Layout, types of keys, input from keyboard, The Mouse –Usage, Variants of mouse, Devices for Hand – Pens, Touch Screens, Game controllers, Optical devices – Bar Code readers, Image scanners and OCR, Monitors – Types, CRT monitors, Flat panel Monitors.

UNIT – II

DATA STORAGE: Categories of storage devices, Magnetic – How data is stored and organized on disk, How OS access the data, Diskettes, Hard disks, Removable High-Capacity Magnetic disks, Tape Drives, Optical Storage devices – CD-ROM, DVD-ROM, Recordable Optical Technologies, Solid-state storage devices – Flash Memory, Smart Cards, Solid State Disks.

	DATA PROCESSING: How Computers represent data – Number systems, Bits and Bytes, Text Codes, How Computers process data – the CPU, Machine cycles, Memory, Factors affecting processing speed – Registers, Memory and Computing power, The Computer's Internal Clock, The Bus, Cache Memory. **UNIT – III** **SOFTWARE PROGRAMMING AND DEVELOPMENT :** Definition of a computer program, Hardware/Software Interaction, Planning a computer program, How programs solve problems-Program control flow, Algorithms, Structured and object oriented programming. **PROGRAMMING LANGUAGES AND THE PROGRAMMING PROCESS :** The evolution of programming languages, Categories- Machine, Assembly and Higher level languages, Systems development life cycle for programming. **UNIT – IV** **OS BASICS**: types of Operating Systems – Real Time Operating Systems, Single-user/Single-Tasking OS and Single user/Multitasking OS, Multi-user/Multitasking OS, User interfaces – Graphical User Interfaces, Command-Line Interfaces and Running Programs – Sharing information. **UNIT – V** **NETWORKING BASICS**: The usage of Network – Simultaneous access, Shared peripheral devices, Personal Communications and Easier data backup, Common types of networks – LANs, WANs, Hybrid Networks – CANs, MANs, HANs, Intranets and Extranets, Network topologies – Bus, Ring, Star, Mesh, Tree and Hybrid Topologies. **UNIT – VI** **DATABASE MANAGEMENT SYSTEMS:** Databases and Database management systems, The database, The DBMS, Working with database, Creating database tables. **COMPUTER SECURITY**: Basic Security Concepts – Threats, Degrees of Harm, Countermeasures and Threats to Users – Identify theft, Loss of Privacy, Online Spying tools, Spam, Computer related injuries, Hardware threats – Power related threats, Theft and Vandalism, Natural Disasters.
Text Books & References	**TEXT BOOK(S):** 1. Peter Norton "Introduction to Computers", McGraw Hill Publishers, 7th Edition 2011. **REFERENCE BOOKS:** 1. Alex Leon and Mathews Leon "Fundamentals of Information Technology", Vikas Publishers, 2nd Edition 1999. 2. David Cyganski & John A.Orr "Information Technology-Inside and Outside", Pearson Education, 2002. 3. Marilyn Wolf "Computers as Components", MK publications, 3rd Edition, 2014.
E-Resources	1. https://nptel.ac.in/courses 2. https://freevideolectures.com/university/iitm

17EE1101-BASIC ELECTRICAL SCIENCES

(Common for ECE, EEE, CSE & IT)

Course Category:	Professional core	**Credits:**	4
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-2-0
Prerequisite:	Fundamental concepts of Electricity and electromagnetic induction.	**Sessional Evaluation:** **External Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. Basic characteristics of R, L, C parameters and Network Reduction techniques. 2. The concept of form factor, Crest factor and j notation. 3. The concept of power triangle, series and parallel connection of R, L & C elements with sinusoidal Excitation. 4. Application of Graph theory to Electrical circuits. 5. Application of K.C.L and K.V.L 6. Concept of inductance & mutual inductance, Dot convention and coefficient of coupling. **7.** Concept of Series and parallel resonance and current locus diagrams	
Course Outcomes	After completing the course the student will be able to	
	CO1	Find the equivalent resistance by using network reduction Techniques for the given Electrical network
	CO2	To plot varies waveform, finding the average, Rms, form factor &crest factor.
	CO3	Determine the real power, reactive power, power factor and response of the circuit for the given circuit and Excitation
	CO4	Able to apply nodal and mesh analysis for a given electrical network
	CO5	Find the coefficient of coupling (K) and the equivalent inductance for the given magnetic circuits
	CO6	Find Quality factor, band width and drawing current locus diagrams for a given electrical circuit
Course Content	**UNIT- I** **CONCEPT OF ELECTRIC CIRCUITS**: Introduction, Active and passive elements, V-I Characteristics of R, L and C elements, Ideal & Practical Sources, Source Transformation, Kirchhoff's laws, Network reduction techniques, Star-Delta transformation. **UNIT – II** **FUNDAMENTALS OF AC CIRCUITS:** R.M.S, Average values , form factor and crest factor for different periodic wave forms, Sinusoidal Alternating Quantities - Phase and Phase Difference, Complex and Polar Forms Of Representations, j-Notation. Concept of Reactance, Impedance, Susceptance and Admittance-problems **UNIT – III** **SINGLE PHASE AC CIRCUITS:** Concept of Active and reactive power, power factor –power triangle, Steady state Analysis of R, L and C elements(in series, parallel and series parallel combinations) –with sinusoidal Excitation - Phasor diagrams-problems	

	UNIT – IV **GRAPH THEORY:** Network topology, Cut set and Tie set matrices – Incident matrices application to circuit analysis- Problems - Duality & Dual circuits – Problems **ANALYSIS OF ELECTRICAL CIRCUITS:** Mesh and Nodal analysis of DC and AC circuits concept of super mesh and Super node-problems **UNIT – V** **MAGNETIC CIRCUITS**: Faraday's Laws of Electromagnetic Induction, Concept of Self and Mutual Inductance, Dot Convention in coupled coils, Coefficient of Coupling, Analysis of Series and Parallel Magnetic Circuits, MMF Calculations- Composite Magnetic Circuit. **UNIT – VI** **RESONANCE:** Series and parallel Resonance, Half power frequencies, Bandwidth and Q factor, Relation between half power frequencies- Bandwidth – Quality factor. **LOCUS DIAGRAMS:** Series and parallel combinations of R-L, R-C, and R-L-C with variation of parameters.
Text Books & Reference Books	**TEXT BOOKS:** 1. "Engineering Circuit Analysis" by Hayt & Kemmerly, TMH publishers 2. "Network Analysis" by M.E Van Valkenburg,Third edition ,PHI learning private limited 3. "Fundamentals of Electric circuits" by Charles k Alexander,Mathew N O Sadiku,Tata McGraw Hill Education private Limited **REFERENCE BOOKS:** 1. "Circuits & Networks" by A.Sudhakar and Shyam Mohan - TMH 2. "Circuit Theory" by A.Chakarabarti - Dhanpat Rai publishers 3. "Circuits & Systems" by K.M.Soni – Kataria Publishers
E-Resources	1. http://nptel.ac.in/courses 2. http://iete-elan.ac.in 3. http://freevideolectures.com/university/iitm

17ME1103-COMPUTER AIDED ENGINEERING DRAWING

(Common to ECE, EEE, CSE & IT)

Course Category:	Professional core	**Credits:**	3
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-6
Prerequisite:	Knowledge of basic math concepts and different types of shapes, angles, symmetry, scaling and unit measurement systems.	**Sessional Evaluation:** **External Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. To enable the students with various concepts like dimensioning, construction of conic sections, polygons, cycloids and involutes. 2. To impart and inculcate proper understanding of AutoCAD fundamentals. 3. To apply the knowledge of AutoCAD for the projections of points, lines and solids. 4. To know about sections and developments of solids. 5. To improve the visualization skills with isometric projections.	
Course Outcomes	After completing the course the student will be able to	
	CO1	Apply the conventions and the methods of engineering drawing.
	CO2	Create geometric constructions, conics with hand tools to draw lines, polygons, circle, tangencies, conic sections and irregular arcs
	CO3	Sketch the solutions to the problems on projection of points, lines, planes and solids through Auto CAD
	CO4	Use the sectioning and developments concepts of solids in actual applications.
	CO5	Visualize the objects so that they can apply these skills in developing new products
Course Content	**UNIT – I** **INTRODUCTION:** Importance of Drawing, Drawing Instruments, Sheet layout, BIS Conventions, Types of lines, Lettering, and dimensioning methods. **GEOMETRICAL CONSTRUCTIONS:** Regular Polygons (Triangle, Square, Pentagon, Hexagon) **CONIC SECTIONS:** Introduction, Construction of Ellipse, Parabola and Hyperbola using Eccentricity method and Rectangular/ Oblong methods. **SPECIAL CURVES:** Introduction, Construction of Cycloids and Involute curves. **UNIT – II** **INTRODUCTION TO CAD SOFTWARE:** Importance of Computer Aided Drawing, software tool environment, drawing size and scale, main menu, tool bar and menus, co-ordinate system, drafting settings. **CREATION AND EDITING:** Points, Lines, Poly lines, Polygons, Splines, circle, ellipse, text, move, copy, off-set, pan, mirror, rotate, trim, extend, break, chamfer, fillet, curves, block, layers, line representations, dimensioning and hatching.	

	UNIT – III **PROJECTIONS OF POINTS:** Principles of projections, Planes of projection, Points in four quadrants. **PROJECTIONS OF LINES:** Line inclined to both the principal planes (first angle projection only). **UNIT – IV** **PROJECTIONS OF PLANES:** Plane (triangle, square, rectangle, pentagon, hexagon and circular) inclined to both the principal planes. **PROJECTIONS OF SOLIDS:** Solids such as Prisms, Pyramids, Cylinders and Cones. **UNIT – V** **SECTIONS OF SOLIDS:** Solids such as Prisms, Pyramids, Cylinders and Cones resting on their bases on HP. **DEVELOPMENT OF SURFACES:** Lateral surfaces of solids such as Prisms, Pyramids, Cylinders and Cones (cut by a plane inclined to HP). **UNIT – VI** **ORTHOGRAPHIC PROJECTIONS:** Conversion of Pictorial views into Orthographic Views. **ISOMETRIC PROJECTIONS OF SIMPLE OBJECTS.**
Text Books & Reference Books	**TEXT BOOKS:** 1. Engineering Drawing, N.D. Bhat / Charotar Publishing House,. Gujarat, 53rd edition, 2014. 2. AutoCAD 2 0 13 For Engineers and Designers, Sham Tickoo, Dream tech Press, 2013. **REFERENCE BOOKS:** 1. Engineering Drawing And Graphics + Autocad, Venugopal K, New Age International Pvt. Ltd.New Delhi, 2007. 2. Engineering Graphics with Auto CAD, D.M. Kulkarni, A.P. Rastogi and A.K. Sarkar, PHI Learning Private Limited, Revised Edition, August 2010. 3. Engineering Drawing and Graphics Using Autocad, T Jeyapoovan, Vikas Publishing House, 3rd Edition, 2010. 4. A Textbook on Engineering Drawing, P. Kannaiah, K. L. Narayana, K. Venkata Reddy, Radiant Publishing House, 2012.6. Jolhe, Engineering Drawing, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.

17SH11P1-ENGLISH LANGUAGE LABORATORY

(Common to all Branches)

Course Category:	Basic Sciences	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Basic Level of LSRW Skills	**Sessional Evaluation:** **External Exam Evaluation:** **Total:**	40 60 100
Course Objectives	The main objective is to develop students' basic skills of communication viz. LSRW in English through which communicative competence can be enhanced and can communicate efficiently in a realistic professional ambience.		
Course Outcomes	These activities practiced in the laboratory are helpful in comprehending the important language aspects which are useful for the real life situations. These are also helpful in enhancing the language competency and communicative level of students.		
Course Content	**LIST OF EXPERIMENTS** I. Listening Skills: • Listening for Pleasure, • Listening for Details • Listening for Information II. Speaking Skills: • Jam, • Extempore • Presentations • Seminars III. Reading Skills: • News Paper Reading IV. Writing Skills: • Story Writing • Description 1. Object, 2.Place, 3. Person,4.Situation • Giving Directions & Instructions **REFERENCES:** 1. A Manual for English Language Laboratories: Dr. D. Sudha Rani , Pearson Publications 2. Pronunciation Dictionary: Daniel Jones 3. Techniques of Teaching English: A.L. Kohli 4. A Textbook of English Phonetics: For Indian Students: T Balasubramanian Macmillan India Limited.		

17SH11P2-ENGINEERING PHYSICS LABORATORY

(Common to EEE, ECE, CSE & IT Branches)

Course Category:	Basic Sciences	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Engineering Physics	**Sessional Evaluation:** **External Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives	1 The main objective is to provide students to learn about some important experimental techniques in physics with knowledge in theoretical aspects so that they can excel in that particular field.
Course Outcomes	1 These experiments in the laboratory are helpful in understanding important concepts of physics through involvement in the experiments by applying theoretical knowledge. 2 It helps to recognize where the ideas of the students agree with those accepted by physics and where they do not.
Course Content	Minimum of 8 experiments to be completed out of the following : **LIST OF EXPERIEMENTS** 1. Determination of Rigidity modulus of a material – Torsional pendulum 2. Melde's Experiment – Transverse and Longitudinal modes 3. Time constant of RC circuit 4. Resonance in LCR circuit 5. Magnetic field along the axis of a coil (Stewart-Gees Method) 6. Study of characteristics of LED 7. Evaluation of Numerical Aperture of a given fiber 8. Energy Gap of a material of p-n junction 9. Diode Characteristics 10. Transistor Characteristics 11. Characteristics of Solar cell 12. Logic Gates 13. Hall Effect

17CS11P1-BASIC COMPUTER ENGINEERING LABORATORY

(Common to ECE, EEE, CSE &IT)

Course Category:	Program Core	**Credits:**	1
Course Type:	Practical	**Lecture – Tutorial – Practical:**	0-0-2
Prerequisite:	Basic knowledge about Computer fundamentals and various hardware components.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Identify the physical components of a computer system, integration and study various application softwares.
Course Content	1. Identification of computer hardware parts. (2 Labs) 2. Assembling and disassembling the system hardware components of a PC.(2 Labs) 3. Installation Steps for any Windows Operating System.(1 Lab) 4. To Practice the basics of Networking (Wired and Wireless network connections) (1 Lab) 5. To Practice the Basic commands of LINUX.(2 Labs) 6. To Practice the Basic MS-Word features (like Formatting, Tables and Sorting etc.) (1 Lab) 7. Create envelopes and labels using mail merge.(1 Lab) 8. Spread sheet experiments using EXCEL. (1 Lab) 9. To Practice on MS-Power Point.(1 Lab) 10. To Practice on MS-Access. (1 Lab)	
Text Books and References	**TEXT BOOK(S):** 1. Peter Norton "Introduction to Computers", McGraw Hill Publishers, 7th Edition 2011. **REFERENCE BOOKS:** 1. Alex Leon and Mathews Leon "Fundamentals of Information Technology", Vikas Publishers, 2nd Edition 1999. 2. David Cyganski & John A.Orr "Information Technology-Inside and Outside", Pearson Education, 2002. 3. Marilyn Wolf "Computers as Components", MK publications, 3rd Edition, 2014.	
E-Resources	3. https://nptel.ac.in/courses 4. https://freevideolectures.com/university/iitm	

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY: VIDYANAGAR

(AUTONOMOUS)

(AFFILIATED TO JNTU ANANTAPUR: ANANTHAPURAMU)

SPSR NELLORE DIST

I YEAR OF FOUR YEAR B.TECH DEGREE COURSE – II SEMESTER

ELECTRONICS AND COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATIONS

(With effect from the academic year 2017-2018)

(For the batch admitted in the academic year 2017-2018)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation							
							Sessional Test-I		Sessional Test-II		Total Sessional Marks (Max. 40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Duration In Hours	Max. Marks	Duration In Hours	Max. Marks		Duration In Hours	Max. Marks	100
1	17SH1201	Professional English**	3	-	-	3	2	40	2	40	0.8*Best of two+0.2*least of two	3	60	100
2	17SH1203	Engineering Mathematics-I **	3	2	-	4	2	40	2	40		3	60	100
3	17SH1202	Engineering Chemistry**	3	-	-	3	2	40	2	40		3	60	100
4	17CS1204	C Programming**	2	2	-	3	2	40	2	40		3	60	100
5	17EE1201	Circuits & Networks**	2	2	-	3	2	40	2	40		3	60	100
6	17EC1201	Electronic Devices**	3	-	-	3	2	40	2	40		3	60	100
		PRACTICALS												
7	17SH12P2	Engineering Chemistry Lab**	-	-	3	2	-	-	-	40	Day to Day Evaluation and a test (40 Marks)	3	60	100
8	17CS12P3	C Programming Lab**	-	-	3	2	-	-	-	40		3	60	100
9	17ME12P1	Engineering Workshop**	-	-	2	1	-	-	-	40		3	60	100
		TOTAL	16	06	08	24	-	-	-	360		-	540	900

**Common to ECE, EEE, CSE, IT

17SH1201- PROFESSIONAL ENGLISH

(Common to all Branches)

Course Category:	Basic Sciences	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-0-0
Pre-requisite:	Basic Level of LSRW skills	**Sessional Evaluation:** **External Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. To develop their basic professional writing skills in English 2. To achieve specific linguistic and verbal competence 3. To acquire relevant skills and function efficiently in a realistic professional working environment 4. To inculcate the habit of reading &writing	
Course Outcomes	Upon successful completion of the course, the students will able to:	
	CO1	Equip verbal proficiency and face competitive exams; GATE, GRE, TOEFL, GMAT etc.
	CO2	Draft professional writings: email drafting, professional Letters, etc. for social and professional contexts.
	CO3	Write effective book reviews and make effective notes in professional environment
	CO4	Procure considerable knack in using wide range of vocabulary.
	CO5	Write proposals, business letters, project reports, writing proposals
	CO6	Acquire skills : Prepare Speeches in analytical and critical procedures

Course Content	**UNIT –I** **DATA INTERPRETATION:** Interpretation and analysis of the data based on text, tables, graphs (linear), charts- bar, pie etc. Verbal: Verbal reasoning- Analogies, Homophones & Homonyms **UNIT-II** **WRITING:** Email Communication- Writing Effective Business Email Verbal: Idioms and Phrases, One word substitutes **UNIT-III** **ANALYTICAL WRITING:** Presenting perspective of an issue- Compare & Contrast, Cause and Effect, Analyze an argument Verbal: Affixes-prefix and suffix, root words, derivatives **UNIT-IV** **TECHNICAL WRITING:** Writing Proposals: Significance; Structure, Style & Writing of Project Reports. Verbal: Synonyms & Antonyms **UNIT-V** **WRITING:** Introduction to different kinds of materials: Technical & Non-technical- Note Taking and Note Making- identification of important points and precise the content Verbal: Words often confused **UNIT-VI** **BOOK REVIEWS**- Review of a Technical and Non-Technical - a brief written analysis including summary and appreciation Verbal: Sentence Completion . **REFERENCES:** 1. A Textbook of English for Engineers and Technologists (combined edition, Vol. 1 & 2); Orient Black Swan 2010. 2. Word Power Made Easy by Norman Lewis 3. A Communicative Grammar of English By: Geoffrey Leech

17SH1203-ENGINEERING MATHEMATICS - I

(Common to all Branches)

Course Category:	Basic Sciences	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-2-0
Pre – requisite:	Intermediate Mathematics	**Sessional Evaluation:**	40
		External Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to understand: 1. The basic concepts of Matrices. 2. Solving Higher Order Differential Equations with RHS of different types by using analytical techniques. 3. Taylor's and Maclaurin's series, Maxima and Minima of the functions of two and three variables. 4. The concepts of Double and Tripple integrals, Areas and Volumes. 5. The Gradient, Divergence and Curl operators, Solenoidal and Irrotational vectors. 6. The basic concepts of Vector Integration.	
Couse Outcomes	After completing the course the student will be able to	
	CO1	Understand effectively the analyzation of the Rank of the matrix, Consistency of system of linear equations, Eigen values and Eigen vectors.
	CO2	Acquire knowledge in solving higher order differential equations by using various types.
	CO3	Attains skills in analyzing the Taylor's and Maclaurin's series and Maxima and Minima of the functions of two and three variables.
	CO4	Apply Double and Tripple integrals to find Areas and Volumes.
	CO5	Understand effectively Curl, Divergence and Gradient operators, Solenoidal and Irrotational vectors with their applications.
	CO6	Acquire knowledge in analyzing the applications of Green's, Stoke's and Gauss-divergence theorems.
Course Content	**UNIT - I** **MATRICES:** Rank of Matrix - Echelon Form and Normal Form - Consistency of system of linear equations - Eigen values and Eigen vectors. **UNIT – II** **HIGHER ORDER DIFFERENTIAL EQUATIONS:** Homogeneous linear differential equations of second and higher order with constant coefficients with R.H.S. of the type e^{ax}, $\sin ax$ or $\cos ax$, x^n, e^{ax} V and $x^n v(x)$.	

	UNIT – III **DIFFERENTIAL CALCULUS:** Taylor's and Maclaurin's series - Maxima and Minima of function of two variables - Lagrangian method of multipliers with three variables only. **UNIT - IV** **MULTIPLE INTEGRALS:** Double and Triple integrals - Change of order of integration - Change to polar coordinates - Area and Volumes by Double integration - Volume by Triple integration. **UNIT - V** **VECTOR DIFFERENTIATION:** Gradient, Divergence, Curl - Solenoidal and Irrotational vectors. **UNIT - VI** **VECTOR INTEGRATION:** Line, Surface and Volume integrals - Green's, Stoke's and Gauss-divergence theorem (without proof), Applications to theorems.
Text Books & Reference Books	**TEXTBOOKS:** 1. Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers, New Delhi. 2. Engineering Mathematics – B.V. Ramana, Tata McGraw-Hill Education Pvt. Ltd, New Delhi. **REFERENCE:** 1. Higher Engineering Mathematics - H.K. Dass, Er. Rajnish Verma, S. Chand Publication, New Delhi. 2. Advanced Engineering Mathematics - N.P. Bali & M. Goyal, Lakshmi Publishers, New Delhi. 3. Engineering Mathematics-I& II - Dr.T.K.V. Iyengar, Dr.B. Krishna Gandhi, S. Ranganatham, Dr.M.V.S.S.N. Prasad, S. Chand Publication, New Delhi. 4. Advanced Engineering Mathematics - Erwin Kreyszig, Wiley, India.

17SH1202-ENGINEERING CHEMISTRY

(Common for ECE, EEE, CSE & IT Branches)

Course Category:	Basic science	**Credits**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-0-0
Pre-requisite:	Fundamental concepts of Chemistry	**Sessional Evaluation:** **External Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives

Students undergoing this course are expected to understand:

1. To strengthen the fundamentals of Chemistry and then build an interface of theoretical and experimental concepts with their industrial/ engineering applications.
2. The extension of fundamentals of Electrochemistry to energy storage devices such as batteries and fuel cells is one such example.
3. To know the factors effecting the rate of corrosion and its prevention.
4. To design engineering materials and solve problems related to them.
5. To understand various water softening methods.
6. To understand preparation of polymers and their applications.

Course Outcomes

On successful completion of this course students will be able to:

CO1	Understand the electrochemical sources of energy
CO2	Identify and investigate means of protecting metal against corrosion.
CO3	Understand industrially based engineering materials
CO4	Understand the classification of fuels and their analysis
CO5	Know the disadvantages of hard water and ability to remove hardness by using various methods
CO6	Understand the basics of polymers and their preparation and uses in engineering field

Course Content

UNIT – I

ELECTRO CHEMISTRY: Single electrode potential-explanation and measurement Reference electrodes-hydrogen gas electrode-calomel electrode-glass electrode Electrochemical cells: Lead-**Acid storage cells Batteries:** Li- Batteries Fuel Cells: Hydrogen - Oxygen fuel cell Conductometric titration of strong acid and strong base

UNIT – II

CORROSION: Definition-classification- theories of corrosion-factors affecting the corrosion- Prevention methods of corrosion-metallic coatings (Electroplating, cementation) and cathodic protection.

UNIT-III

CHEMISTRY OF ENGINEERING MATERIALS:

Electrical insulators: Definition-classification-Characteristics- Application of electrical insulating materials (solid, liquid and gaseous insulators).

	Refractories: Classification- properties and applications of refractories. **Lubricants:** Lubricant-Lubrication-classification of lubricants-Properties and applications of lubricating oils. **UNIT – IV** **FUEL TECHNOLOGY:** Classifications of Fuels - Characteristics of fuels - Calorific value – determination – Bomb calorimeter – Boy's gas calorimeter - Theoretical calculation of calorific value. **Solid fuels:** coal-analysis of coal. **Liquid fuels:** Petroleum-refining of petroleum - Synthetic petrol – Fischer Tropch's synthesis. Gaseous fuel – Flue gas analysis by Orsat's apparatus. **UNIT – V** **WATER TREATMENT:** Impurities in water-Hardness of water-Estimation of hardness by EDTA method-Estimation of dissolved oxygen-Alkalinity-Chlorides in water Industrial use of water: For steam generation-troubles in boilers-scale and sludge-priming and foaming-caustic embrittlement-boiler corrosion Softening methods of hard water: Lime-soda process- Zeolite process-Ion exchange method. **UNIT-VI** **POLYMERS:** Introduction to polymers- Polymerization process-types of polymerization. **Elastomers:** natural rubber – vulcanization of rubber – compounding of rubber- **Synthetic rubbers:** preparation, properties and engineering applications of Buna – N, Neoprene, Thiokol and silicon rubbers **Plastomers:** Thermosetting and thermoplastics- Preparation, properties and engineering applications of PVC, Bakelite, Nylons and Urea-Formaldehyde
Text Books & Reference Books	**TEXT BOOKS:** 1. Engineering Chemistry, First Edition, Jayaveera KN, Subba Reddy GV and Ramachandraiah C, McGraw Hill Higher Education, New Delhi, 2013. 2. A Text Book of Engineering Chemistry, 15th Edition, Jain and Jain, Dhanapathi Rai Publications, New Delhi, 2013.REFERENCES: **REFERENCES:** 1. A Text book of Engineering Chemistry, 12th Edition, SS Dhara,Uma, S. Chand Publications, New Delhi, 2010. 2. Engineering Chemistry, First edition, K.B. Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Publications India Pvt Limited, 2010. 3. Engineering Chemistry, First edition, Seshamaheswaramma K and Mridula Chugh, Pearson Education, 2013.

17CS1204 - C- PROGRAMMING

(Common for ECE, EEE ,CSE &IT)

Course Category:	Core	**Credits:**	3
Course Type:	Theory	**Lecture – Tutorial – Practical:**	2-2-0
Prerequisite:	Basic mathematical knowledge to solve problems in analytical manner and logical thinking.	**Sessional Evaluation:** **Univ. Exam Evaluation:** **Total Marks:**	40 60 100
Course Objectives	Students undergoing this course are expected to understand: • Gaining insights of building blocks of C language. • Getting fundamental ideas about core concepts of C Programming. • Understanding the Procedural approach to solve simple problems.		

Course Outcomes	Upon the successful completion of the course, the students will be able to:	
	CO1	Learn the fundamental structure of C program and basic data types.
	CO2	Find the usage of operators in expression evaluation and I/O Statements.
	CO3	Acquire information on various control structures
	CO4	Study the concept of arrays and strings
	CO5	Understand the features of Pointers and Functions
	CO6	Explore the basics of Data Storage on Files and Derived data types
Course Content	**UNIT – I** **INTRODUCTION:** Algorithms, Flow charts, Program development steps. **FUNDAMENTALS OF C:** History, Structure of a C program, Programming rules and execution. Character set, Delimiters, C keywords, Identifiers, Constants, Variables, Rules for defining Variables, Datatypes, Declaration and Initialization of Variables. **UNIT – II** **OPERATORS AND EXPRESSIONS:** Introduction, Operator Precedence and Associativity, Operator Types **INPUT AND OUTPUT IN C:** Formatted and Unformatted functions, Commonly used library functions. **UNIT – III** **DECISION STATEMENTS:** Introduction, Types of If statements, switch statement, break, continue, goto. **ITERATIVE STATEMENTS**: while, do-while and for loops. **UNIT – IV** **ARRAYS**: Definitions, Initialization, Characteristics of an array, Array Categories.	

	STRINGS: Declaration and Initialization of strings, String handling functions. **STORAGE CLASSES**: Automatic, External, Static and Register Variables. **UNIT – V** **POINTERS:** Fundamentals, Declaration and initialization of Pointers, Arithmetic Operations, Pointers and Arrays. **FUNCTIONS:** Definition, Function Prototypes, Types of functions, Call by Value and Call by Reference, Recursion. **UNIT – VI** **STRUCTURES:** Definition, Declaration and Initialization of Structures. **UNIONS:** Definition, Declaration and Initialization of Union. **FILES:** Introduction, File Types, Basic operations on Files, File I/O, Command Line Arguments.
Text Books & References	**TEXT BOOK(S):** 1.Programming with ANSI & TURBO C by Ashok N.Kamthane, Pearson Education 2007 **REFERENCE BOOKS:** 2. A Book on C by Al Kelley/Ira Pohl, Fourth Edition, Addison-Wesley.1999 3. Let Us C by Yashavant Kanetkar, BPB Publications. 4. Programming in ANSI C by Balaguruswamy 6th Edition, Tata McGraw Hill Education, 2012.
E-Resources	5. https://nptel.ac.in/courses 6. https://freevideolectures.com/university/iitm

17EE1201-CIRCUITS & NETWORKS

(Common for EEE, ECE)

Course Category:	Professional core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	2-2-0
Pre-requisite:	Fundamental concepts of Electricity	**Sessional Evaluation:** **External Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. Network theorems and their applications 2. The analysis of three phase balanced & unbalanced circuits **3.** Necessary conditions for driving point function & transfer function **4.** Time domain response from pole-zero plots **5.** Transient response of RL, RC, RLC series circuit for DC and AC excitation.	
Course Outcomes	After completing the course the student will be able to	
	CO1	Apply the network theorems suitable for a given circuit.
	CO2	Analyse three phase balanced &unbalanced circuits, and measure P, Q & S for a given circuit.
	CO3	Analyse the two port network by finding the parameters of the given circuit.
	CO4	Draw the pole- zero plot and obtain the time domain response for a given transfer function.
	CO5	Find the time constant and V and I across the inductor or capacitor under sourced and source free network for a given D.C excitation.
	CO6	Find the time constant and V and I across the inductor or capacitor under sourced and source free network for a given A.C excitation.
Course Content	**UNIT- I** **NETWORK THEOREMS:** Superposition, Reciprocity, Thevenin's and Norton's theorems, Maximum power transfer theorem, Millman's theorem, Compensation theorem and Tellegen's theorem. Application of these theorems to DC and AC Excitations **UNIT – II** **THREE PHASE A.C CIRCUITS:** Advantages of three phase systems - Phase sequence - Star and Delta connection-Relation between line and phase voltages & currents in balanced systems-Analysis of balanced three phase circuits-measurement of Active and Reactive power in Balanced and unbalanced three phase systems. Analysis of three phase Unbalanced circuits-Loop method-Application of milliman's theorem-Star Delta Transformation Technique -for balanced and unbalanced circuits, measurement of Active and Reactive power **UNIT – III** **TWO PORT NETWORK PARAMETERS:** Open circuit parameters – Short circuit parameters – Transmission parameters - inverse transmission parameters - Hybrid parameters – Inverse hybrid parameters - Inter-relationships of different parameters-Interconnections of two port networks –Condition for reciprocity and symmetry of networks with different two port parameters - Terminated two port networks – Image parameters. **UNIT – IV**	

	NETWORK FUNCTIONS : Single port & multi port networks - Immitance functions of two port networks – Necessary conditions for driving point functions & transfer function – Complex frequencies – Poles and zeros – Time domain response from pole zero plots – Restrictions on pole-zero locations. **UNIT – V** **D.C TRANSIENT ANALYSIS:** Transient response of RL, RC & RLC circuits for DC excitations initial conditions-Time constants -solution method using Differential equation & Laplace transform. **UNIT – VI** **A.C TRANSIENT ANALYSIS :** Transient response of RL, RC & RLC circuits for sinusoidal excitations-initial condition-time constants –solution method using Differential Equations & Laplace transforms - Transformed circuits-Transient response of RL,RC& RLC circuits for other types of signals(step, impulse) using Laplace transform methods.
Text Books & Reference Books	**TEXT BOOKS:** 1. "Engineering Circuit Analysis" by Hayt & Kemmerly, TMH publishers 2. "Network Analysis" by M.E Van Valkenburg,Third edition ,PHI learning private limited 3."Fundamentals of Electric circuits" by Charles k Alexander,Mathew N O Sadiku,Tata McGraw Hill Education private Limited **REFERENCE BOOKS:** 1. "Circuits & Networks" by A.Sudhakar and Shyam Mohan - TMH 2. "Circuit Theory" by A.Chakarabarti - Dhanpat Rai publishers 3. "Circuits & Systems" by K.M.Soni – Kataria Publishers
E-Resources	http://nptel.ac.in/courses http://iete-elan.ac.in http://freevideolectures.com/university/iitm

17EC1201 – ELECTRONIC DEVICES

(Common for ECE, EEE ,CSE &IT)

Course Category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	To provide students with the fundamentals of Electronics.	**Sessional Evaluation :** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The concepts of Solid State Semi-Conductor Theory. 2. The operation of a PN Junction Diode. 3. The Ideal, Practical and Electrical Characteristics of Zener, Varactor, Tunnel and Avalanche Photo Diode. 4. The need for biasing of Transistor. 5. The working of FET and MOSFET. 6. The operation of Thyristors.	
Course Outcomes	Upon successful completion of the course, the students will able to:	
	CO1	Understand the Semiconductor Physics for Intrinsic and Extrinsic materials and theory of operation of Solid State devices.
	CO2	Apply how the properties of semiconductor materials are used for the formation of PN diode.
	CO3	Explain the functioning of various solid-state devices, including several types of diodes including conventional, Zener, Varactor, Tunnel and Avalanche Photo Diode.
	CO4	Design the various Bi-polar Junction Transistor biasing circuits and its usage in applications of amplifiers.
	CO5	Distinguish the constructional features and operation of FET and MOSFET and their applications.
	CO6	Understand the operation with sketch the transfer characteristics of Thyristors.
Course Content	**Unit-I** **SEMICONDUCTOR DIODES:** Introduction, Classification of Semiconductors, Conductivity of Semiconductor, Energy Distribution of Electrons, Carrier Concentration in Intrinsic Semiconductor, Mass-Action Law, Properties of Intrinsic Semiconductors, Variation in Semiconductor Parameters with Temperature, Drift and Diffusion currents, Carrier Life Time, Continuity Equation. **Unit – II** **PN JUNCTION DIODE:** Introduction, Energy Band Structure of Open Circuited Diode, Quantitative Theory of Diode Currents, Diode Current Equation, Ideal vs Practical Resistance Levels, Transition Capacitance, Diffusion Capacitance, Temperature Dependence of V-I characteristics, Breakdown in Diodes, Diode as a Circuit Element, Piecewise Linear Diode Model, Applications.	

	Unit –III **SPECIAL DIODES:** Introduction, Zener Diode, Varactor Diode, Tunnel Diode, Avalanche Photo Diode. **Unit – IV** **BIPOLAR JUNCTION TRANSISTOR:** Introduction, Construction, Transistor Biasing, Operation of NPN Transistor, Operation of PNP Transistor, Types of Configuration. **Unit – V** **FIELD EFFECT TRANSISTOR:** Introduction, Construction & Operation of N-Channel JFET, Characteristic Parameters, Saturation Drain Current, Slope of the Transfer Characteristic at I_{DSS}, Comparison of JFET and BJT, Applications, MOSFET, Enhancement MOSFET, Depletion MOSFET, Comparison of MOSFET and JFET. **Unit – VI** **Thyristors:** Introduction, PNPN Diode, SCR, Thyristor Ratings, Rectifier Circuits using SCR, LASER, TRIAC, DIAC.
Text Books & Reference Books	**TEXT BOOKS:** 1. Electronic Devices & Circuits by Jacob Millman & Christos C. Halkias, McGraw- Hill Co. 2. Mottershed, "Electronic devices and circuits", PHI. **REFERENCES:** 1. Electronic Devices and circuits by S. Salivahanan, N. Suresh Kumar, McGraw- Hill Co. 2. Boylestad, Louis Nashelsky "Electronic devices and circuits" 9ed.., 2008 PE.
E-Resourses	1. https://nptel.ac.in/courses 2. https://iete-elan.ac.in 3. https://freevideolectures.com/university/iitm

17SH12P2-ENGINEERING CHEMISTRY LABORATORY

(Common for ECE, EEE, CSE &IT Branches)

Course Category:	Basic science	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial-Practical:**	0-0-3
Pre-requisite:	Fundamental concepts of Chemistry	**Sessional Evaluation:** **External Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives	• The main objective is to provide students to learn about experimental techniques in chemistry with knowledge in theoretical aspects so that they can excel in that particular field.
Course Outcomes	• These experiments in the laboratory are helpful in understanding key concepts of chemistry through involvement in the experiments by applying theoretical knowledge. • It helps to recognize where the ideas of the student agree with those accepted by chemistry and where they do not.
Course Content	Minimum of 8 experiments to be completed out of the following: **LIST OF EXPERIMENTS** 1. Determination of total hardness of water by EDTA method 2. Determination of Copper by EDTA method 3. Estimation of dissolved oxygen by Winkler's method 4. Determination of Acidity of water 5. Determination of total alkalinity of water. 6. Estimation of chlorides using potassium chromate indicator 7. Conductometric titration of strong acid Vs strong base. 8. Determination of pH of unknown solution 9. Preparation of Bakelite 10. Determination of viscosity of oils with Redwood viscometer **Text Books:** 1. Vogel's text books of quantitative chemical analysis, Mendham et all, person publications. 2. Chemistry lab manual – KN Jayaveera, Subbareddy & Chandrasekher. 3. Instrumental methods of chemical analysis – Chatwal & Anand Himalaya publications.

17CS12P3 - C- PROGRAMMING LABORATORY

(Common to ECE, EEE, CSE &IT)

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture – Tutorial – Practical:**	0-0-3
Prerequisite:	Basic mathematical knowledge to solve problems in analytical manner and idea on programming Methodologies.	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Outcomes	Upon successful completion of the course, the students will be able to:
	CO: Problem solving using C Programming concepts
Course Content	**LIST OF PROGRAMS** 1. Write a C program to evaluate expressions. 2. Write a C program to implement if constructs. 3. Write a C program to implement Switch statement. 4. Write a C program to implement all Iterative statements. 5. Write a C program to implement Arrays. 6. Write a C program to implement operations on Strings without using library functions. 7. Write a C program to implement arithmetic operations using Pointers. 8. Write C programs that use both recursive and non-recursive functions. 9. Write a C program to implement parameter passing. 10. Write a C program to implement Structures. 11. Write a C program to implement Basic file operations.
Text Books and References	**Text Book(s):** 2. Programming with ANSI & TURBO C by Ashok N.Kamthane, Pearson Education 2007 **Reference Books:** 4. A Book on C by Al Kelley/Ira Pohl, Fourth Edition, Addison-Wesley.1999 **5.** Let Us C by Yashavant Kanetkar, BPB Publications. **6.** Programming in ANSI C by Balaguruswamy 6th Edition, Tata McGraw Hill Education, 2012.
E-Resources	7. https://nptel.ac.in/courses 8. https://freevideolectures.com/university/iitm

17ME12P1- ENGINEERING WORKSHOP

(Common to ECE, EEE, CSE and IT)

Course Category:	Program Core	**Credits**	1
Course Type:	Practical	**Lecture-Tutorial- Practice**	0 - 0 - 2
Prerequisite:	Engineering Physics and Basics Electrical Sciences	**Sessional Evaluation:**	40
		Semester End Evaluation:	60
		Total Marks:	100

Course Outcomes	Upon successful completion of the course, the students will able to know the trades and do carpentry, fitting, tin-smithy, house wiring and foundry.
Course Content	**LIST OF EXPERIMENTS** **TRADES FOR EXERCISES:** At least two exercises from each trade: 1. **Carpentry**: Lap joint, Mortise and Tenon joint, Bridle joint. 2. **Fitting:** Square, V, half round and dovetail fittings 3. **Tin-Smithy:** Tray, cylinder, hopper, cone 4. **House-wiring:** One lamp controlled by one switch, Two lamps (bulbs) controlled by two switches, Stair- case connection, Water pump connected with single phase starter. 5. **Foundry**: single-piece pattern, Two- piece pattern **TRADES FOR DEMONSTRATION:** 1. Machine Tools 2. Welding 3. Black Smithy **REFERENCE BOOKS:** 1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd. 2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers. Engineering Practices Lab Manual, Jeyapoovan, SaravanaPandian, Vikas publishers

N.B.K.R. INSTITUTE OF SCIENCE & TECHNOLOGY

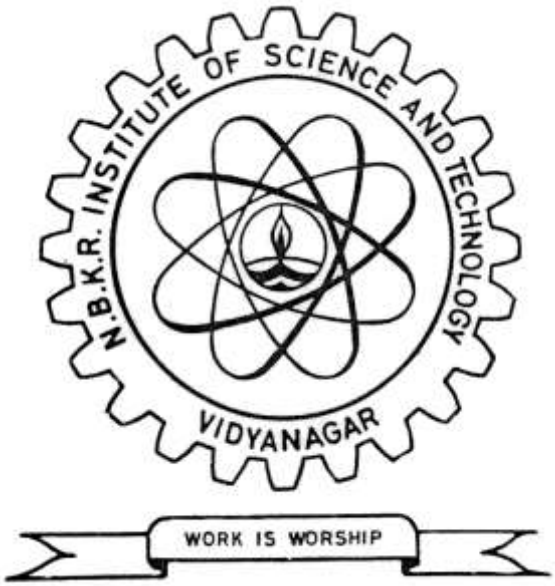
(AUTONOMOUS)

COLLEGE WITH POTENTIAL FOR EXCELLENCE (CPE)

Affiliated to JNTUA, Anantapuramu

Re-Accredited by NAAC with 'A' Grade

B.Tech. Courses Accredited by NBA under TIER-I



SYLLABUS

B.TECH. DEGREE COURSE

II B.TECH

I & II Semesters

ELECTRONICS AND COMMUNICATION ENGINEERING

(With effect from the batch admitted in the academic year 2017-2018)

VIDYANAGAR - 524413

SPSR Nellore-Dist. Andhra Pradesh

www.nbkrist.org

INSTITUTE:

Vision:

To emerge as a comprehensive Institute that provides quality technical education and research thereby building up a precious human resource for the industry and society.

Mission:

1. To provide a learner-centered environment that challenges individuals to actively participate in the education process.

2. To empower the faculty to excel in teaching while engaging in research, creativity and public service.

3. To develop effective learning skills enabling students pick up critical thinking thus crafting them professionally fit and ethically strong.

4. To reach out industries, schools and public agencies to partner and share human and academic resources.

VISION AND MISSION OF THE DEPARTMENT

Vision:

To develop high quality engineers with sound technical knowledge, skills, ethics and morals in order to meet the global technological and industrial requirements in the area of Electronics and Communication Engineering.

Mission:

1. To produce high quality graduates and post-graduates of Electronics and Communication Engineering with modern technical knowledge, professional skills and good attitudes in order to meet industry and society demands.
2. To develop graduates with an ability to work productively in a team with professional ethics and social responsibility.
3. To develop highly employable graduates and post graduates who can meet industrial requirements and bring innovations.
4. Moulding the students with foundation knowledge and skills to enable them to take up postgraduate programmes and research programmes at the premier institutes.

Programme Educational Objectives (PEOs):

1. To provide the students with strong fundamental and advanced knowledge in mathematics, Science and Engineering with respect to Electronics and Communication Engineering discipline with an emphasis to solve Engineering problems.

2. To prepare the students through well - designed curriculum to excel in bachelor degree programme in Electronics and Communication Engineering in order to engage in teaching or industrial or any technical profession and to pursue higher studies.

3. To train students with intensive and extensive engineering knowledge and skill so as to understand, analyze, design and create novel products and solutions in the field of Electronics and Communication Engineering.

4. To inculcate in students the professional and ethical attitude, effective communication skills, team spirit, multidisciplinary approach and ability to relate engineering issues to broader social context.

5. To provide students with an excellent academic environment to promote leadership qualities, character molding and lifelong learning as required for a successful professional career.

Program Outcomes (POs):

PO1: Ability to acquire and apply knowledge of science and engineering fundamentals in problem solving.

PO2: Acquire in-depth technical competence in a specific information technology discipline.

PO3: Ability to undertake problem identification, formulation and providing optimum solution.

PO4: Ability to utilize systems approach to design and evaluate operational performance.

PO5: Understanding of the principles of inter-disciplinary domains for sustainable development.

PO6: Understanding of professional & ethical responsibilities and commitment to them.

PO7: Ability to communicate effectively, not only with engineers but also with the community at large.

PO8: Ability to Communicate effectively on complex engineering activities with the engineering community and with society at large.

PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO11: Understanding of the social, cultural, global and environmental responsibilities as a professional engineer.

PO12: Recognizing the need to undertake life-long learning, and possess/acquire the capacity to do so.

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY: VIDYANAGAR

(AUTONOMOUS)

(AFFILIATED TO JNTU ANANTAPUR: ANANTHAPURAMU)

SPSR NELLORE DIST

II YEAR OF FOUR YEAR B.TECH DEGREE COURSE – I SEMESTER

ELECTRONICS AND COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the academic year 2017-2018)

(For the batch admitted in the academic year 2017-2018)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation									
							Sessional-I Marks			Sessional-II Marks			Total Sessional Marks(40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Test$^{\$}$-I	A$^{\#}$-I	Max. Marks	Test$^{\$}$-II	A$^{\#}$-II	Max. Marks		Duration In Hours	Max. Marks	100
1	17SH2101	Engineering Mathematics-II**	2	2	-	3	34	6	40	34	6	40	0.8*Best of two+0.2* least of two	3	60	100
2	17EC2101	Signals & Systems*	2	2	-	3	34	6	40	34	6	40		3	60	100
3	17EC2102	Switching Theory & Logic Design*	2	2	-	3	34	6	40	34	6	40		3	60	100
4	17EC2103	Analysis of Electronic Circuits	3	-	-	3	34	6	40	34	6	40		3	60	100
5	17EC2104	Electromagnetic Fields and waves	2	2	-	3	34	6	40	34	6	40		3	60	100
6	17EE2104	Electrical Technology	2	2	-	3	34	6	40	34	6	40		3	60	100
		PRACTICALS														
7	17EC21P1	Electronic Devices Lab*	-	-	3	2	-	-	-	-	-	-	Day to Day Evaluation and a test (40 Marks)	3	60	100
8	17EE21P2	Electrical Engineering Lab	-	-	3	2	-	-	-	-	-	-		3	60	100
9	17EC21P2	Basic Simulation Lab	1	-	2	2	-	-	-	-	-	-		3	60	100
		MANDATORY														
10	17MC2101	Environmental Studies**	3	-	-	-	34	6	40	34	6	40	0.8*Best of two+0.2* least of two	3	60	100
		TOTAL	17	10	08	24	-	-	-	-	-	-	-	-	600	1000

**Common to ECE, EEE, CSE, IT

***** Common to ECE, EEE

A for Assignment (continuous evaluation)

$ Test (Descriptive & Objective) duration = 2 Hours

17SH2101-ENGINEERING MATHEMATICS -II

(Common to ECE, EEE, CE and ME)

Course Category:	Basic Sciences	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	2-2-0
Prerequisite:	Intermediate Mathematics	**Sessional Evaluation:**	40
		External Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to understand: 1. The concepts of First shifting theorem, Change of scale property, Laplace transformation of multiplied by t and division by t and transformation of derivatives and integrals. 2. The application of Solutions of Ordinary Differential Equations. 3. The determination of Fourier coefficients, Fourier series, Even and Odd Functions and Change of intervals. 4. The concepts of Fourier Transforms. 5. The Properties of Z- Transforms, Shifting properties, initial value and final value theorems. 6. The applications of difference equations and to develop the basic mathematical knowledge and computational skills of the students in the areas of applied mathematics.	
Course Outcomes	After completing the course the student will be able to	
	CO1	Acquire basic knowledge in Laplace transforms and their applications.
	CO2	Develop analytical skills in solving the Ordinary Differential Equations by using the Laplace transform technique.
	CO3	Know analytical skills in solving the problems involving Fourier Series.
	CO4	Understand effectively Fourier Sine and Cosine integral, Fourier Transforms, Fourier Sine and Cosine transforms.
	CO5	Attains skills in analyzing the Z-Transforms and their applications.
	CO6	Apply and solve difference equations by effectively understanding Inverse Z-Transforms.
Course Content	**UNIT – I** **LAPLACE TRANSFORMATION:** Laplace Transformations of standard functions - First shifting theorem - Change of scale property - Laplace transformation of multiple by t and division by t - Transformation of derivatives and integrals. **UNIT – II** **INVERSE LAPLACE TRANSFORMATION**: Inverse transforms - Method of partial fractions - Shifting property - Inverse Laplace transform of a multiple by s and division by s - Inverse Laplace transform of derivatives and integrals - Convolution theorem - Application to Solutions of Ordinary Differential Equations.	

Course Content	**UNIT-III** **FOURIER SERIES**: Determination of Fourier coefficients - Fourier series - Even and Odd functions - Change of intervals (0,2l). **UNIT-IV** **FOURIER TRANSFORMS**: Fourier Integral Theorem (Without proof)-Fourier Sine and Cosine integrals - Fourier integral in complex form - Fourier Transforms - Fourier Sine and Cosine transforms. **UNIT-V** **Z-TRANSFORMS**: Z-Transform of some standard functions - Properties of Z-Transforms - Shifting Properties - Initial value theorem and final value theorem. **UNIT-VI** **INVERSE Z- TRANSFORM AND DIFFERENCE EQUATIONS**: Inverse Z-Transform - Convolution theorem-Inversion by partial fractions - Applications to difference equations.
Text Books and Reference Books	**TEXT BOOKS:** 1. Higher Engineering Mathematics - B.S.Grewal, Kanna Publishers, New Delhi. 2. Engineering Mathematics - B.V. Ramana, Tata McGraw-Hill Education Pvt. Ltd, New Delhi. **REFERENCE BOOKS:** 1. Higher Engineering Mathematics - H.K. Dass, Er. Rajnish Verma, S.Chand Publication, New Delhi. 2. Advanced Engineering Mathematics - N.P. Bali & M. Goyal, Lakshmi Publishers, New Delhi. 3. Advanced Engineering Mathematics - Erwin Kreyszig, Wiley, India

17EC2101 – SIGNALS AND SYSTEMS

(Common to ECE and EEE)

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 – 0
Prerequisite:	Knowledge of vectors Trigonometry, Differentiation & Integration	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The different types of Continuous Time Signals. 2. The Fourier series for periodic signals. 3. The Fourier Transform of various signals. 4. The analysis of different types of Continuous Time Systems. 5. Mathematical background of Discrete Time Signals and Systems. 6. The Fourier Transform of discrete time signals and systems.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Define the signals and systems with examples.
	CO2	Find the Fourier series of various Periodic signals.
	CO3	analyse the signal in frequency domain by applying FT and its properties
	CO4	establish the inter connections of LTI systems.
	CO5	know the operations on discrete time signals and its transformations.
	CO6	solve the difference equation and attain the solution using DTFT.
Course Content	**UNIT-I** **CONTINUOUS TIME SIGNALS:** Signal classification, Types of signals-Dirac delta, unit step, ramp, Signum and Exponential functions, Operations on signals, Analogy between vectors and signals, Orthogonality, Mean square error **UNIT-II** **FOURIER SERIES**: Definition-Dirichlet's conditions, classification of Fourier Series, properties of Fourier Series. **UNIT III** **FOURIER TRANSFORM:** Existence of Fourier Transform- Properties of Fourier Transform-Inverse Fourier Transforms, Parseval's Theorem of Energy and Power signals, Energy, Power, Periodicity of signals, Power and Energy Spectral Densities, Auto and Cross correlation of signals. **UNIT-IV** **CONTINUOUS TIME SYSTEMS:** Classification of systems – Linearity and time invariance – Transmission of signals through LTI systems – Convolution – Impulse response – Frequency response of LTI Systems.	

Course Content	**UNIT-V** **DISCRETE TIME SIGNALS AND SYSTEMS:** Unit impulse, step, ramp, and exponential signals – Periodicity of signals – Operations on signals – Linear Shift Invariant(LSI) system – Stability – Causality – Convolution and Correlation –Linear constant coefficient difference equation – Impulse response. **UNIT-VI** **DISCRETE TIME FOURIER TRANSFORM**: Definition of Discrete Time Fourier Transform – Properties – Transfer function – System analysis using DTFT. Ideal filters – Distortion less transmission – Band Width – Rise time – Hilbert transform – Pre and complex envelopes – Band pass signals through band pass systems.
Text Books and Reference Books	**TEXT BOOKS:** 1. Signals & Systems : A Anand Kumar – PHI 2. Linear Systems and Signals : B.P.Lathi – Oxford University Press 3. Signals & Systems: P.Ramesh Babu-SP **REFERENCES:** 1. Signals &Systems :J.S.Chitode – Technical Publications 2. Signals &Systems :A.V.Oppenhiem & A.S.Willsky with S.Hamid Nawab – PHI
E-Resourses	1. https://nptel.ac.in/courses 2. https://iete-elan.ac.in 3. https://freevideolectures.com/university/iit

17EC2102 – SWITCHING THEORY & LOGIC DESIGN

(Common to ECE and EEE)

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 - 0
Prerequisite:	Number systems ,Semiconductor device operations, basic Arthematic operations	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to:	
	1. Introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions. 2. Introduce the methods for simplifying Boolean expressions. 3. Outline the formal procedures for the analysis and design of combinational circuits 4. Illustrate the concept of synchronous and asynchronous sequential circuits 5. Introduce the concept of various counters and Registers 6. Introduce the concept of memories and Memory expansion.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	understanding of the fundamental concepts and techniques used in digital electronics and examine the structure of various number systems and its application in digital design
	CO2	Formulate the K-maps and apply Boolean algebra in designing a Digital System.
	CO3	design various combinational circuits
	CO4	analyse various sequential circuits.
	CO5	Identify and prevent various hazards and timing problems in a digital design.
	CO6	Classify various memories in Digital Circuits
Course Content	**UNIT – I** **NUMBER SYSTEMS AND CODES:** Number systems, Signed binary numbers, Base conversions, Binary arithmetic, Complements, Binary codes–(BCD, Grey, ASCII). **BOOLEAN ALGEBRA AND LOGIC GATES**: Basic definitions and theorems of Boolean algebra, De-Morgan's theorem, Digital logic gates, Universal gates, Multi-level gate circuits. **UNIT – II** **MINIMIZATION OF DIGITAL CIRCUITS:** Standard forms of logical functions, Min-term and max-term specifications, Simplification by K-maps, Incompletely specified functions, prime implicants, Essential prime implicants, Tabular method, Realization of logic functions using gates. **UNIT -III** **COMBINATIONAL LOGIC CIRCUITS:** Design procedure, Binary adder, Subtractor, Decimal adder, Magnitude comparator, Decoders, Encoders, Multiplexers, Demultiplexers.	

Course Content	**UNIT – IV** **SEQUENTIAL CIRCUITS:** Sequential circuits, Storage Elements: (Latches & Flip-flops), Master-slave Flip-flop, Flip-flop conversions, Timing and triggering consideration, Analysis of clocked sequential circuits, State reduction & assignment, Design procedure. **UNIT – V** **REGISTERS AND COUNTERS:** Registers, Shift registers, Ripple counters, Synchronous counters, other counters– Ring and Johnson counters. **UNIT-VI** **MEMORY AND PROGRAMMABLE DEVICES:** Random-Access Memory, Memory Decoding, Error detection and correction, Read-only Memory, Programmable Logic Array, Programmable Array Logic, Sequential programmable devices.
Text Books and Reference Books	**TEXT BOOKS:** 1. Digital design by Morris Mano,Pearson Education Asia 2. Fundamentals of logic design by Roth & Charles,2nd Edition, West *Publishing* Company, 1979 **REFERENCES:** 1. Fundamentals of logic circuits by A.Anand Kumar, PHI Learing 2. Jon M, Yarbrough, "Digital logic — applications and design", Thomson — Brooks India edition .
E-Resourses	1. http://nptel.ac.in/cources 2. https:// iete-elan.ac.in 3. https://freevideolectures.com/university/iitm

17EC2103– ANALYSIS OF ELECTRONIC CIRCUITS

Course Category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Knowledge in electronic devices and its operations with various applications.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The concept of rectifiers and other Diode applications 2. The Hybrid model, Small signal analysis of single stage BJT amplifiers 3. The FET biasing schemes, high frequency response. 4. The types of coupling, Darlington and Bootstrap circuits. 5. The hybrid π model at high frequency. 6. Different types of feedback circuits as well as Sinusoidal oscillators	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Understand the concept of rectifiers and other applications of diodes.
	CO2	Analyse the stability and biasing concepts of BJT and to design Single Stage amplifiers.
	CO3	Design a FET amplifier and compare with BJT
	CO4	know different methods of coupling and able to design multistage amplifiers
	CO5	represent the Hybrid π model at high frequency.
	CO6	Design feedback amplifiers and able to understand oscillators.
Course Content	**UNIT I** **RECTIFIERS:** Half Wave, Full Wave & Bridge Rectifiers, Analysis of FWR with filters(L, C, LC), Regulators **UNIT II** **TRANSISTOR BIASING AND STABILITY:** Operating Point, Bias Stability against variation in I_{CO}, V_{BE} & β stability factor, fixed bias, Collector to Base Bias, Self-Bias, Thermal runaway, Compensation Methods. **SINGLE STAGE AMPLIFIERS:** BJT Amplifier, h-parameter model, analysis of common emitter, common collector and common base amplifier using exact model, Approximate model, Millers Theorem and its Dual, Design of RC Coupled amplifier using BJT. **UNIT III** **FET AMPLIFIERS:** FET Equivalent model, Analysis of Common Source, Common Drain Amplifiers, Design of FET Amplifier.	

Course Content	**UNIT IV** **MULTISTAGE AMPLIFIERS:** Methods of Coupling, Analysis of Cascade Transistor Amplifier, Analysis of Two Stage RC Coupled Amplifier, High Input Impedance Circuits: Darlington Pair Amplifier, Cascode Amplifier and Bootstrap Emitter Follower, Analysis of Multistage Amplifier using FET. **UNIT V** **HIGH FREQUENCY ANALYSIS:** Transistor at High Frequency, Hybrid π CE Model, Determination of High Frequency Parameters and CE Short circuit Current Gain, Current Gain with Resistive Loads, Cut-off Frequencies, Frequency Response, parameters f_T and f_{β}. Analysis of CS & CD amplifier at High Frequency. **UNIT VI** **FEEDBACK AMPLIFIER:** Feedback Concept, Types of Feedback, Feedback Topology, Characteristics, Analysis of Feedback Amplifiers, Performance Comparison. **OSCILLATORS:** Oscillators Principles, Barkhausan Criteria, RC Phase shift and Wien Bridge Oscillator, Hartley and Colpitts Oscillators, Crystal Oscillator.
Text Books and Reference Books	**TEXT BOOKS:** 1. Mottershed, "Electronic devices and circuits", PHI. 2. Millman and Halkias, "Integrated Electronics", McGraw- Hill Co. **REFERENCES:** 1. Boylestad, Louis Nashelsky "Electronic devices and circuits" 9ed.., 2008PE. 2. David.A.Bell. "Electronic Devices and circuits", PHI.
E-Resourses	1. https://nptel.ac.in/courses 2. https://iete-elan.ac.in 3. https://freevideolectures.com/university/iit

17EC2104 – ELECTRO MAGNETIC FIELDS AND WAVES

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 - 0
Prerequisite:	Basic concepts of coordinate system & fundamentals of electricity & magnetism	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. Coordinate systems, Vector calculus, Electrostatics, laws involved in Electrostatics. 2. Coulomb's law, Mathematical analysis of Gauss's law. 3. Behavior of conductors with regard to Current, Current Density, Resistance. Understand the significance of Ohm's law for EM fields. 4. Magneto Static Fields and various laws applicable to magnetic fields. 5. Dipole Moment of materials, Boundary conditions governing Magnetic interfaces and study about energy stored in Magnetic Fields. 6. Maxwell's equations in different forms and their applications to EM fields.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	know the conversions of one coordinate system to other forms.
	CO2	remember Gauss Law, Coulomb's law to find fields and potentials for a various situation.
	CO3	derive the Continuity equation and give the importance of current density.
	CO4	understand Biot-Savart's Law and Ampere's Circuital law and apply to solve problems on these
	CO5	acquire the knowledge of Dipole moment, Boundary conditions of Magnetic Fields
	CO6	Know the Maxwell's equation in differential and integral forms, Faraday's law
Course Content	**UNIT-I** **REVIEW OF COORDINATE SYSTEMS:** Introduction to coordinate systems, Cartesian, Cylindrical and spherical coordinate systems, Vector transformations, Vector calculus. **UNIT-II** **ELECTROSTATIC FIELDS:** Coulomb's Law, Electric Field Intensity, Electric Flux Density –Gauss's Law. Gauss's law in point form. Electric Potential-Potential Gradient-Energy Stored in Electric Field. **UNIT-III** **CONDUCTORS AND DIELECTRICS:** Current and Current Density- Continuity Equation-Conductors-Ohms Law, Resistance, power dissipation and Joules law. Dielectrics: Dipole Moment-Polarization-bound Charge Densities-Boundary Conditions, Capacitance.	

Course Content	**UNIT-IV** **MAGNETOSTATIC FIELDS:** Amperes force law, Biot-Savart's Law, Lorentz force law, Ampere's circuital law in point form, Magnetic Vector Potential **UNIT-V** **MAGNETIC FIELD IN MATERIALS:** Dipole Moment, Magnetization and bound current densities. Boundary Conditions- Inductance, Energy Stored in Magnetic Field. **UNIT-VI** **MAXWELL'S EQUATIONS:** Faraday's law, Motional and transformer induced EMFs, Faraday's law in point form. Displacement current, Maxwell's equations in differential and integral forms.
Text Books and Reference Books	**TEXT BOOKS:** 1. Matthew N.O.Sadiku: "Elements of Engineering Electromagnetics" Oxford University Press, 4thedition, 2007. 2. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Pearson Education/PHI 4thedition 2006. **REFERENCES:** 1. Narayana Rao, N: "Elements of Engineering Electromagnetics" 6th edition, Pearson Education, New Delhi, 2006. 2. G.S.N. Raju, Electromagnetic Field Theory & Transmission Lines, Pearson Education, 2006.
E-Resourses	1. https://nptel.ac.in/courses 2. https://iete-elan.ac.in 3. https://freevideolectures.com/university/iit

17EE2104-ELECTRICAL TECHNOLOGY

Course Category:	Professional core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	2-2-0
Pre-requisite:	Basic Electrical Sciences	**Sessional Evaluation:**	40
		External Exam Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The basic concepts, operation, characteristics and underlying theories of DC Machines, Transformers and Induction Motors 2. The applications of electrical machines.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Comprehend the construction, principle of operation and characteristics of DC Generator
	CO2	Describe the construction and principle of operation of DC Motor
	CO3	Understand the construction and principle of operation of Single phase transformers
	CO4	Depict the construction, principle of operation and characteristics of Three phase Induction Motors
	CO5	Empathise the construction and principle of operation of Alternator
	CO6	Describe the principle of operation of Single Phase Induction Motor and Stepper Motor
Course Content	**UNIT-I** **DC GENERATORS:** Constructional details of DC machines, principle of operation of the generator, EMF equation, types of generators, magnetization and load characteristics **UNIT-II** **DC MOTORS:** Principle of operation of DC Motors, Torque equation, Speed control methods and Efficiency calculation by Swinburne's test and direct load test. **UNIT-III** **TRANSFORMERS:** Single phase transformer, principle of operation & types, constructional details, EMF equation, Phasor diagram on no load and loaded Conditions, equivalent circuit, voltage regulation, transformer tests-OC & SC tests. **UNIT-IV** **THREE PHASE INDUCTION MOTORS**: Constructional features, principle of torque production, torque equation, slip-torque characteristics, efficiency calculation, starting methods, Autotransformer method & DOL method.	

Course Content	**UNIT-V** **ALTERNATOR:** Constructional features, operation, EMF equation, estimation of regulation by synchronous impedance method. **UNIT-VI** **SINGLE PHASE INDUCTION MOTORS:** Principle of operation, starting methods, types of single phase induction motors and Stepper motor.
Text Books and Reference Books	**TEXT BOOKS:** 1. "Theory and performance of Electrical machines" by J.B Gupta - SK Kataria Publishers-2013. 2. "Principles of Electrical Machines" by VK Mehta, Rohit Mehta – S.Chand – 2006. 3. "A Textbook of Electrical Technology: Volume 2 AC and DC Machines" by Theraja B.L, Theraja A.K. –S.Chand-2006 **REFERENCE BOOKS:** 1. "Electrical Machinery" by P.S Bimbhra - Khanna publishers-2011. 2. "Performance of DC machines" by M.G.Say, Second Edition, CBS Publishers 3. "Electrical machines" by I.J.Nagarath and D.P.Kothari Fourth edition, Tata Mc Graw-Hill.
E-Resourses	1. http://nptel.ac.in/courses 2.http://iete-elan.ac.in 3.http://freevideolectures.com/university/iit

17MC2101- ENVIRONMENTAL STUDIES

Course Category:	Professional core	**Credits:**	0
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-0-0
Pre-requisite:	Basic idea on environment, Environmental pollution causes, effects, and control measures.	**Sessional Evaluation:** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to:	
	1. Know the importance of Environmental studies and various environment components 2. Know the value of natural resources and need to protect them. 3. Know the value of biodiversity and its conservation methods. 4. Design engineering methods and solve problems related to environmental pollution. 5. Understand the social issues and provide plans to minimize the problems. 6. Understand need to protect various environmental acts.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	know the importance of Environmental studies and understand the various components of environment.
	CO2	estimate the value of natural resources
	CO3	asses the value of biodiversity and need to protect.
	CO4	know how the environment is polluted and suggest some control measures.
	CO5	aware the several environmental problems in India and way to minimize the effects.
	CO6	Know the environmental protection laws in our country and understand the need to respect those laws.
Course Content	**UNIT-I** **INTRODUCTION**: Definition, Scope and Importance of Environmental studies, Environmental Components. **UNIT-II** **ENVIRONMENT AND NATURAL RESOURCES MANAGEMENT:** a. Land resources: Importance, Land degradation, Soil erosion and desertification, Effects of modern agriculture (fertilizer and pesticide problems). b. Forest Resources: Use and over-exploitation-Mining and Dams-their effects on forest and tribal people. c. Water Resources: Use and over-utilization of surface and ground water, Floods and droughts, Rainwater harvesting, clouds seeding and watershed management. d. Energy resources: Energy needs - Renewable and non-renewable energy, need to use of alternate energy sources, Impact of energy use on environment. **UNIT-III** **ECOSYSTEM**: Introduction, types, characteristics and functions of Ecosystems	

Course Content	**BIO-DIVERSITY AND ITS CONSERVATION**: Value of bio-diversity- consumptive and productive use, social, ethical, aesthetic and option values - Threats to biodiversity- conservation of biodiversity. **UNIT-IV** **ENVIRONMENTAL POLLUTION:** Causes, Effects and control measures of Air pollution, Water Pollution, Soil pollution, Marine Pollution, Noise pollution, Nature of Thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion. **SOLID WASTE MANAGEMENT**: Composting, Vermiculture - Urban and industrial wastes, recycling and reuse, **UNIT-V** **ENVIRONMENTAL PROBLEMS IN INDIA:** Drinking water, Sanitation and public health -Effects of urbanization, Transportation, Industrialization on the quality of environment-Social Issues. **ECONOMY AND ENVIRONMENT**: The economy and environment interaction, Sustainability, Environment Impact Assessment **UNIT-VI** **ENVIRONMENTAL ACTS:** Water (Prevention and control of pollution) Act-Air (Prevention and control of pollution) Act – Environment protection Act, Wildlife protection Act, Forest conservation Act. **CASE STUDIES:** Silent valley project, Madhura Refinery and Taj Mahal, Tehri Dam, Kolleru Lake Aquaculture, Fluorosis in Andhra Pradesh. **FIELD WORK:** Visit to Local Area having river/Forest/grass land/hill/mountain to Document and Environmental assets.
Text Books and Reference Books	**TEXT BOOKS:** 1. “Environmental science” by Anubha Kaushik and C.P.Kaushik. 2. “Environmental science and Engineering” by P.Anandan and R.K.Kumaravelan. **REFERENCES:** 1. “Introduction to Environmental science” by Y.Anjaneyulu. 2. “Environmental studies” by Dr B.S.Chauhan. 3. “Environmental science” by M.Chandra sekhar

17EC21P1 – ELECTRONIC DEVICES LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Basic Electrical Sciences and Electronic Devices	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. The behaviour of various semiconductor devices. 2. The V-I characteristics of various semiconductor devices.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Analyse the electronic circuits experimentally.
	CO2	Verify the V-I characteristics of various semiconductor devices experimentally.
	CO3	Analyse & Calculate the cut-in voltage and forward resistance of P-N Junction diode practically.
	CO4	Examin the performance of JFET and UJT.
	CO5	Understand the performance LED and DIAC
	CO6	inspect the input and output characteristics of BJT.
Course Content	Minimum of 10 experiments to be completed out of the following: **LIST OF EXPERIMENTS** 1. P-N Junction Diode Characteristics (Ge & Si) 2. Zener Diode Characteristics 3. Bi-Polar Junction Transistor Characteristics (CE Configuration) 4. Junction Field Effect Transistor Characteristics 5. Uni-Junction Transistor Characteristics 6. Light Emitting Diode Characteristics 7. Light Dependent Resistor Characteristics 8. Photo Transistor Characteristics 9. Thermistor Characteristics 10. DIAC Characteristics 11. Bi-Polar Junction Transistor Characteristics (CB Configuration) 12. TRAIC Characteristics	

17EE21P2-ELECTRICAL ENGINEERING LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Physics, Electrical and Electronic components.	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. The design and analysis of basic electric circuits. 2. The behaviour of DC & AC machine.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Analyse the electric circuits experimentally.
	CO2	Verify the theorems and determine the two port network parameters experimentally.
	CO3	estimate the mutual inductance of coupled coils practically.
	CO4	distinguish the performance of DC motor on no load & full load conditions.
	CO5	test the performance of single-phase transformer under no load & full load conditions.
	CO6	demonstrate the load characteristics of DC shunt generator.
Course Content	**LIST OF EXPERIMENTS** 1. Verification of Kirchhoff's laws 2. Verification of Superposition theorem 3. Verification of Maximum power transfer theorem 4. Determination of Two-Port network parameters 5. Measurement of Mutual inductance 6. Locus diagram of RC series circuit 7. External characteristics of DC shunt generator 8. Swinburne's test 9. Brake test on DC shunt motor 10. Speed control of DC shunt motor 11. Open circuit and short circuit test on 1-φ transformer 12. Load test on 1- φ transformer	

17EC21P2 – BASIC SIMULATION LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	1 - 0 - 2
Prerequisite:	Signals and Systems	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. Basic operations of matrices and varies signals. 2. Verification of various systems and sampling theorem.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Perform the Operations on Matrices
	CO2	Generate various signals using MAT lab.
	CO3	Find the Even and Odd parts of Signal/Sequence and Real and Imaginary part of Signal.
	CO4	Verify the linearity and time invariance properties of a given continuous /discrete system.
	CO5	Find LT for some signals and system
	CO6	Compute the unit sample, unit step and sinusoidal response of the given LTI system
Course Content	Minimum of 10 experiments to be completed out of the following: **LIST OF EXPERIMENTS** 1. Basic Operations on Matrices 2. Generation on various Signals and Sequences (periodic and aperiodic) 3. Operations on Signals and Sequences 4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary part of Signal. 5. Convolution between Signals and Sequences 6. Auto Correlation and Cross Correlation between Signals and Sequences. 7. Verification of linearity and time invariance properties of a given continuous /discrete system. 8. Computation of unit sample, unit step and sinusoidal response of the given LTI system and verifying its physical reliability and stability properties. 9. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum. 10. Waveform synthesis using Laplace Transform. 11. Locating the zeros, poles and plotting the pole zero maps in s-plane and z-plane for the given transfer function. 12. Sampling theorem verification	

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY: VIDYANAGAR

(AUTONOMOUS)

(AFFILIATED TO JNTU ANANTAPUR: ANANTHAPURAMU)

SPSR NELLORE DIST

II YEAR OF FOUR YEAR B.TECH DEGREE COURSE – II SEMESTER

ELECTRONICS AND COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the academic year 2017-2018)

(For the batch admitted in the academic year 2017-2018)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation									
							Sessional-I Marks			Sessional-II Marks			Total Sessional Marks(40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Test$^{\$}$-I	A$^{\#}$-I	Max. Marks	Test$^{\$}$-II	A$^{\#}$-II	Max. Marks		Duration In Hours	Max. Marks	100
1	17SH2201	Engineering Mathematics-III**	2	2	-	3	34	6	40	34	6	40	0.8*Best of two+0.2* least of two	3	60	100
2	17SH2202	Engineering Economics and Financial Accounting**	2	2	-	3	34	6	40	34	6	40		3	60	100
3	17EC2201	Pulse & Switching Circuits *	2	2	-	3	34	6	40	34	6	40		3	60	100
4	17EC2202	Electromagnetic Transmission lines	2	2	-	3	34	6	40	34	6	40		3	60	100
5	17EC2203	Analog Communication	3	-	-	3	34	6	40	34	6	40		3	60	100
6	17EC2204	Random Signals & Stochastic Processes	2	2	-	3	34	6	40	34	6	40		3	60	100
		PRACTICALS														
7	17EC22P1	Electronic Circuits Lab	-	-	3	2	-	-	-	-	-	-	Day to Day Evaluation and a test (40 Marks)	3	60	100
8	17EC22P2	Analog Communication lab	-	-	3	2	-	-	-	-	-	-		3	60	100
9	17EC22P3	Electronic Design Automation lab	1	-	2	2	-	-	-	-	-	-		3	60	100
		MANDATORY											0.8*Best of two+0.2* least of two			
10	17MC2201	Technical English and Soft Skills**	2	-	-	-	34	6	40	34	6	40		3	60	100
		TOTAL	16	10	08	24	-	-	-	-	-	-	-	-	600	1000

**Common to ECE, EEE, CSE, IT

***** Common to ECE, EEE

A for Assignment (continuous evaluation)

$ Test (Descriptive & Objective) duration = 2 Hours

17SH2201-ENGINEERING MATHEMATICS -III

(Common to ECE and EEE)

Course Category:	Basic Sciences	**Credits:**	3
Course Type:	Theory	**Lecture -Tutorial-Practical:**	2-2-0
Prerequisite:	Intermediate Mathematics	**Sessional Evaluation:**	40
		External Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The concepts of One-dimensional Wave equation, One-dimensional Heat flow equation and Two-dimensional Laplace equations. 2. Legendre and Bessel functions. 3. The concepts of Cauchy - Riemann equations, Construction of Analytic function, Applications to flow problems and bilinear transformations. 4. Line integral, Cauchy's theorem and Cauchy's integral formula. 5. The concepts of Residues. 6. Random variables, Discrete and Continuous distributions.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Have a sound knowledge in analyzing One-dimensional wave equation, Heat flow equation and Two-dimensional Laplace equations.
	CO2	Attains skills in analyzing the Bessel functions and Legendre functions.
	CO3	Understand effectively the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.
	CO4	Recognize and apply the Cauchy's integral formula and the generalized Cauchy's integral formula.
	CO5	Compute the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues.
	CO6	Have a well-founded knowledge of standard distributions (Binomial,Poisson and Normal distributions) which can describe real life phenomena.
Course Content	**UNIT-I** **APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**: Methods of Separation of Variables - One-dimensional Wave equation - One-dimensional Heat flow equation - Two-dimensional Laplace equations. **UNIT-II** **SPECIAL FUNCTIONS**: Bessel functions – Properties - Recurrence formulae for Bessel function - Generating function for $J_n(x)$ - Orthogonality of Bessel Functions. Legendre functions - Rodrigue's formula - Recurrence relation for Pn(x) - Generating function for Pn(x) - Orthogonality of Legender polynomials.	

Course Content	**UNIT-III** **COMPLEX ANALYSIS-I**: Analytical functions, Cauchy - Riemann equations, Construction of Analytic function - Applications to flow problems - Harmonic and Conjugate harmonic functions - Bilinear transformations. **UNIT-IV** **COMPLEX ANALYSIS-II**: Complex integration - Line integral –Cauchy's theorem - Cauchy's integral formula - Generalized Cauchy's integral formula. **UNIT-V** **RESIDUES**: Taylor's theorem and Laurent's theorem (without proof) – Singularities – Poles - Residues - Residue theorem - Evaluation of real definite integrals. **UNIT-VI** **PROBABILITY AND STATISTICS**: Introduction - Random experiments - Random variables - Discrete and Continuous distributions - Binomial distribution - Poisson distribution - Normal distribution.
Text Books and Reference Books	**TEXTBOOKS:** 1. Higher Engineering Mathematics - B.S. Grewal, Kanna Publishers, New Delhi. 2. Engineering Mathematics - B.V. Ramana, Tata McGraw-Hill Education Pvt. Ltd, New Delhi. 3. Advanced Engineering Mathematics - Erwin Kreyszig, Wiley, India **REFERENCE:** 1. Higher Engineering Mathematics - H.K. Dass, Er. Rajnish Verma, S. Chand Publication, New Delhi. 2. Engineering Mathematics -III - Dr.T.K.V. Iyengar, Dr.B. Krishna Gandhi, S. Ranganatham, Dr.M.V.S.S.N. Prasad, S. Chand Publication, New Delhi 3. Special functions and complex variables (Engineering Mathematics-III) – Shahnaz Bathul, PHI, New Delhi.

17SH2202-ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING

(Common to ECE and EEE)

Course Category:	Humanities	**Credits**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	2-2-0
Pre-requisite:		**Sessional Evaluation:**	40
		External Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to understand:	
	1. Causes of economic problems. 2. Behaviour of a Consumer while purchasing and consuming various commodities and services 3. Various production and cost concepts used in managerial decision making process 4. Formation of different types of business organizations in India. 5. Application of the basic accounting concepts	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Demonstrate an ability to define, analyze and identify the appropriate solution to a business problem using sound economic and accounting principles.
	CO2	Know the role of various cost concepts in managerial decisions and the managerial uses of production function.
	CO3	Understand to take price and output decisions under various market structures.
	CO4	Know in brief formalities to be fulfilled to start a business organization.
	CO5	Analyse the firm's financial position with the techniques of economic aspects as well as financial analysis.
	CO6	Evaluate and select profitable investment proposals
Course Content	**UNIT – I** **BASIC CONCEPTS OF ECONOMICS**: Definition of Economics and basic micro and macro-economic concepts (including GDP/GNP/NI/Disposable Income). The concept of Demand-Law of demand – Elasticity of Demand: Types and measurement. Consumer's equilibrium: Marginal Utility Analysis. **UNIT – II** **THEORY OF PRODUCTION AND COST**: Production function – Cobb – Douglas production function and its properties – Law of variable proportions – Law of Returns to Scale – Cost concepts – Revenue curves – Break-Even Analysis. **UNIT – III** **THEORY OF PRICING**: Classification of markets – Pricing under perfect Competition – Pricing under Monopoly – Price discrimination – Monopolistic Competition.	

Course Content	**UNIT – IV** **TYPES OF BUSINESS ORGANIZATIONS:** Sole proprietorship, partnership and Joint Stock Company – Shares and debentures. **BANKING SYSTEM**: Central bank, Commercial banks and their functions. Impact of technology in banking sector. **UNIT – V** **FINANCIAL ACCOUNTING**: Concepts and principles, Journal and Ledger, Trial Balance, Final Accounts: Trading account, Profit and Loss account and Balance sheet - Simple problems. **UNIT-VI** **FUNDAMENTAL CONCEPTS OF CAPITAL BUDGETING AND WORKING CAPITAL:** Meaning, process and Methods (Payback period, NPV, ARR & IRR- simple problems), Working Capital: operating cycle, factors and sources.
Text Books and Reference Books	**TEXT BOOKS:** 1. Varshney & Maheswari: Managerial Economics, S. Chand Publishers 2. Business Organisations: C.B.Gupta , S.Chand Publishers 3. Managerial Economics and Financial Accounting: A.R.Arya Sri, Tata Mcgraw Hills publishers. **REFERENCE BOOKS:** 1. Economic Analysis: S.Sankaran, Margham Publications. 2. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas Publishers. 3. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications. .

17EC2201 – PULSE & SWITCHING CIRCUITS

(Common to ECE and EEE)

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 - 0
Prerequisite:	Knowledge in active & passive components and mathematical representation of different waves.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. design of wave shaping circuits. 2. Functioning of Switching Circuits. 3. Concept of multi-vibrators. 4. Principle and operation of time base generators. 5. various Power Amplifiers and their operation 6. LC tuned amplifiers.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Design RC circuits for triggering
	CO2	Understand Switching circuits (BJT Inverter, NMOS, PMOS and CMOS Switching circuits)
	CO3	design a Multi-vibrator and Schmitt trigger
	CO4	analyze Voltage/ Current Sweep Circuits
	CO5	categorize Power Amplifiers and understand the essence
	CO6	Understand principle and operation of a Tuned amplifiers
Course Content	**UNIT-I** **WAVE SHAPING CIRCUITS**: Types of waveforms, RC low pass and high pass circuits, rise time, tilt, Diode as a switch, Diode clipper and clamper circuits. **UNIT-II** **REVIEW OF SWITCHING CIRCUITS:** BJT Inverter, NMOS, PMOS and CMOS Switching circuits and their implementation (universal gates only). **UNIT-III** **MULTI-VIBRATORS:** BJT switch and switching times, Bi-stable multivibrator & triggering methods, Schmitt-trigger, Mono-stable and Astable multi-vibrators using BJT. **UNIT-IV** **TIME BASE CIRCUITS:** RC sweep circuits, constant current Miller and Bootstrap time base generators using BJT's, UJT relaxation oscillators, and sampling gates.	

Course Content	**UNIT-V** **POWER AMPLIFIERS:** Classification of Power Amplifiers, Class-A, Transformer coupled Class-A, Class-B Push-pull, Complementary Class-B push-pull amplifiers. **UNIT-VI** **TUNED AMPLIFIERS:** Introduction, Q-factor, small signal tuned amplifiers, effect of cascading single tuned amplifier on bandwidth and stagger-tuned amplifiers.
Text Books and Reference Books	**TEXT BOOKS:** 1. "Pulse & Digital switching waveforms" by J.Milliman & H.Taub McGraw-Hill,2nd edition 2008. 2. Design of analog CMOS Integrated circuits by Behad razhavi, McGraw-Hill,2nd edition 2001. **REFERENCE:** 1. Solid State pulse circuits, by David A. Bell, PHI.4th edition 2008. 2. Electronic devices and circuit thoery by Boylestad, Louis Nashelsky, 9ed.,2008Pearson Education 3. Millman and Halkian,"Integrated Electronics", McGraw-Hill.
E-Resourses	1. http://nptel.ac.in/cources 2. https:// iete-elan.ac.in 3. https://freevideolectures.com/university/iit

17EC2202 – ELECTROMAGNETIC TRANSMISSION LINES

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 - 0
Prerequisite:	Knowledge of Electrostatic fields and magneto static fields	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The significance of Maxwell's equations and their importance in analysing EM waves, which form the core of wireless signal propagation 2. Analyse EM wave propagation through conventional medium like physical conductors and identify the differences between free space propagation and propagation through wired medium. 3. Calculate EM power and impedance offered by different media. 4. Study various types of polarization techniques and its significance and understand the incidental properties of a wave at the interface. 5. Develop mathematical and scientific approaches in solving problems related to identification of line parameters. 6. Study impedance matching techniques of Tx line and solving of Tx line problems using smith chart.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Use Maxwell's equations to analyse the behaviour of fields.
	CO2	Derive wave equations and find their solutions in lossy medium
	CO3	Develop wave equations and estimate their solutions in loss less medium
	CO4	Explain polarization and its significance in wireless communications.
	CO5	Understand the functionality of transmission lines and their mathematical modelling.
	CO6	Use Smith charts to solve problems related to impedance matching.
Course Content	**UNIT-I** **MAXWELL'S EQUATIONS:** Summary of field equations, Displacement current, Maxwell's equations in integral and differential forms. Wave equation for free space conditions. Uniform plane wave propagation. Phasor notations for fields, Maxwell's equations in Frequency domain. **UNIT-II** **WAVE PROPAGATION IN LOSSLESS MEDIUM:** Uniform plane waves in lossless media, Phase velocity, Group velocity, Wavelength, Phase constant, Refractive index and intrinsic impedance. **UNIT-III** **WAVE PROPAGATION IN LOSSY MEDIUM:** Wave equation and its solution, Propagation	

Course Content	Constant, conductors and dielectrics. Skin effect and impedance. Poynting vector, Instantaneous and average Poynting vectors. **UNIT-IV** **POLARIZATION, REFLECTION AND REFRACTION:** Polarization- Linear, Circular and Elliptical polarizations. Normal incidence on plane boundaries- Reflection and transmission coefficients, Standing waves and VSWR. Oblique incidence on plane boundaries- Parallel and perpendicular polarizations, Snell's law, Total internal reflection, Breswter angle. **UNIT-V** **TRASNMISSION LINES:** Primary constants of the line. Distributed parameter equivalent circuit. Transmission line equations and solutions. Propagation constant. Characteristic impedance. Distortion less transmission line. Power flow, Reflection coefficient. Standing waves and VSWR. **UNIT-VI** **IMPEDANCE MATCHING:** Line impedance, Input impedance of open and short-circuited lines. Smith chart. Impedance matching using Smith chart. Quarter wave transformer and single stub tuner. Transients on transmission lines.
Text Books and Reference Books	**TEXT BOOKS:** 1. N.O.Sadiku: "Elements of Engineering Electromagnetics" Oxford University Press, 2. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Pearson Education/PHI **REFERENCES:** 1. Narayana Rao, N: "Elements of Engineering Electromagnetics", Pearson Education, New Delhi, 2006. 2. G.S.N. Raju, Electromagnetic Field Theory & Transmission Lines, Pearson Education, 2006.
E-Resourses	1. https://nptel.ac.in/courses 2. https://iete-elan.ac.in 3. https://freevideolectures.com/university/iit

17EC2203 – ANALOG COMMUNICATION

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 - 0
Prerequisite:	Knowledge in Fourier series and Fourier transforms.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The Generation and Detection of A.M waves. 2. SSB modulation and demodulation 3. The difference between SSB, DSB-SC and VSB modulation schemes 4. The discriminate between Frequency Modulation and Phase Modulation generation and detection methods. 5. The effect of noise on different modulation schemes and to design some circuits like Pre - emphasis and De - emphasis networks. 6. The concepts to realize or implement the circuits required for modulation and demodulation of AM and FM Schemes such as Transmitters and receivers.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Understand the need for modulation, Generation and detection of an AM waves.
	CO2	know the SSB-SC modulation and demodulation techniques
	CO3	compare the DSB-SC and VSB schemes
	CO4	Differentiate the A.M and F.M.
	CO5	Get familiarized with the different types of noises present in the Analog Communication.
	CO6	Describe the Characteristics of AM and F.M radio Transmitter and receiver.
Course Content	**UNIT –I** **AMPLITUDE MODULATION:** Introduction to communication system, need for modulation, Amplitude Modulation, Definition, Time domain and frequency domain description, Single tone modulation, Power relations in AM waves, Generation of AM waves, Square law Modulator, switching modulator, Detection of AM Waves: Square law detector, Envelop detector. **UNIT –II** **SSB MODULATION AND DEMODULATION:** Frequency discrimination method for generation of SSB Modulated Wave, Phase discrimination method for generating SSB Modulated waves. Demodulation of SSB Waves. **UNIT –III** **DSB MODULATION AND DEMODULATION:** Double Side Band Suppressed Carrier modulators, Generation of DSB-SC Modulated waves, COSTAS Loop. Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Comparison of AM Techniques, Applications of different AM Systems.	

Course Content	**UNIT –IV** **ANGLE MODULATION:** Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct and Indirect method of FM, Detection of FM Waves: Balanced Frequency discriminator, Phase locked loop, phase discriminator, Comparison of FM and AM. **UNIT –V** **NOISE IN ANALOG COMMUNICATION:** Classification of Noise, Various sources of Noise, Types of Noise: Resistive (Thermal) Noise, Shot noise, Extraterrestrial Noise, Narrowband Noise- In phase and quadrature phase components and its Properties, Noise in DSB and SSB System, Noise in Angle Modulation System, Pre-emphasis and de-emphasis. **UNIT-VI** **TRANSMITERS AND RECEIVERS**: Block diagram of AM transmitter, Frequency Scintillation, Radio broadcast transmitter, Armstrong FM transmitter, Simple FM transmitter using Reactance modulator. Classification of radio receivers, TRF receives, Super heterodyne receivers, Intermediate frequency, AGC, AFC.
Text Books and Reference Books	**TEXT BOOKS:** 1. "Communication Systems" Simon Haykin, Wiley Eastern. 2. "Electronic communication systems" J.Kennedy TMH **REFERENCE BOOKS:** 1. "Communication Systems Engineering" John Proakis, MasoudSaleb. 2. "Principles of Communication Systems" Taub and Schilling", McGraw-Hill ISE.
E-Resourses	1. http://nptel.ac.in/cources 2. https:// iete-elan.ac.in 3. https://freevideolectures.com/university/iit

17EC2204 – RANDOM SIGNALS AND STOCHASTIC PROCESSES

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2- 0
Prerequisite:	Knowledge of Signals and systems, integrations and differential equations.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to:	
	1. Provide mathematical background and probability theory. 2. Understand the random variable concepts with distribution and density functions. 3. Know basic concepts of multiple random variables, Conditional probability and conditional expectation, joint distribution and independence. 4. Make the difference between time averages and statistical averages. 5. Analysis of random process and application to the signal processing in the communication system. 6. Demonstrate the students how to model a noise source and design of filters for white and coloured noises and maximize S/N ratio.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand fundamentals of probability theory
	CO2	Learn the fundamentals of random variables.
	CO3	Illustrate the concepts of vector random variables and related problems.
	CO4	remember the characterization of random processes and their properties
	CO5	Evaluate response of a system to random signal and noise
	CO6	Know the noise and how these noise are effecting the communication system
Course Content	**UNIT-I** **PROBABILITY**: Introduction, Set theory and Venn diagrams -Axioms- Joint and conditional probability - Bayes' theorem - Bernoulli trials. **UNIT -II** **RANDOM VARIABLE**: Concept — Distribution function — Density functions — Conditional density functions — Expectation — Conditional expected value — Moments — Chebyshev, Markov's, and Chernoff's inequalities — Characteristics and moment generating functions - Transformation of continuous and discrete random variables. **UNIT -III** **MULTIPLE RANDOM VARIABLES**: Vector random variables — Joint distribution / Density functions — Conditional density / Distribution functions - Statistical independence — pdf and CDF for sum of random variables — Central limits theorem - Operations on multiple random variables — Expected value of function of random variables — Joint characteristic function — Joint by Gaussian random variables — Transformations of multiple random variables.	

Course Content	**UNIT – IV** **RANDOM PROCESSES:** Concept — Stationarity — Independence — Time averages — Ergodicity — Correlation function and its Properties. Gaussian, Poisson, and Markov processes — Power spectral density and its properties — Relation between power spectral density and auto-correlation — Cross power spectral density and its properties — Power spectrum for discrete time processes and sequences — Definition of white and coloured noise. **UNIT-V** **LINEAR SYSTEMS WITH RANDOM INPUTS:** Random signal response of linear system — System evaluation using random noise— Spectral characteristics of system response - Band pass, Band limited, and Narrow band processes — Properties of band limited processes. **UNIT-VI** **MODELING OF NOISE SOURCES:** Classification of noise sources — Resistive (Thermal) noise — Effective noise temperature — Antenna as a noise source — Available power gain — Equivalent networks — Input noise temperature — Noise figure. **OPTIMUM LINEAR SYSTEMS:** Maximization of (S/N); Matched filter for coloured and white noise — Minimization of Mean Squared Error — Wiener filter.
Text Books and Reference Books	**TEXT BOOKS:** 1. P.Z.Peebles Jr., "Probability Random Variables and Random Signal Principles". Tata McGraw-Hill, 4 edition, 2001. 2. A.Papoulis and S.Unnikrishna Pillai, "Probability Random Variables and Stochastic Processes", PHI, 4 edition, 2008 3. J.LAunon and V.Chandrasekhar, "Introduction to Probability and Random Processes", McGraw-Hill 1997. **REFERENCE:** 1. D.G. Childer, "Probability and Random Processes", McGraw Hill, 1997. 2. GR.Babu and K. Pushpa, "Probability Theory and Stochastic Processes", Premier Publishing House, 2003.
E-Resourses	1. http://nptel.ac.in/cources 2. https:// iete-elan.ac.in 3. https://freevideolectures.com/university/iit

17MS2201- TECHNICAL ENGLISH AND SOFT SKILLS

(Common to all Branches)

Course Category:	Basic Sciences	**Credits:**	3*
Course Type:	Theory	**Lecture-Tutorial-Practical:**	2-0-2
Prerequisite:	Basic Level of LSRW skills	**Sessional Evaluation:**	40
		External Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to:	
	1. Develop their basic technical writing skills in English. 2. Learn specific technical verbal competence. 3. Acquire soft skills and work efficiently in a realistic professional working Environment. 4. Develop soft skills including problem solving skills, working in groups and Leadership Skills.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Present technical papers and equip technical verbal proficiency.
	CO2	Develop group discussion skills and summarizing skills.
	CO3	Write effective resumes and job applications.
	CO4	Develop soft skills and effective nonverbal communication skills.
	CO5	Develop motivational skills and problem solving skills.
	CO6	Develop professionals with idealistic, practical and moral values.
Course Content	**UNIT –I** **INTRODUCTION TO TECHNICAL ENGLISH :** Writing simple descriptions and explanations on scientific/technical nature - Technical presentations - Communicating technical topics- Jargon **UNIT-II** **GROUP DISCUSSION:** Dynamics of Group Discussion – Intervention- Summarizing- Modulation of voice - Body Language – Relevance - Fluency and Coherence. **UNIT-III** **RESUMES AND JOB APPLICATIONS:** Writing resumes – Resume design – Parts of a resume – Resume styles – Cover letter **UNIT-IV** **INTRODUCTION TO SOFT SKILLS & HARD SKILLS**: Non Verbal communication- Haptics – Proxemics - kinesics - Chronemics – Oculesics -Vocalics	

Course Content	**UNIT-V** **PERSONALITY DEVELOPMENT SKILLS** : Assertiveness - Positive Attitude - Self Confidence- Problem Solving Skills- Leadership Skills **UNIT-VI** **ETIQUETTE & MANNERS**: Corporate etiquette-Dinning etiquette - Goal Setting- Career Planning -Time Management
Text Books and Reference Books	**REFERENCES:** 1. A Textbook of English for Engineers and Technologists (combined edition, Vol.1 &; Orient Black Swan 2010. 2. Effective Technical Communication, M. Ashraf Rizvi, Tata Mc Graw- Hill, 2011 3.Soft Skills, Dr K. Alex, S. Chand Publications, New Delhi

17EC22P1 – ELECTRONIC CIRCUITS LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Electronic Devices & Circuits and Analysis of Electronic Circuits	**Sessional Evaluation:** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. The design and analysis of various electronic circuits. 2. The behaviour of various rectifiers and amplifiers.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Analyse the electronic circuits experimentally.
	CO2	Design & Analyse the rectifiers (With & Without filters).
	CO3	Calculate the frequency response of the RC coupled amplifier practically.
	CO4	Analyse the Transistor Voltage Regulator (Series and Shunt).
	CO5	Understand the performance of feedback amplifiers practically
	CO6	Design & Analyse the various oscillators.

Course Content

Minimum of 10 experiments to be completed out of the following:

LIST OF EXPERIMENTS

1. Rectifiers without Filters (HWR, FWR, BR).
2. Rectifiers with Filters (C, LC, CLC).
3. R-C Coupled Amplifier.
4. FET Amplifier.
5. Colpitts Oscillator.
6. Current Series Feedback Amplifier (With & Without feedback).
7. Determination of f_T of a Transistor.
8. R-C Phase Shift Oscillator.
9. Wien Bridge Oscillator.
10. Darlington Pair Amplifier.
11. Transistor Voltage Regulator (Series and Shunt)
12. Voltage Series Feedback Amplifier (With & Without feedback).

17EC22P2 – ANALOG COMMUNICATION LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Electronic Devices and Circuits, Signals and Systems	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. The design and analysis of various communication circuits. 2. To study and verify the various modulation techniques.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Analyse the electronic circuits experimentally.
	CO2	Design & Analyse the Amplitude Modulation and De-Modulation system.
	CO3	Study and verify the Mixer Characteristics.
	CO4	examine the PAM and PPM practically
	CO5	Understand the performance of transmission lines.
	CO6	Design & Analyse the Frequency Modulation and De-Modulation system.
Course Content	Minimum of 10 experiments to be completed out of the following: **LIST OF EXPERIMENTS** 1. Amplitude Modulation. 2. Amplitude De-Modulation. 3. Frequency Modulation. 4. Pulse Amplitude Modulation. 5. Pulse Position Modulation. 6. Pulse Width Modulation. 7. Proto Type Filters. 8. Pre-Emphasis and De-Emphasis. 9. Transmission Lines. 10. FM using Variable Reactance Method. 11. Frequency De-Modulation. 12. Mixer Characteristics.	

17EC22P3-ELECTRONIC DESIGN AUTOMATION LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	1 - 0 - 2
Prerequisite:	Electronic Devices, Signals and Systems	**Sessional Evaluation:** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. The design and analysis of various electronic circuits. 2. The behaviour of various rectifiers and amplifiers.	
Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	simulate and Verification the Class-A Power Amplifier.
	CO2	Design & simulate the Rectifiers.
	CO3	Analyse & Calculate the frequency response CE and CS Amplifier.
	CO4	Analyse the Transistor Voltage Regulator.
	CO5	Design and Verification the Pre-emphasis and De-emphasis circuits.
	CO6	simulation and Verification of Logic Gates.
Course Content	Minimum of 10 experiments to be completed out of the following: **LIST OF EXPERIMENTS** 1. Verification of Half–Wave and Full-Wave Rectifier 2. Frequency Response of CE Amplifier 3. Frequency Response of CS Amplifier 4. Design and Verification of Class-A Power Amplifier 5. Design and Verification of Pre-emphasis and De-emphasis circuits 6. Verification of Clippers 7. Verification of Clampers 8. Design and Verification of RC coupled amplifier 9. Design and Verification of Voltage Regulator 10. Design and Verification of Logic Gates 11. Characteristics of the UJT 12. Characteristics of the MOSFET and CMOS	

N.B.K.R. INSTITUTE OF SCIENCE & TECHNOLOGY

(AUTONOMOUS)

COLLEGE WITH POTENTIAL FOR EXCELLENCE (CPE)

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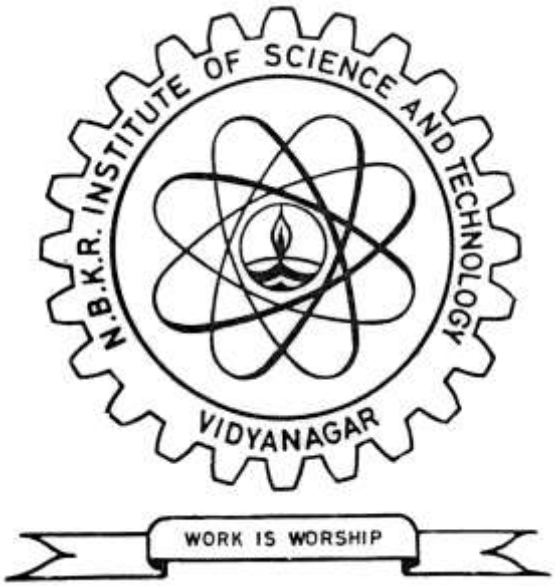


SYLLABUS

B.TECH. DEGREE COURSE

III B.Tech.

I & II Semesters

ELECTRONICS AND COMMUNICATION ENGINEERING

(With effect from the batch admitted in the academic year 2017-2018)

VIDYANAGAR - 524413

SPSR Nellore-Dist. Andhra Pradesh

www.nbkrist.org

INSTITUTE:

Vision:

To emerge as a comprehensive Institute that provides quality technical education and research thereby building up a precious human resource for the industry and society.

Mission:

1. To provide a learner-centered environment that challenges individuals to actively participate in the education process.

2. To empower the faculty to excel in teaching while engaging in research, creativity and public service.

3. To develop effective learning skills enabling students pick up critical thinking thus crafting them professionally fit and ethically strong.

4. To reach out industries, schools and public agencies to partner and share human and academic resources.

VISION AND MISSION OF THE DEPARTMENT

Vision:

To develop high quality engineers with sound technical knowledge, skills, ethics and morals in order to meet the global technological and industrial requirements in the area of Electronics and Communication Engineering.

Mission:

1. To produce high quality graduates and post-graduates of Electronics and Communication Engineering with modern technical knowledge, professional skills and good attitudes in order to meet industry and society demands.
2. To develop graduates with an ability to work productively in a team with professional ethics and social responsibility.
3. To develop highly employable graduates and post graduates who can meet industrial requirements and bring innovations.
4. Moulding the students with foundation knowledge and skills to enable them to take up postgraduate programmes and research programmes at the premier institutes.

Programme Educational Objectives (PEOs):

1. To provide the students with strong fundamental and advanced knowledge in mathematics, Science and Engineering with respect to Electronics and Communication Engineering discipline with an emphasis to solve Engineering problems.

2. To prepare the students through well - designed curriculum to excel in bachelor degree programme in Electronics and Communication Engineering in order to engage in teaching or industrial or any technical profession and to pursue higher studies.

3. To train students with intensive and extensive engineering knowledge and skill so as to understand, analyze, design and create novel products and solutions in the field of Electronics and Communication Engineering.

4. To inculcate in students the professional and ethical attitude, effective communication skills, team spirit, multidisciplinary approach and ability to relate engineering issues to broader social context.

5. To provide students with an excellent academic environment to promote leadership qualities, character molding and lifelong learning as required for a successful professional career.

Program Outcomes (POs):

PO1: Ability to acquire and apply knowledge of science and engineering fundamentals in problem solving.

PO2: Acquire in-depth technical competence in a specific information technology discipline.

PO3: Ability to undertake problem identification, formulation and providing optimum solution.

PO4: Ability to utilize systems approach to design and evaluate operational performance.

PO5: Understanding of the principles of inter-disciplinary domains for sustainable development.

PO6: Understanding of professional & ethical responsibilities and commitment to them.

PO7: Ability to communicate effectively, not only with engineers but also with the community at large.

PO8: Ability to Communicate effectively on complex engineering activities with the engineering community and with society at large.

PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO11: Understanding of the social, cultural, global and environmental responsibilities as a professional engineer.

PO12: Recognizing the need to undertake life-long learning, and possess/acquire the capacity to do so.

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY: VIDYANAGAR

(AUTONOMOUS)

(AFFILIATED TO JNTU ANANTAPUR: ANANTHAPURAMU)

SPSR NELLORE DIST

III YEAR OF FOUR YEAR B.TECH DEGREE COURSE – I SEMESTER

ELECTRONICS AND COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the academic year 2017-2018)

(For the batch admitted in the academic year 2017-2018)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation									
							Sessional-I Marks			Sessional-II Marks			Total Sessional Marks(40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Test$^{\$}$-I	A$^{\#}$-I	Max. Marks	Test$^{\$}$-II	A$^{\#}$-II	Max. Marks		Duration In Hours	Max. Marks	100
1	17EC3101	Microprocessors & microcontrollers	2	2	-	3	34	6	40	34	6	40	0.8*Best of two+0.2* least of two	3	60	100
2	17EC3102	Digital Signal Processing*	2	2	-	3	34	6	40	34	6	40		3	60	100
3	17EC3103	Electromagnetic radiating Systems	2	2	-	3	34	6	40	34	6	40		3	60	100
4	17EC3104	Analog IC Applications*	2	2	-	3	34	6	40	34	6	40		3	60	100
5	17EE3103	Linear Control Systems*	2	2	-	3	34	6	40	34	6	40		3	60	100
6	17EC31EX	Elective-I	3	0	-	3	34	6	40	34	6	40		3	60	100
		PRACTICALS	**PRACTICALS**													
7	17EC31P1	Pulse & Digital Circuits Lab*	-	-	3	2	-	-	-	-	-	40	Day to Day Evaluation and a test (40 Marks)	3	60	100
8	17EC31P2	IC Applications Lab	-	-	3	2	-	-	-	-	-	40		3	60	100
9	17SH31P1	Advanced Communication Skills Lab*	1	-	2	2	-	-	-	-	-	40		3	60	100
		TOTAL	14	10	08	26	-	-	-	-	-	360	-	-	540	900

***** Common to ECE, EEE

A for Assignment (continuous evaluation)

$ Test (Descriptive & Objective) duration = 2 Hours

17EC3101-MICROPROCESSORS AND MICROCONTROLLERS

Course Category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 – 0
Prerequisite:	Computer architecture and Basic programming.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The history and need of different types of microprocessors and learn the internal architecture details, pin configuration, and their timing diagrams of 8085µp. 2. And develop various projects, by learning programming, and interfacing details of 8085 microprocessor. 3. The internal architecture details, pin configuration, Interrupts and their timing diagrams of 8086µp, and develop assemble language programs. 4. The internal architecture details, pin configuration, and their timing diagrams of 8051µp. 5. The programming and interfacing details of 8051 microcontroller and memory interfacing too. 6. The internal architecture details, pipelining, addressing modes, and C.P.U. Registers of P.I.C. µc.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand the evaluation of different types of microprocessors and features of 8085 µp along with memory interfacing.
	CO2	Assess and solve basic binary math operations using the microprocessor and explain the microprocessor 8085 internal architecture and its operation within the area of manufacturing and performance.
	CO3	Gain the knowledge on internal architecture of 8086µp and its modes of operations along with timing diagrams.
	CO4	Design electrical circuitry to the Microcontroller I/O ports in order to interface the processor to external devices.
	CO5	Illustrate how the different peripherals are interfaced with 8086 µc and develop hardware projects using DAC, ADC, & 7-Segment Display.
	CO6	Gain the knowledge on internal architecture of 8051µp and its modes of operations along with timing diagrams by which improving programming skills on microcontroller.
Course Content	**UNIT-I** **INTRODUCTION TO MICROPROCESSORS:** Evolution of Microprocessors, Types of microprocessors, Features of 8085 microprocessor, Architecture of 8085 microprocessor, pin configuration, Register set, Instruction Cycle, Timing Diagrams, Stack and Subroutines.	

Course Content	**UNIT-II** **INSTRUCTION SET OF 8085 MICROPROCESSOR:** Addressing modes, Assembly Language Programs (8085) for addition, subtraction, multiplication, division etc., Interrupts of 8085, Memory interfacing of 8085 microprocessor. **UNIT-III** **ARCHITECTURE OF 8086 MICROPROCESSOR:** Architecture, pin description, Instruction set, Addressing modes, Interrupt system. Minimum mode and Maximum mode operations of 8086 and its timing diagrams, Assembler directives, Assembly language programs (8086). **UNIT- IV** **DATA TRANSFER SCHEMES:** Programmable interrupt controller (8259) and its interfacing, Programmable DMA controller (8257) and its interfacing, Programmable Interval Timer (8253) and its interfacing. **UNIT-V** **MEMORY INTERFACING TO 8086:** Interfacing various types of RAM and ROM chips, PPI (8255) and its interfacing, ADC and DAC Interfacing, Waveform generation, Traffic light controller, Stepper motor control, temperature measurement and control. **UNIT-VI** **8051 MICROCONTROLLER:** Architecture, pin description, Register set, Instruction set. Interrupt structure, timer & serial port operations, Simple Assembly language programs on general arithmetic and logical operations.
Text Books and Reference Books	**TEXT BOOKS:** 1. Ram. B, "Fundamentals of Microprocessors and Micro controllers", Dhanpat Rai publications. 2. Douglas V. Hall, "Microprocessors and interfacing: Programming and hard ware", TMH, 2nd edition. 3. The 8051 Micro-Controllers, Kenneth J. Ayala, 3rd Edition, Thomson Publications. 4. Design with PIC Micro-Controllers by John B. Peatman, Pearson Educations. **REFERENCES BOOKS:** 1. A.K. Ray and K.M. Bhurchandi, "Advanced Microprocessors and Peripherals", TMH. 2. "Microprocessor Architecture, Programming, and Applications with the 8085" by Ramesh S. Gaonkar", Prentice Hall of India. 3. Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Prentium Proprocessor, Pentium II, III, IV by Barry B.Brey.
E-Resources	1. http://w3.ualg.pt/~jmcardo/ensino/ihs2004/Benner93.pdf 2. http://engreric.com/wpcontent/uploads/2014/06/Syllabus_CECS346_Fall15.pdf

17EC3102– DIGITAL SIGNAL PROCESSING

(Common to ECE and EEE)

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 - 0
Prerequisite:	Signal & System, Fourier transform, Laplace Transform & Z transform	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The basic concepts and analytical methods of Z-transform. 2. The various DFT & FFT algorithms. 3. The techniques and tools for digital filter structures. 4. The design of FIR filters. 5. The various IIR filters. 6. The truncation and Rounding errors, Quantization noise	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Explain the concept of Z-transform, its properties and understand the concept of discrete and fast Fourier trans forms.
	CO2	Understand the concept of IDFT and Inverse Z-Transform
	CO3	Apply the Concept of FIR ,IIR Structures and frequency domain filter models
	CO4	Design Parallel and cascade structure of Butterworth, Chebyshev filters.
	CO5	Design FIR filter using Fourier series method and understand the concept of fixed point and floating-point number representation.
	CO6	Understand limit cycle oscillations concept and windowing technique.
Course Content	**UNIT – I** **REVIEW OF DISCRETE SIGNALS & SYSTEMS:** Z-transform and Inverse Z-Transform, Theorems and Properties, system function, Fourier representation of finite duration sequences. **UNIT – II** **DISCRETE & FAST FOURIER TRANSFORM**: DFT, properties of DFT, FFT, FFT algorithms, Use of DFT for fast computation of convolution, IDFT. **UNIT – III** **DIGITAL FILTER STRUCTURES:** Basic FIR structures, IIR structures: Direct form-I, Direct form-II, Parallel form,Cascade form Lattice Structure, Lattice-ladder structures. **UNIT – IV** **DESIGN OF IIR FILTERS:** Properties of Analog filters – Frequency domain filter models – Butter- worth, Chebyshev and other approximations – Filter design data – Low pass to high pass, Band pass and Band stop transformation – Filter response curves.	

Course Content	**UNIT – V** **DESIGN OF FIR FILTERS**: Fourier series method, Windowing, Sampling. **UNIT-VI** **FINITE WORDLENGTH EFFECTS**: Fixed point and floating point number representations – Truncation and Rounding errors – Quantization noise – coefficient quantization error – Product quantization error – Overflow error – Roundoff noise power – limit cycle oscillations due to product round off and overflow errors.
Text Books and Reference Books	**TEXTBOOKS:** 1. Digital Signal Processing A.V Oppenheim and R.W. Schafer, Prentice – Hall of India. 2. Digital Signal Processing, S. Salivahanam – TMH. 3. Digital Signal Processing Computer Base Approach, S.K. Mitra – Tata McGraw-Hill (III) **REFERENCES BOOKS :** 1. Digital Signal Processing, P. Ramesh Babu, Scitech Publications. 2. Digital Signal Processing, John G Proakis and monolokis – Wiley Eastern Economy edition.
E-Resources	1. http://nptel.ac.in/courses 2. https://dspace.mit.edu/handle/1721.1/57007 3. http://dl.acm.org/citation.cfm?id=562622

17EC3103 – ELECTROMAGNETIC RADIATING SYSTEMS

Course category:	Program Core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 – 0
Prerequisite:	Vector Calculus, Basics of Electromagnetic Waves and Waves	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to:	
	1. Study the propagation of signals; calculate various line parameters 2. Study the variation of input impedance, SWR and impedance matching techniques. 3. Learn antenna basics, antenna parameters and calculation of radiation resistances of various antennas. 4. Study antenna arrays and to draw their radiation 3-D patterns. 5. Understand the basic working principle of VHF and UHF antennas. 6. Understand different kinds of Wave Propagation.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand the fundamentals of Transmission Line Theory.
	CO2	Understand the Impedance Matching of High Frequency Lines.
	CO3	Learn antenna basics, Antenna Parameters and calculation of Radiation Resistances.
	CO4	Describe various Antennas, Arrays And Draw Radiation Patterns.
	CO5	Learn different types of Antennas to be employed in V.H.F. and U.H.F.
	CO6	Classify Radio Wave Propagation in the Atmosphere.
Course Content	**UNIT I** **TRANSMISSION LINES-I:** Primary and Secondary Constants of the Line, Transmission Line Equations, Propagation Constant, Characteristic Impedance, Distortion less Line, **UNIT II** **TRANSMISSION LINES-II:** Input Impedance of Open and Short Circuited Lines, Standing Waves, Reflection Coefficient, Smith Chart, Impedance Matching Using Smith Chart(Single Stub Only). **UNIT III** **RADIATION FUNDAMENTALS:** Definition of antenna, Retarded Potentials, Relation between Potential and Time Varying Fields, Far Field Approximation, Radiation from a current Element, Half Wave Dipole and Monopole Antennas. **ANTENNA PARAMETERS:** Radiation Pattern, Radiation Intensity, Directivity, Gain, H.P.B.W., Effective Aperture, Relation between Directivity and Maximum Effective Aperture.	

Course Content	**UNIT IV** **LINEAR WIRE ANTENNAS:** Current Distribution on Thin Linear Wire Antennas, Array of Two Point Sources, Principle of Pattern Multiplication, Uniform Linear Arrays: Broad Side and End fire Array and Binomial Arrays. **TRAVELLING WAVE ANTENNAS:** Long Wire and Rhombic Antennas, Yagi-Uda Antenna, Folded Dipole Antennas (Without Analysis) **UNIT V** **SURFACE AND SPACE WAVE PROPAGATION:** Friis Transmission Equation, Salient Features of Somerfield Theory, Ground Wave Field Strength Calculation, Antennas located over Flat Earth, Effect of Curvature of Earth, Refraction of Radio Waves in Troposphere, Effective Radius of Earth, Radio Horizon and Maximum Radio Range. **UNIT VI** **SKY WAVE PROPAGATION:** Structure of Ionosphere, Mechanism of Wave Refraction in Ionosphere, Critical Frequency, M.U.F., Virtual Height, Skip Distance, Effect of Earth's Magnetic Field, Faraday Rotation.
Text Books and Reference Books	**TEXT BOOKS:** 1. Antennas by John D Krauss – ISE. 2. Antenna and Wave Propagation by K.D.Prasad -Khanna Publication. **REFERENCE BOOKS:** 1. Transmission Lines and Networks by Umesh Sinha-Sathya Prakashan. 2. Electromagnetic Waves and Radiating Systems by Jordan E.C. and Balmain H. G.-P.H.I.
E-Resources	1. http://www.nptel.ac.in. 2. http:/www.ebookee.com/antennaandwavepropagation.

17EC3104– ANALOG IC APPLICATIONS

(Common to ECE and EEE)

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 - 0
Prerequisite:	Circuit & Networks, Electronics Devices & Circuits and Pulse & Analog Circuits	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to:	
	1. Learn the basic building blocks of Op-amp & its characteristics. 2. Study linear and non-linear applications of operational amplifiers. 3. Design Multivibrators. 4. Understand the theory and applications of 555 timer and P.L.L. 5. Design of various filters using op amp. 6. Learn theory of A.D.C.s and D.A.C.s.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Gain the basics of op-amp characteristics and its applications.
	CO2	Study and analyse each building blocks of op-amp and its applications.
	CO3	Analyse and design of Multivibrators, Oscillators and comparators using op-amp.
	CO4	Illustrate and design of Multivibrators using 555 timer, understand of PLL and its applications.
	CO5	Analyse and design of Active filters and regulators.
	CO6	Apply and Analyse A/D and D/A converters and their applications.
Course Content	**UNIT – I** **OPERATIONAL AMPLIFIER :** Introduction to I.C.s, Op-Amp Ideal Characteristics, Internal Circuit, D.C. and A.C. Characteristics of Op-Amp, Inverting and Non-Inverting Modes of Operation, Voltage Follower, Summer, Adder-Subtractor, Integrator, and Differentiator **UNIT – II** **OPERATIONAL AMPLIFIER APPLICATIONS:** Differential Amplifier and its Transfer Characteristics, Derivation of C.M.R.R. & Improvement Methods of Differential Amplifier Characteristics, Instrumentation Amplifier, V-I and I-V Converters, Precision Rectifiers, Sample and Hold Circuit, Analog Computation. **UNIT – III** **COMPARATORS AND WAVEFORM GENERATORS:** Comparator, Regenerative Comparator, Astable and Mono stable Multivibrators using Op-Amp, Triangular Wave Generator, Sine Wave Generators using Op-Amp (R.C. Phase Shift).	

Course Content	**UNIT – IV** **IC TIMERS:** 555 Timer, Astable and Monostable Modes. **PHASE LOCKED LOOPS:** Basic Principles, Lock and Capture Range, Voltage Control Oscillator (I.C.-566), PLL (I.C.-565) and P.L.L. Applications. **UNIT – V** **ACTIVE FILTERS:** Low Pass, High Pass and Band Pass Filters, State Variable Filters. **VOLTAGE REGULATORS:** Series Op-Amp Regulator, I.C. Voltage Regulators, I.C.-723 Regulator, Switching Regulators. **UNIT – VI** **ELECTRONIC DATA CONVERTERS:** Introduction, D.A.C.s-Weighted Resistor, R-2R and Inverted R-2R. **TYPES OF A.D.C.S:** Parallel Comparator Type, Counter Type, Successive Approximation and Dual Slope A.D.C.s, Specifications of D.A.C. and A.D.C.
Text Books and Reference Books	**TEXT BOOKS:** 1. D. Roy Choudary, Shail B. Jain, "Linear Integrated Circuits", New Age International Publishers, 2003. 2. Design of Analog Integrated Circuits by Sergio Franco. **REFERENCE BOOKS:** 1. J. Michael Jacob, "Applications and Design with Analog Integrated Circuits", PHI, EEE, 1997. 2. Ramkant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", LPE, 4th Edition, Pearson Education.
E-Resources	1. http://www.nptel.ac.in 2. http:/www.ebookee.com/linearintegratedcircuits.

17EE3103 – LINEAR CONTROL SYSTEMS

(Common to ECE and EEE)

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 - 0
Prerequisite:	Basics of Signals and Systems and Calculus	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The various types of control systems and methods to obtain transfer function. 2. The mathematical models of physical systems 3. Time domain responses of first and second-order systems for different input signals. 4. The stability of a control system using different techniques. 5. Frequency domain techniques to assess the system performance. 6. The different types of compensator for linear systems.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand control systems to obtain transfer function and reduction of block diagram using signal flow graph and modelling of electrical and mechanical systems
	CO2	Develop mathematical models of electromechanical systems and apply Mason's gain formula.
	CO3	Determine the time domain responses of first order systems for different input signals and RHC.
	CO4	Evaluate the stability of a control system using Root locus technique and determine the response of second-order systems.
	CO5	Apply frequency domain techniques polar, bode to assess the system performance and the design of Lag compensators.
	CO6	Design the Lead compensator for linear systems and apply frequency domain specifications by using Nyquist plots.
Course Content	**UNIT –I** **INTRODUCTION TO CLASSICAL CONTROL SYSTEMS:** Open loop and closed loop control systems- Types of feedback, Feedback and its effects- Transfer functions - block diagrams and their reduction- signal flow graphs - Masons gain formula. **UNIT-II** **MATHEMATICAL MODELING OF PHYSICAL SYSTEMS:** Mathematical modeling and transfer functions of electrical, mechanical and electro-mechanical elements - DC servo motors- two-phase A.C. servo motors – synchros. **UNIT-III** **TIME DOMAIN ANALYSIS:** Introduction, Standard test signals, Time response specifications – steady state error constants. **UNIT-IV** **STABILITY OF CONTROL SYSTEMS:** Routh-Hurwitz criterion- Root Locus – rules for the construction of root loci- Introduction to proportional, derivative and integral controllers.	

Course Content	**UNIT-V** **FREQUENCY DOMAIN ANALYSIS:** Introduction- Frequency domain specifications-Polar plots – Bode Plots- Nyquist stability criterion **UNIT-VI** **DESIGN OF COMPENSATORS:** Introduction - Need for compensators. Lag and lead compensators design in frequency domain.
Text Books and Reference Books	**TEXT BOOKS:** 1. "Control system Engineering" by I.J.Nagrath and M.Gopal, Wiley Eastern Ltd. 2. "Control Systems" by A. Nagoorkani RBA publishers 3. "Control Systems" by A. Anandkumar PHI publishers **REFERENCE BOOKS:** 1. "Automatic Control systems" by B.C.Kuo, PHI publishers. 2."Discrete Time Control Systems" by K.Ogata, Pearson education 3. "Control system Engineering" by NISE, Wiley, 2000.
E-Resources	1. http://nptel.ac.in/courses 2. http://iete-elan.ac.in 3. http://freevideolectures.com/university/iitm

17EC31P1 – PULSE & DIGITAL CIRCUITS LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Electronic Devices and Circuits, Pulse and Analog Circuits, Switching Theory and Logic design.	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The behaviour of various semiconductor devices. 2. The V-I characteristics of various semiconductor devices.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand function of logic gates and can implement logic circuits using gates.
	CO2	Implement the combinational logic circuits.
	CO3	Elucidate differences between synchronous and asynchronous circuits.
	CO4	Demonstrate linear and non-linear wave Shaping.
	CO5	Design Multivibrators.
	CO6	Design Schmitt Trigger
Course Content	**LIST OF EXPERIMENTS** 1. (a). Logic Circuits and Logic Gates (b). Realization of logic gates using NAND and NOR Gates 2. Full Adder and Full Subtractor 3. Decoder 4. Divide by N-Ripple Counter 5. Multiplexer 6. Divide by N-Synchronous Counter 7. RC-Differentiator and RC-Integrator 8. Diode Clippers and Clampers 9. Astable Multivibrator 10. Schmitt Trigger	

17EC31P2 – IC APPLICATIONS LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Analog Integrated Circuit Applications	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The basic applications of Op-Amp 2. The R-2R ladder network used as an A/D converter in interfacing between Analog and digital. 3. 555 Timer applications –in various timer circuits and Delay circuits.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Design Rectifiers without and with Filters (HWR, FWR, BR).
	CO2	Design various amplifier circuits using op-amp
	CO3	Design various oscillator circuits using op-amp
	CO4	Design regulator circuit using op-amp
	CO5	Design various feedback amplifier circuits using op-amp
	CO6	Determine the f_T of a given Transistor.
Course Content	**LIST OF EXPERIMENTS** 1. Function Generator using 8038 and 566 ICs. 2. Astable Multivibrator using Op-Amp & 555 Timers. 3. Comparator using Op-Amp. 4. Zero Crossing Detector using Op-Amp. 5. Ramp Generator using 555 Timers. 6. Op-Amp Frequency Response. 7. Narrowband Pass Filter. 8. Full Wave Rectifier using Op-Amp. 9. R-2R Ladder Network. 10. Window Detector. 11. Schmitt Trigger using Op-Amp.	

17SH31P1 – ADVANCED COMMUNICATION SKILLS LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	1 - 0 - 2
Prerequisite:	1. Knowledge of issues around the world, 2. Ability to use language in professional contexts, 3. Understand the importance of maintenance of good relationships	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected:	
	1.To understand the strategies of the interviews to facilitate better responses during the placements 2. To develop inter personal skills and be an effective goal oriented team player with idealistic, practical and moral values 3. What constitutes proper etiquette in a professional environment? 4. To equip with a wide range of vocabulary technically and perform better in tests like GRE, TOEFL etc 5. To understand Communication skills towards writing a persuasive resume	
Course Outcomes	Upon successful completion of the course , the students will be able:	
	CO1	Improve verbal proficiency and face competitive exams; GATE, GRE, TOEFL, GMAT.
	CO2	Develop group discussion skills viz verbal and nonverbal
	CO3	Develop intrapersonal and interpersonal relationship skills
	CO4	Prepare effective résumés and job applications.
	CO5	Face all types of interviews successfully and get jobs in different companies
	CO6	Improve personal and professional grooming, business dressing and telephonic skills

Course Content

LIST OF EXPERIMENTS

1. **Vocabulary Building** – Synonyms and Antonyms, Word roots, One-word Substitutes, Prefixes and Suffixes, Study of word origin, Analogy, Idioms and Phrases.
2. **Group Discussion** – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of voice, Body Language, Relevance, Fluency and Coherence.
3. **Intrapersonal & Interpersonal Relationship Skills** - Intrapersonal & Interpersonal Relationship Skills - To be an Effective Team Player
4. **Resume Writing** – Structure and Presentation, Planning, Defining the career Objective, Projecting ones strengths and Skill-Sets, Summary, Formats and Styles, Letter-Writing.
5. **Interview Skills** – Concept and Process, Pre-Interview Planning, Opening Strategies, Answering Strategies, Interview through Tele and Video-Conferencing.
6. **Corporate Etiquettes**- Dressing Etiquettes- Dining Etiquettes- Nonverbal Communication- Proximity of Place.

ELECTIVES-I

1. **VLSI DESIGN**
2. **COMPUTER ORGANIZATION**
3. **COGNETIVE RADIO**
4. **DATA STRUCTURES**

17EC31E1 – VLSI DESIGN

Course category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0- 0
Prerequisite:	Electronic Devices & Circuits, Linear & Digital ICs and Basics of IC Fabrication	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected:	
	1. To introduce the fundamental structures of VLSI Systems at the lowest levels of System abstraction. 2. To know the basic electrical properties of MOS & BI-CMOS circuits 3. To understand the Basic Circuit Concepts and design process of VLSI circuits and also to introduce the fundamental principles of VLSI circuit design. 4. To know the Gate level design and physical design by considering partioning, floor Planning, Placement and Routing. 5. To bring both Circuits and System views on design together by considering circuit Subsystems and VLSI Design styles. 6. To have a profound understanding of the design of complex digital VLSI circuits, computer aided simulation and synthesis tool for hardware design	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Know the trends in semiconductor technology, and how it impacts scaling and performance.
	CO2	analyze the basic electrical characterstics of MOS & BI-CMOS circuits
	CO3	Learn Layout, Stick diagrams, Fabrication steps, Static and Switching characteristics of inverters
	CO4	Estimate delay in circuits and knows routing techniques for clock and power
	CO5	Understand design styles in VLSI like full-custom, FPGA etc.
	CO6	Discriminate various faults in circuits and to develop fault-modeling synthesis.
Course Content	**UNIT-I** **INTRODUCTION:** IC fabrication - MOS, PMOS, NMOS, CMOS & Bi-CMOS Technologies - Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Probe testing, Integrated Resistors and capacitors. **UNIT-II** **BASIC ELECTRICAL PROPERTIES OF MOS & Bi-CMOS CIRCUITS:** I_{ds}-V_{ds} relationships, MOSFET threshold voltage, g_m, g_{ds}, ω_o, Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design Bi-CMOS inverters. **UNIT-III** **BASIC CIRCUIT CONCEPTS:** Sheet Resistance R_s and its concepts to MOS, Area Capacitance calculations, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-In and Fan-Out.	

Course Content	**VLSI CIRCUIT DESIGN PROCESSES:** VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2µm CMOS Design rules for wires, Contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and gates , Scaling of MOS circuits, Limitation of Scaling. **UNIT-IV** **GATE LEVEL DESIGN:** Logic gates and other Complex gates, Switch Logic, Alternate Gate circuits. **PHYSICAL DESIGN:** Floor- Planning, Placement, routing, Power delay estimation, Clock and Power routing **UNIT-V** **SUBSYSTEM DESIGN:** Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Counters, High density Memory Elements. **VLSI DESIGN STYLES:** Full-custom, Standard Cells, Gate-arrays, FPGAs and CPLDs and Design approach for Full Custom and Semi-Custom devices. **UNIT-VI** **VHDL Synthesis:** VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools. **TEST AND TESTABILITY:** Fault-modelling and simulation, test generation, design for testability, Built-in self-test.
Text Books and Reference Books	**TEXT BOOKS:** 1. Essentials of VLSI circuits and Systems – Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, PHI, 2005 Edition. 2. Principles of CMOS VLSI Design- Weste and Eshraghian, Pearson Education,1999 3. ASIC Design Flow by Smith. **REFERENCE BOOKS:** 1. D. Roy Chowdhury. Linear Integrated circuits, New Age International Edition(2003) 2. Modern VLSI Design-Wayne Wolf, Pearson Education, 3rd Edition 1997. 3. Introduction to VLSI Circuits and Systems – John. P. Uyemura. John Wiley, 2003. 4. Digital Integrated Circuits – John M. Rabaey, PHI.
E-Resources	1. http://nptel.ac.in/courses 2. http://tocs.ulb.tu-darmstadt.de/35621702.pdf 3. http://www.ulb.tu-darmstadt.de/tocs/23570458.pdf 4. http://www.academia.edu/download/30922844/L1-print.pdf

17EC31E2– COMPUTER ORGANIZATION

Course Category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3- 0 – 0
Prerequisite:	Switching Theory & Logic Design, basics of Digital Design	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The Register Transfer and Micro Operations 2. The Instruction cycle and various Interrupts. 3. The machine language, Assembly language and Micro Programmed Control. 4. The general Register, Stack Organization, Program Control, Pipeline and vector Processing. 5. The detailed information of I/O devices and their Interface, Data transfer and its modes, Priority Interrupt and D.M.A. 6. Types and Organization of memory; Multiprocessor characteristics and Inter Processor communication.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand registers transfers and arithmetic logic operations, which gives fundamental idea to know about Instruction codes and memory organization.
	CO2	Understand register transfer notations and micro operations, which gives a glance to learn Memory instructions and timing diagrams.
	CO3	Learn various micro programming languages, which gives an idea of instruction formats execution in CPU.
	CO4	Understand machine level languages, which emphasize the concept of addressing modes in register and stack organization.
	CO5	Learn several of modes of data transfer through IO interface in turn which uses various types of memory.
	CO6	Understand various data transfer communication using IO processor and classifies the hierarchy of memories.
Course Content	**UNIT-I** **REGISTER TRANSFER AND MICRO OPERATIONS:** register transfer, Bus and Memory transfers, Arithmetic micro operations. Logic micro operations, Shift micro operations, Arithmetic logic shift units. **UNIT-II** **BASIC COMPUTER ORGANIZATION AND DESIGN:** Instruction codes, Computer Registers and Instructions, Timing and Control, Instruction cycles, Memory reference Instructions, Input-Output and interrupt. **UNIT-III** **PROGRAMMING THE BASIC CONTROL:** Machine language, Assembly language, Assembler, Programming Arithmetic and logic operations, Subroutines.	

Course Content	**MICRO PROGRAMMED CONTROL:** Control memory, Address sequencing, Micro program example, Design of control unit. **UNIT-IV** **CENTRAL PROCESSING UNIT:** General register organization, Stack organization, Instruction formats, Addressing modes, Program control, R.I.S.C., Parallel processing, Pipelining, Arithmetic pipe-line, Instruction pipe-line. **UNIT-V** **INPUT – OUTPUT ORGANIZATION:** Peripheral devices, Input-Output Interface, Asynchronous Data Transfer. Modes of transfer, Priority interrupt, D.M.A., Input – Output Processor, Serial Communication. **UNIT-VI** **MEMORY ORGANIZATION:** Memory hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Characteristics of multi processors, Inter processor arbitration, Inter processor communication and Synchronization and Cache coherence.
Text Books and Reference Books	**TEXT BOOKS:** 1. "Computer System Architechture" 3/e M. Moris Mano PHI-I. 2. "Computer Organization" – V.C. Hemacher, Z.G. Vranesic and others Mc-Graw-Hill. **REFERENCE BOOKS:** 1. "Computer architecture and organization" – Hays& Briggs –P.H.I. 2. "Computer Organization" Willium stallings PHI.
E-Resources	1. http://nptel.ac.in/courses/106105085/4 2. http://nptel.ac.in/courses/106108052/1

17EC31E3 – COGNITIVE RADIO

Course category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Computer networks, basic concepts of embedded systems.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The spectrum scarcity problem and how cognitive radio deals with this problem. 2. The contribution of cognitive radio systems in wireless networks and its architectures that enable the development of the cognitive radio network (both Centralized and distributed). 3. The technologies to allow an efficient use of TVWS for radio communications Discussion about various cognitive radio standards. 4. The various research challenges for deployment of cognitive radio network. 5. The knowledge in issues in next generation wireless networks 6. The current research scenario in this field	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Identify fundamental issues regarding dynamic spectrum access and radio-resource management.
	CO2	Understand Essential functions of the software radio, architecture of SDR
	CO3	Demonstrate energy issues in cognitive radio.
	CO4	Understand principle of cognitive techniques and AI techniques
	CO5	Illustrate functions and design rules of cognitive radio
	CO6	Identify layer issues and design cross layer
Course Content	**UNIT I** **INTRODUCTION TO SOFTWARE DEFINED RADIO**: Definitions and Potential Benefits, Software defined Radio, Architecture, Evolution, Technology Tradeoffs and Architecture Implications. **UNIT II** **SDR ARCHITECTURE**: Essential Functions of The Software defined Radio, Basic SDR, Hardware Architecture, Computational Processing Resources, Software Architecture, Top Level Component Interfaces, Interface Topologies Among Plug And Play Modules. **UNIT III** **INTRODUCTION TO COGNITIVE RADIOS**: Marking Radio Self-Aware, Cognitive Techniques – Position Awareness, Environment Awareness in Cognitive Radios, Optimization of Radio Resources, Artificial Intelligence Techniques.	

Course Content	**UNIT IV** **COGNITIVE RADIO ARCHITECTURE:** Cognitive Radio – Functions, Components And Design Rules, Cognition Cycle – Orient, Plan, Decide and act Phases, Inference Hierarchy, Architecture Maps, Building the Cognitive Radio Architecture On Software Defined Radio Architecture. **UNIT V** **NEXT GENERATION WIRELESS NETWORKS**: The XG Network Architecture, Spectrum Sensing, Spectrum Management, Spectrum Mobility, Spectrum Sharing, Upper Layer Issues, Cross – Layer Design. **UNIT VI** **COGNITIVE TECHNIQUES: PHYSICAL AND LINK LAYERS:** Introduction, Optimizing physical and Link Layers for Multiple-Objectives, Under Current Channel Conditions, Defining the Cognitive Radio, developing Radio Controls (Knobs) and Performance Measures (Meters), multi object decision making Theory and Its Application to Cognitive Radio , The Multi-objective genetic algorithm for Cognitive Radios, Advanced GA Techniques ,Need for a Higher-Layer Intelligence.
Text Books and Reference Books	**TEXT BOOKS:** 1. Joseph Mitola III,"Software Radio Architecture: Object-Oriented Approaches To Wireless System Engineering", John Wiley & Sons Ltd. 2000. 2. Thomas W.Rondeau, Charles W. Bostain, "Artificial Intelligence in Wireless Communication", ARTECH HOUSE .2009. 3. Bruce A. Fette, "Cognitive Radio Technology", Elsevier, 2009. 4. Ian F. Akyildiz, Won – Yeol Lee, Mehmet C. Vuran, Shantidev Mohanty, "Next Generation / Dynamic Spectrum Access / Cognitive Radio Wireless Networks: A Survey" Elsevier Computer Networks, May 2006. **REFERENCES BOOKS:** 1. Simon Haykin, "Cognitive Radio: Brain –Empowered Wireless Communications", IEEE Journal on Selected Areas in Communications, Feb 2005. 2. Hasari Celebi, Huseyin Arslan, "Enabling Location And Environment Awareness In Cognitive Radios", Elsevier Computer Communications, Jan 2008. 3. Markus Dillinger, Kambiz Madani, Nancy Alonistioti, "Software Defined Radio", John Wiley, 2003.
E-Resources	1. http://www.nptel.ac.in. 2. http:/www.ebookee.com/ Cognitive Radio Communication and Networks.

17EC31E4 –DATA STRUCTURES

Course Category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Basics of mathematics and Logic with programming knowledge in C or any Language as optional.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. Familiar with basic techniques of data structures and programming development. 2. Master the implementation of linked data structures such as linked lists and binary trees. 3. Learn several sorting and searching techniques including quicksort, merge sort, heap sort, linear and binary search to application development 4. Exposure on graph theory to learn the basics of graph terminology and supporting traversals 5. Analyzing problems and writing program solutions to problems using above techniques	
Course Outcomes	Upon the successful completion of the course, the students will be able to:	
	CO1	Know the fundamentals of data structures, primitive data types and Programming development
	CO2	Learn and apply the utilization of arrays, Linked lists and supporting applications
	CO3	Study the basic linear data structures like stacks, queues and their applicability
	CO4	Study one of the non-linear data structure, types and properties to get the support for various application developments.
	CO5	Understand searching and sorting techniques and apply them for simple to complex applications
	CO6	Get the exposure on graph basics and its applicability in various domains
Course Content	**UNIT – I** **INTRODUCTION**: Overview on data structures, Data representations, Abstract data types, Data types, Primitive data types, Data Structure and structures types, Atomic types, Differences between ADTs, Data types and Data Structures, Refinement stages. **PRINCIPLES OF PROGRAMMING**: Software engineering, Program design, Algorithms, Different approaches to design algorithms, Structured programming and Recursion. **UNIT – II** **DATA STRUCTURE TYPES AND ARRAY BASICS**: Introduction to linear and nonlinear data structures, arrays, array operations, Single, double and multi-dimensional arrays. **LINKED LISTS**: Introduction, Dynamic memory allocation, Linked list operations, Doubly and circular linked lists.	

Course Content	**UNIT – III** **STACKS**: Introduction, Stack as ADT, Representation of stacks using arrays and linked lists, Applications, Stacks and recursion. **QUEUES**: Introduction, Queue as ADT, Representation of queues, Circular queues, Double ended queues, Priority queues, Applications. **UNIT – IV** **BINARY TREES**: Introduction to non-linear data structures, Overview on binary trees, types, Basic definitions and properties, Representation of binary trees, Operations and tree traversals. Applications. **UNIT – V** **SORTING**: Introduction, Bubble sort, selection sort, Quick sort, Insertion sort and Merge sort. **SEARCHING**: Introduction, Linear and Binary search techniques. **UNIT – VI** **GRAPHS**: Introduction, Terms associated with graphs, Sequential and linked list representations, Graph traversals, Spanning trees, Shortest path and Graph applications.
Text Books and Reference Books	**TEXT BOOKS:** 1. Data Structures using C by ISRD group, Tata Mc. Graw – Hill company ltd. **REFERENCE BOOKS:** 1. C & data structures / P.S. Deshpande, O.G. Kakde. Charles River Media, INC. 2. Classical Data Structures by Samanta debasis, Prentice Hall of India, 2nd edition. 3. Data structures using C by Reema Thareja, 2nd edition, Oxford University Press.
E-Resources	1. https://nptel.ac.in/courses 2. https://freevideolectures.com/university/iitm

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY: VIDYANAGAR

(AUTONOMOUS)

(AFFILIATED TO JNTU ANANTAPUR: ANANTHAPURAMU)

SPSR NELLORE DIST

III YEAR OF FOUR YEAR B.TECH DEGREE COURSE – II SEMESTER

ELECTRONICS AND COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the academic year 2017-2018)

(For the batch admitted in the academic year 2017-2018)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation									
							Sessional-I Marks			Sessional-II Marks			Total Sessional Marks(40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Test$^{\$}$-I	A$^{\#}$-I	Max. Marks	Test$^{\$}$-II	A$^{\#}$-II	Max. Marks		Duration In Hours	Max. Marks	100
1	17EC3201	Digital Communication	2	2	-	3	34	6	40	34	6	40	0.8*Best of two+0.2* least of two	3	60	100
2	17EC3202	Microwave Techniques	2	2	-	3	34	6	40	34	6	40		3	60	100
3	17EC3203	Electronic Measurements & Instrumentation	2	2	-	3	34	6	40	34	6	40		3	60	100
4	17EC3204	Embedded Systems & IOT	2	2	-	3	34	6	40	34	6	40		3	60	100
5	17EC3205	Data & Computer Communication	2	2	-	3	34	6	40	34	6	40		3	60	100
6	17EC32EX	Elective-II	3	0	-	3	34	6	40	34	6	40		3	60	100
		PRACTICALS	**PRACTICALS**										Day to Day Evaluation and a test (40 Marks)			
7	17EC32P1	MP & MC Lab	-	-	3	2	-	-	-	-	-	40		3	60	100
8	17EC32P2	Digital Communication Lab	-	-	3	2	-	-	-	-	-	40		3	60	100
9	17EC32P3	Digital Signal Processing Lab	-	-	3	2	-	-	-	-	-	40		3	60	100
10	17EC32MP	Mini Project	-	-	-	2	-	-	-	-	-	-	-	-	-	-
11	17AC3201	Audit Course	-	-	-	0	-	-	-	-	-	-	-	-	-	-
		TOTAL	13	10	09	26	-	-	-	-	-	360	-	-	540	900

**Common to ECE, EEE, CSE, IT

***** Common to ECE, EEE

A for Assignment (continuous evaluation) $ Test (Descriptive & Objective) duration = 2 Hours

17EC3201-DIGITAL COMMUNICATION

Course Category:	Program Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	2-2-0
Prerequisite:	Random Signals and Stochastic Processes- Analog Communication	**Sessional Evaluation:** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to:	
	1. Understand basic components of digital communication system 2. Apply suitable pulse code modulation schemes and coding for various applications. 3. Understand transmission and detection of digital carrier modulation schemes. 4. Analyze error performance of a digital communication system in presence of noise and other interferences. Design of band limited signals for no Inter Symbol Interference (I.S.I.) and controlled I.S.I and understand various M-ary signaling schemes. 5. Understand various information theory techniques. 6. Prepare mathematical background for communication signal analysis and learn techniques for encoding and decoding of different digital codes.	
Course Outcomes	After completing the course the student will be able to	
	CO1	Describe each block in PCM with help of digital communication system
	CO2	Derive signal to noise ratio in different digital modulation schemes and explain Bandwidth-S/N trade off.
	CO3	Characterize Band Limited Channels and explain generation and Reception of ASK signals.
	CO4	Acquire knowledge of I.S.I. and different Shift Keying techniques.
	CO5	Gain knowledge of coding efficiency of Shannon fano coding technique.
	CO6	Acquire knowledge of encoding and decoding of cyclic code and channel capacity theorem.
Course Content	**UNIT – I** **ELEMENTS OF DIGITAL COMMUNICATION SYSTEMS**: Model of Digital Communication Systems- Digital Representation of Analog Signal- Certain issues in Digital Transmission- Advantages of Digital Communication Systems- Bandwidth-S/N trade off- Hartley Shannon Law- Sampling Theorem. **UNIT – II** **PULSE CODE MODULATION:** PCM Generation and Reconstruction- Quantization noise- Non uniform Quantization and Companding- DPCM- DM and Adaptive DM. Noise in PCM and DM. **UNIT – III** **DIGITAL CARRIER MODULATION TECHNIQUES:** Introduction- ASK Modulator and Demodulator- Coherent and Non-Coherent FSK- BPSK- Coherent PSK Detection- QPSK- Differential PSK.	

Course Content	**UNIT – IV** **BASEBAND TRANSMISSION AND OPTIMAL RECEPTION OF DIGITAL SIGNAL:** **BASEBAND DATA TRANSMISSION:** Characterization Of Band Limited Channels – Design of band limited signals for no Inter Symbol Interference (I.S.I.) – The Nyquist criterion –Design of band-limited signals with controlled I.S.I. **BASEBAND SIGNAL RECEIVER:** Optimum- Matched Filters and Correlator - Transmitting & Receiving Filters for Optimum Performance. **M-ARY SIGNALLING SCHEMES**: Binary Vs M-ary – Equalization schemes – Eye diagrams. **UNIT – V** **INFORMATION THEORY:** Information and entropy- conditional entropy and redundancy- Shannon Fano coding- Mutual Information- Information loss due to noise- source codings - Bandwidth-S/N Trade off-Huffman Code- variable length coding- Source coding to Increase average Information per bit. Lossy source coding. **UNIT – VI** **ERROR CONTROL CODING** **LINEAR BLOCK CODES:** Matrix description of Linear Block Codes- Error detection and error Correction capabilities of linear block codes. **HAMMING CODES:** Error detection and error Correction capabilities of Hamming codes. **CYCLIC CODES:** Algebraic Structure – Encoding Using Shift Register – Syndrome Calculation Decoding.
Text Books and Reference Books	**TEXT BOOKS:** 1. Digital Communication - Simon Haykin- Jon Wiley- 2005. 2. Digital and Analog Communicator Systems - Sam Shanmugam- John Wiley- 2005. **REFERENCE BOOKS:** 1. Principles of communication systems - Herbert Taub. Donald L Schiling- Goutam Sana- 3rd Edition-McGraw-Hill- 2008. 2. Communication Systems- Analog & Digital –R. P. Singh & S.D. Sapre- T.M.H. Publishers 3. Digital Communications - John G. Proakis. Masoud salehi – 5th Edition- McGraw-Hill- 2008.
E-Resources	1. http://www.nptel.ac.in. 2. http:/www.ebookee.com/digitalcommunicationsystems.

17EC3202 – MICROWAVE TECHNIQUES

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 - 0
Prerequisite:	Electro Magnetic Fields & Waves, Antenna & wave Propagation.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected:	
	1. To understand the operation of Klystron amplifier, Reflex Klystron oscillator, Travelling Wave Tube amplifier and Magnetron oscillators. 2. To study the operation of different microwave semiconductor devices like Tunnel diode, Gunn diode, IMPATT diode, Schottkey Barrier diode, PIN diode and varactor diodes. 3. To understand different microwave components like Resonators, attenuators, TEEs, Directional couplers, Isolators and S-parameters of networks. 4. To study the measurement of frequency, VSWR, impedance, S-parameter and 'Q' of a cavity. 5. To study parabolic reflector antenna, Horn and Lens antennas. 6. To study Hybrid MICs, strip lines, micro strip lines	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Demonstrate the Magnetron and tunnel diode as oscillator.
	CO2	Derive the power efficiency in parametric amplifier and klystron amplifier.
	CO3	Understand the measurement of impedance using Microwave TEEs.
	CO4	Measure various parameters like power, VSWR at microwave frequencies with the help of various microwave components.
	CO5	Design Parabolic antenna and explain MIC.
	CO6	Understand the fabrication technique of MICs and radiation pattern of Horn Antenna.
Course Content	**UNIT-I** **MICRO WAVE TUBES:** Klystron Amplifier, Reflex Klystron Oscillator, Travelling Wave Tube Amplifier and Magnetron Oscillator. **UNIT-II** **MICROWAVE SEMOCONDUCTOR DEVICES:** Tunnel Diode, Gunn Diode, IMPATT Diode, PIN Diode, SchottKey Barrier Diode, Varactor Diode and Parametric Amplifier, MASER. **UNIT-III** **MICROWAVE COMPONENTS:** Waveguides, Cavity Resonators, Attenuators, TEEs, Bends, Corners, Windows, Phase Shifters, Directional Couplers, Matching elements, Isolators, Circulators, S-Parameters of Networks.	

Course Content	**UNIT-IV** **MICROWAVE MEASUREMENTS:** Measurement of Frequency, Power, VSWR, Impedance, Reflection Coefficient, Attenuation Constant and Dielectric Constant, S-parameters, 'Q'- of a Cavity. **UNIT-V** **MICROWAVE ANTENNAS:** Parabolic Reflector Antenna, Passive Reflector Antenna, Helical antenna, Horn and Lens Antennas **UNIT-VI** **MICs:** Fabrication of MICs, Advantages of MICs, Hybrid MICs, Strip Lines, and Microstrip Lines, Monolithic MICs
Text Books and Reference Books	**TEXT BOOKS:** 1. Samuel Y Liao, "Microwave Devices and Circuits", Prentice Hall, 1999. 2. M. Kulkarni, "Microwave and Radar Engineering", Umesh Publications, 1998. 3. Annapurna Das and Sisir K. Das, "Microwave Engineering", TMH, 2000 **REFERENCE BOOKS:** 1. D. C. Dube, "Microwave Devices and Applications", Narosa Publications, 2011. 2. David M. Pozar, "Microwave Engineering", IE, 1997. 3. Robert E. Collin, "Foundations for Microwave Engineering", John Wiley and Sons, 2007
E-Resources	1. http://nptel.ac.in/syllabus/117105029/ 2. https://www.youtube.com/user/nptelhrd

17EC3203 – ELECTRONIC MEASUREMENTS & INSTRUMENTATION

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2-2 - 0
Prerequisite:	Electronic Devices and Circuits, Pulse and Analog Circuits, Signals & Systems	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The various standards and units of measurements, electronic instruments, their construction, applications, and principles of operation. 2. The internal structure of analog and digital instruments that are used in measuring parameters and also difference between analog meters and digital meters and their performance characteristics. 3. The importance of different waveforms and their generation. 4. The functioning of CRO including digital oscilloscope and its operation. 5. The measurement using bridges for resistances, inductance and capacitances. 6. Different type of sensors and transducers and their application.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Explain various performance characteristics of instruments like accuracy, sensitivity, resolution and speed of response and their importance in meters.
	CO2	Design basic meters with good performance characteristics.
	CO3	Generate various signals using signal generators and harmonic distortion analyzer with the help of oscilloscope.
	CO4	Analyse the waveforms and signals with the help of digital oscilloscope.
	CO5	Understand precision measurement techniques to measure resistance, capacitance using different transducers.
	CO6	Identify the transducers for various applications like to measurement of force, voltage, and speed with the help of bridges.
Course Content	**UNIT-I** **PERFORMANCE CHARACTERISTICS OF INSTRUMENTS**: Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error. **UNIT-II** **METERS:** D.C. Voltmeters- D.C. Ammeters Multi range, Range extension, A.C. voltmeters- multi range, range extension, Ohmmeters - series type, shunt type, Multimeter for Voltage, Current and resistance measurements. **UNIT-III** **FIXED AND VARIABLE SIGNAL GENERATORS**: AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzer.	

Course Content	**UNIT-IV** **OSCILLOSCOPES**: C.R.T. features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, triggered sweep C.R.O., Dual beam C.R.O., Measurement of Amplitude and Frequency, Dual Trace Oscilloscope, Sampling Oscilloscope, Storage Oscilloscope, Digital Readout Oscilloscope, Digital Storage Oscilloscope, Lissajous method of frequency measurement, standard specifications of C.R.O., Frequency counter, Time and Period measurement. **UNIT-V** **BRIDGE MEASUREMENT:** Wheatstone bridge, Measurement of Resistance, A.C. Bridges, Measurement of inductance- Maxwell's bridge, and Measurement of capacitance - Schering Bridge. Errors and precautions in using bridges, Q-meter. **UNIT-VI** **TRANSDUCERS:** Active & Passive transducers : Resistance, Capacitance, Inductance; Strain gauges, L.V.D.T., Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors. Measurement of physical parameters force, Pressure, Velocity, Humidity, Moisture, Speed, Proximity and Displacement. Data acquisition systems.
Text Books and Reference Books	**TEXT BOOKS:** 1. Modern Electronic Instrumentation and Measurement Techniques – A. D. Helfrick and W. D. Cooper, P.H.I., 5th Edition, 2002. 2. Electronic instrumentation, second edition - H. S. Kalsi, Tata McGraw Hill, 2004 **REFERENCE BOOKS:** 1. Electronic Instrumentation & Measurements - David A. Bell, P.H.I., 2nd Edition, 2003. 2. Electronic Test Instruments, Analog and Digital Measurements - Robert A. Witte, Pearson Education, 2nd Ed., 2004.
E-Resources	1. http://www.nptel.ac.in. 2. http:/www.ebookee.com/electronicmeasurementand instrumentation.

17EC3204 – EMBEDDED SYSTEMS & IOT

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2- 0
Prerequisite:	Microcontrollers and Microprocessors, C-Programming.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

<table>
<tr><td>Course Objectives</td><td colspan="2">Students undergoing this course are expected to understand:
1. the basic idea regarding the nature of embedded systems.
2. the advantages of using Aurdino and MSP430 microcontrollers in Embedded and IoT applications.
3. basics of MSP430 controller.
4. skill in simple program writing for MSP430 and applications.
5. basics of IoT concepts.
6. different Wireless services to access/control IoT devices.</td></tr>
<tr><td rowspan="7">Course Outcomes</td><td colspan="2">After completing the course the student will be able to understand:</td></tr>
<tr><td>CO1</td><td>the selection procedure of Processors in the Embedded domain.</td></tr>
<tr><td>CO2</td><td>how Embedded Systems can be developed on Arduino and MSP430.</td></tr>
<tr><td>CO3</td><td>the internal architecture and organization of MSP430.</td></tr>
<tr><td>CO4</td><td>the interfacing techniques to MSP 430 and can design and implement programs on MSP430 controller.</td></tr>
<tr><td>CO5</td><td>the application areas of IoT.</td></tr>
<tr><td>CO6</td><td>Develop Wireless Technologies to access/control IoT devices.</td></tr>
<tr><td>Course Content</td><td colspan="2">UNIT-I
INTRODUCTION TO EMBEDDED SYSTEMS: Introduction, Hardware and Software requirements, Processor selection, categories of embedded system, applications of embedded systems. Development Process: Development process of embedded systems, linkers and locators
UNIT – II
INTRODUCTION TO AURDINO AND MSP430:
ARDUINO: AVR Family with Arduino ATMega 328- Interfaces - Arduino IDE – Programming – Interfacing LED- Interfacing LED and Switch with Arduino.
MSP430: Introduction, Features of MSP430, Architecture of MSP430, Exceptions, Addressing Modes of MSP430, Instruction Set, Interrupts, Timers.
UNIT – III
MSP430 I/O REGISTERS AND MODES: I/O ports pull up/down registers concepts, Interrupts and interrupt programming. Watchdog timer. System clocks. Low Power aspects of MSP430: low power modes, Active vs Standby current consumption, FRAM vs Flash for low power & reliability.</td></tr>
</table>

Course Content	**UNIT – IV** **MSP430 INTERFACING:** Timer & Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430, data transfer using DMA. **UNIT – V** **INTRODUCTION TO IOT:** Definition & Characteristics of IoT, Physical design, Logical design, IoT Enabling Technologies, IoT Levels and Deployment Templates, IoT vs M2M. **UNIT-VI** **WIRELESS TECHNOLOGIES FOR IOT (LAYER 1 & 2):**WiFi (IEEE 802.11), Bluetooth/Bluetooth Smart, ZigBee/ZigBeeSmart , UWB (IEEE 802.15.4).
Text Books and Reference Books	**TEXT BOOKS :** 1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hil. 2. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014. 3. MSP430 microcontroller basics. John H. Davies, Newnes Publication, I st Edition. 4. Vijay Madisetti, ArshdeepBagha,"Internet of Things A Hands-On- Approach",2014, ISBN:978-1-118-43062-0 **REFERENCE BOOKS :** 1. Adrian McEwen, "Designing the Internet of Things", Wiley Publishers. 2. Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014. 3. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 4. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 5. Editors OvidiuVermesan Peter Friess,'Internet of Things – From Research and Innovation to Market
E-Resources	1. http://processors.wiki.ti.com/index.php/MSP430_LaunchPad_Low_Power_Mode 2. http://processors.wiki.ti.com/index.php/MSP430_16-Bit_UltraLow_Power_MCU_Training 3. nptel.ac.in/courses

17EC3205 – DATA & COMPUTER COMMUNICATION

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2- 0
Prerequisite:	Data types, Communication theory, basics of computer networks	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. Data networks, communication model with protocols and architecture. Data Transmission with signal encoding and error correction and detection techniques. 2. Link control techniques and various multiplexing techniques for efficient data transmission. 3. Types of networks and their standards (LAN, WAN, Bluetooth etc.,). 4. Advanced protocols like IPV6 and internet applications.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship. Able to differentiate among and discuss the four levels of addresses (physical, logical, port and specific used by the Internet TCP/IP protocols)
	CO2	Distinguish between the different types of bit errors and can explain the concept of bit redundancy and how it is generally achieved in the facilitation of error detection and the main methods of error correction
	CO3	Understand the basic concepts of data logical link control; can discuss logical link control with reference to framing, flow and error control, software implemented protocols (for the noiseless and noisy channel) to facilitate reliable inter-node transmission of frames; and show the ability to compare and contrast high-level data link control protocol and point-to-point protocol (HDLC, PPP)
	CO4	Understand the LAN's with IEEE standards and specifications
	CO5	Understand the Internetworking principles and how the Internet protocols IP, IPv6, demonstrate the mechanics associated with IP addressing, device interface, association between physical and logical addressing
	CO6	Identify the requirements for a high-order communication systems Demonstrate the ability for effective verbal communication.
Course Content	**UNIT I** **DATA COMMUNICATIONS, DATA NETWORKS AND THE INTERNET**: Data Communications and Networking for Todays Enterprise, A Communications Model, The Internet, The Need for a Protocol Architecture, The TCP/IP Protocol Architecture, Standardization within a Protocol Architecture, Traditional Internet-Based Applications, Multimedia. **UNIT II** **DATA TRANSMISSION**: Concepts and Terminology, Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity, Signal Encoding Techniques: Digital Data, Digital Signals; Analog Data, Analog Signals, Types of	

Course Content	Errors, Error Detection and Correction, Error Detection with parity Check, Cyclic Redundancy Check (CRC) and Forward Error Correction. **UNIT-III** **DATA LINK CONTROL PROTOCOLS:** Flow Control, Error Control, High-Level Data Link Control (HDLC), Multiplexing: Frequency-Division Multiplexing, Synchronous Time-Division Multiplexing, Asymmetric Digital Subscriber Line, xDSL. **WIDE AREA NETWORKS (WAN):** Introduction, Switched Communications Networks, Circuit-Switching Networks, Soft switch Architecture, Packet-Switching Principles. **UNIT-IV** **LOCAL AREA NETWORKS**: Overview, Bus and Star Topologies, LAN Protocol Architecture, Bridges, Hubs and Switches, Ethernet: Traditional Ethernet, High-Speed Ethernet, Digital Signal Encoding for LANs, Wireless LANs: Overview, IEEE 802.11 Architecture and Services. **UNIT-V** **INTERNET PROTOCOLS:** Principles of Internetworking, Internet Protocol Operation, Internet Protocol, IPv6. **TRANSPORT PROTOCOLS:** Connection-Oriented Transport Protocol Mechanisms, TCP, UDP, Wireless Networks: Fixed Broadband Wireless Access, WiMAX/IEEE 802.16, Bluetooth. **UNIT-VI** **INTERNET APPLICATIONS**: Electronic Mail: SMTP and MIME, Internet Directory Service: DNS, Web Access: HTTP, Internet Multimedia Support: Real-Time Traffic, Voice Over IP, Real-Time Transport Protocol (RTP).
Text Books and Reference Books	**TEXT BOOKS**: 1. Data & Computer communication by William Stallings, Pearson education 9th edition, 2014. 2. Data communications & networking by Forouzon 4th edition. **REFERENCE BOOKS :** 1. Introduction to Data communications & networking by Wayne Tomasi Pearson education 4th edition 2005. 2. Computer networks by Andrew. S. Tanenbaum 3rd edition.
E-Resources	1. https://nptel.ac.in/courses/106105082

17EC32P1 – MP & MC LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Basic knowledge in programming C, knowledge in microprocessors and programming	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The features of the software tool – T.A.S.A.M. simulator. 2. The arithmetic and data transfer instructions of 8086. 3. The various hardware modules to be interfaced with µp and µc. 4. The interfacing knowledge with Microprocessor kit 5. How to develop the ALP for simple logical and arithmetic operations. 6. Develop assembly language programs for various applications using 8051µc.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Set up programming strategies and select proper mnemonics and run their program on the training boards.
	CO2	Acquire interfacing knowledge with microprocessor kit.
	CO3	Design the high speed communication circuits using serial bus connection
	CO4	Use a commercial C.P.U.(s) as realistic vehicles to demonstrate these concepts by introducing students to C.P.U. instructions and internal register structures
	CO5	Understand the full internal workings of a typical simple C.P.U. including the utilization of the various hardware resources during the execution of instructions.
	CO6	Develop testing and experimental procedures on Microprocessor and Microcontroller analyse their operation under different cases.

Course Content

LIST OF EXPERIMENTS

1. Summation & Block Transfer of Data
   a) Write and execute 8086 to add the given series of B.C.D. numbers and show the result.
   b) Write and execute 8086 A.L.P. to transfer a Block of data from one memory area to another memory area.
   c) Write and execute 8086 A.L.P. to perform the following multiplications.
      1) Repeated addition
      2) Using SHIFT and ADD instruction
   d) Write and execute 8086 A.L.P. to perform the following.
      1)Binary division
      2)B.C.D. division

2. Searching & Sorting Data
   a) Write and execute 8086 A.L.P. to find the minimum and maximum number from a given data array
   b) Write and execute 8086 A.L.P. to arrange the given data array in ascending order and descending order

Course Content	3. Logic Controller Module Write and execute 8086 A.L.P. to design the logical expression using Logic controller interface module 4. Stepper Motor Module Write and execute 8086 A.L.P. to rotate a stepper motor either in clockwise direction or in anticlockwise direction and to control the speed of rotation 5. Serial Input Display Unit Module(S.I.D.U.) Write and execute 8086 A.L.P. to display the desired word in a display of serial input display unit interface module 6. Parallel Input Display Unit Module (P.I.D.U.) Write and execute 8086 A.L.P. to design an up and down counter using P.I.D.U. Interface module 7. Digital to Analog Converter Interface Module Write and execute 8086 A.L.P. to generate given waveform through C.R.O. using D.A.C. 8. Arithmetic & Logical operations using 8051. 9. (a) To find smallest number from given array of numbers using 8051. (b) To find largest number from given array of numbers using 8051. 10. Programming using arithmetic, logical and bit manipulation instructions of 8051.
Reference Books	1. A K Ray and K M Bhurchandi, "Advanced Microprocessors & Peripherals", 2nd ed., TMH, 2006. 2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, "The 8051 microcontroller and embedded systems", Pearson education, 2004.

17EC32P2-DIGITAL COMMUNICATION LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Analog Communication, Digital Communication	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. Analog signal sampling and re- construction. 2. Different modulation and demodulation schemes.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Modulate and demodulate a message Signal with a high frequency carrier using DM.
	CO2	Modulate and demodulate a message Signal with a high frequency carrier using PCM
	CO3	Understand signal sampling and re- construction
	CO4	Understand time division multiplexing & demultiplexing
	CO5	Know the different shift keying methods.
	CO6	Understand the encoder and decoders of Linear Block Codes.
Course Content	**LIST OF EXPERIMENTS** 1. Verifying Sampling Theorem 2. Time Division Multiplexing and Demultiplexing 3. Pulse Code Modulation and Demodulation 4. Differential Pulse Code Modulation and Demodulation 5. Companding 6. Delta Modulation and Demodulation 7. Amplitude Shift Keying Modulation and Demodulation 8. Frequency Shift Keying Modulation and Demodulation 9. Binary Phase Shift Keying Modulation and Demodulation 10. Differential Phase Shift Keying Modulation and Demodulation 11. Linear Block Code-Encoder and Decoder 12. Binary Cyclic Code- Encoder and Decoder	

17EC32P3 – DIGITAL SIGNAL PROCESSING LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Signals and system, digital signal processing and digital image processing.	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. Basic operations varies filters and images. 2. Verification of various systems.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Generate various filters using MAT lab.
	CO2	Find the Inverse z-transform using residue method.
	CO3	Perform linear convolution and cross correlation of two sequences.
	CO4	Compute the DFT and IDFT of a given sequence.
	CO5	Perform linear convolution using DFT
	CO6	Design digital band pass and band stop filters.
Course Content	**LIST OF SIGNAL PROCESSING EXPRIMENTS** 1. Generation of discrete time signals like sine, cosine, exponential, square and sawtooth 2. Perform linear convolution and cross correlation of two sequences. 3. Constant co-efficient difference equation. 4. Computation of the DTFT of a given sequence x (n). 5. Computation of the DFT and IDFT of a given sequence. 6. Computation of the efficiency of FFT algorithm with the DFT algorithm. 7. Linear convolution using DFT. 8. Inverse Z-transform using residue method. 9. Design Chebyshew digital low pass filter using bilinear transformation. 10. Design a Butterworth digital low pass filter. 11. Design FIR digital low pass filter. 12. Design digital band pass filter. 13. Design digital band stop filter.	

ELECTIVES-II

1. **PRINCIPLES OF MODERN RADAR SYSTEMS**
2. **MACHINE LEARNING**
3. **IC FABRICATION TECHNOLOGY**
4. **OPTOELECTRONICS**

17EC32E1 – PRINCIPLES OF MODERN RADAR SYSTEMS

Course category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0- 0
Prerequisite:	Analog and digital communication systems, Microwave techniques and Radiating systems.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to: 1. Analyze the fundamentals of radar block diagram and range equation. 2. understand different components of radar system. 3. know types of radar systems. 4. illustrate Radar detection techniques. 5. learn special radars. 6. understand fundamentals ECM and ECCM.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand the components of a radar system and their relationship to overall system and measure of performance.
	CO2	Analyze the performance of radar components.
	CO3	Familiarized in different radar systems.
	CO4	Develop skills in designing Radar systems in different noise environments.
	CO5	Demonstrate knowledge in special radars.
	CO6	Describe the fundamentals ECM and ECCM.
Course Content	**UNIT-I** **THE NATURE OF RADAR**: The simple form of the Radar equation, Radar block diagram and operation, Radar frequencies and Applications of Radar. Minimum Detectable signal, Receiver noise, Probability Density Functions, Signal to Noise Ratio, Integration of Radar pulses, Radar Cross Section of Targets, Cross section fluctuations, Pulse Repetition Frequency and Range Ambiguities. **UNIT-II** **RADAR COMPONENTS**: Klystron Power Amplifier, Travelling Wave Tube, Magnetron Oscillator, Cross Field Amplifier, Modulators, Mixers: Conversion Loss, Noise Figure, Balanced mixer, Image recovery mixer, Duplexers: Branch type, Balanced type and Solid State Duplexers, limiters, Displays: CRT Display, A,B,C,D Scopes, PPI and RHI. **UNIT-III** **RADAR SYSTEMS**: Doppler Effect, Simple CW Radar, FM-CW Radar, MTI Radar: Delay line Cancellers, Blind speeds, Range Gated Doppler Filters, Limitations and types of MTI radars. **TRACKING RADAR**: Sequential Lobbing, Conical Scanning and Monopulse Tracking, Tracking in Range.	

Course Content	**UNIT- IV** **RADAR DETECTION TECHNIQUES:** Coherent & Non-Coherent Detection – Matched Filters-Different methods of Integration of Pulse Trains – Detection of Fluctuating Targets – Fluctuation laws – Diversity gain – Binary Integration of Fluctuation Targets – Cumulative Integration of Fluctuating Targets – Sequential Detection with Rapid Confirmation – Constant False Alarm Rate Detection – Cell Averaging – Two Parameter Averaging & Non-Parametric Averaging. **UNIT-V** **SPECIAL RADARS:** Bi-Static Radar – Synthetic Aperture Radar – HF Over The Horizon Radar –Air Surveillance Radar– Height Finder & 3D radar. **UNIT-VI** **RADAR ELECTRONIC COUNTER MEASURES (ECM) AND ELECTRONIC COUNTER-COUNTER MEASURES (ECCM):** Noise Jamming of Surveillance Radar – Detection Range in Noise Jamming – ECCM Provisions for Surveillance Radar – Objective of ECM.
Text Books and Reference Books	**TEXT BOOKS:** 1. David. K. Barton-"Modern Radar Systems"- Artech House INC 1988. 2. Introduction to Radar Systems-Merrill. I. Skolnik, TMH, 2nd Edition, 2007. 3. Radar: Principles, Technology and Applications-Byron Edde, Pearson Education, 2004. **REFERENCE BOOKS:** 1. Microwave and Radar Engineering- M. Kulakarni, Umesh Publications, 4th Edition, 2012. 2. Hamish. D. Meikle- "Modern Radar Systems" - Artech House INC 1988. David. K. Barton-"Radar system Analysis & Modeling" - Artech House INC 2003.
E-Resources	1. https://www.ll.mit.edu/outreach/introduction-radar-systems 2. http://lej4learning.com.pk/videos-introduction-to-radar-systems-mit/

17EC32E2 – MACHINE LEARNING

Course category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0- 0
Prerequisite:	Probability Theory and Linear Algebra.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected:	
	1. To introduce fundamental concepts in machine learning and popular machine learning algorithms. 2. To become familiar with the fundamentals of Supervised Learning techniques 3. To understand & analyze various Unsupervised Learning techniques. 4. To acquire knowledge on principles and techniques of Artificial Neural Networks. 5. To understand different types of Perceptron. 6. To have a profound understanding of Computational Learning Theory.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand the fundamental principles, techniques and applications of Machine Learning.
	CO2	Design and implement machine-learning solutions to classification, regression and clustering problems.
	CO3	Evaluate and interpret the results of the Unsupervised Learning techniques.
	CO4	Design the neural network to meet the needs of control systems and pattern classification issues.
	CO5	Recognize and Implement various ways of selecting suitable model parameters for different Machine Learning techniques.
	CO6	Gain the knowledge of Computational Learning Theory.
Course Content	**UNIT – I** **MACHINE LEARNING**: Introduction, Review of Probability Theory and Linear Algebra, Basic definitions of machine learning, types and applications of machine learning, hypothesis space and inductive bias, evaluation, cross-validation. **UNIT - II** **SUPERVISED LEARNING:** Introduction, Linear methods for classification, Linear methods for regression, Support Vector Machine, SVM- the dual formulation, SVM- the maximum margin with noise, Decision trees, over fitting. **UNIT – III** **UNSUPERVISED LEARNING:** Introduction, Instance based learning: K- Nearest neighbour, Feature selection, Feature Extraction, Collaborative filtering based recommendation, Bayesian learning, Naïve Bayes, Bayesian network, Kernel functions, Non-linear SVM with kernel function.	

Course Content	**UNIT – IV** **NEURAL NETWORKS:** Introduction, Biological neurons, Artificial neurons, Mc.Culloch-Pitts model, Neuron Modelling for artificial neural systems, Feed forward network, Feedback network, Types of neural networks. **UNIT – V** **PERCEPTRON:** Introduction, Exclusive OR problem, Single layer perceptron network, Multilayer feed forward networks, Pattern classification, Delta learning rule for multilayer perceptron, Error back propagation algorithm. **UNIT - VI** **COMPUTATIONAL LEARNING THEORY:** Introduction, PAC learning model, Sample complexity, VC Dimension, Ensemble learning, Introduction to Clustering, k-means clustering, adaptive hierarchical clustering.
Text Books and Reference Books	**TEXT BOOKS:** 1. Mitchell Tom, Machine Learning, McGraw Hill, 1997. 2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer 2006. 3. Jacek M. Zurada, Introduction to Artificial Neural Systems, Jaico Publications. **REFERENCE BOOKS:** 1. Richard O. Duda, Peter E. Hart, David G. Stork. Pattern classification (2nd edition). Wiley, New York, 2001. 2. Nikola K.Kasabov, Foundations of Neural Networks, Fuzzy Systems and Knowled Engineering (The MIT Press)
E-Resources	1. https://onlinecourses.nptel.ac.in/noc18_cs40 2. http://nptel.ac.in/courses/108104049/13

17EC32E3 – IC FABRICATION TECHNOLOGY

Course category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Electronic Devices & Circuits, Switching Theory & Logic Design, Analog IC Applications, Digital Design, VLSI Design.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The fundamental process involved in IC fabrication and able to describe the CMOS and Bi-CMOS IC Fabrication Process 2. The modelling of resistor and capacitor in IC fabrication considering the parasitic effects and design rules 3. The gate structures, Network layout design and sequential machines 4. The gain adequate knowledge on subsystems and physical design 5. The floor planning, touting, distribution 6. The automatic test pattern generator and BIST.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand the fundamental process involved in IC fabrication process and Model resistor and capacitor in IC fabrication and understand transistor parasitic, stick diagrams
	CO2	Describe the CMOS and BiCMOS IC Fabrication Process and SCMOS design rules.
	CO3	Understand the gate structures and sub systems
	CO4	Design sequential machines and 4-bit arithmetic processor.
	CO5	Gain adequate knowledge on floor planning and Testing and Testability
	CO6	Design channel distribution and BIST and ATPG
Course Content	**UNIT-I** **FUNDAMENTALS OF IC FABRICATION PROCESS:** Preparation of EGS, Crystal growing, Wafer preparation, Epitaxy, Oxidation, Photolithography, Diffusion, Metallization, CMOS fabrication-p-well process, n-well process, twin-tub process. Bi-CMOS fabrication. IC design techniques-Hierarchical design and design abstraction. **UNIT-II** **DEVICES AND LAYOUT:** Sheet resistance. Area capacitance. Delay unit τ. MOS Transistors - Structure of the transistor, Simple transistor model, Transistor parasitics, Wires and vias, Tub ties and latch up, Wire parasitics, Advanced characteristics, design rules- Fabrication errors, Scalable design rules, SCMOS design rules, Layout design and tools- Layouts for circuits, Stick diagrams, Hierarchical stick diagrams.	

Course Content	**UNIT-III** **GATES, NETWORK AND SEQUENTIAL MACHINES:** Static complementary gates- Gate structures, Basic gate layouts, delay, Power consumption, Speed- power product, parasitic, Wires and delay. Network layout design- Single row layout, Standard cell layout. Network delay- Fan-out, Path delay, Transistor sizing. Sequential machines- Latches and Flip-flops. **UNIT-IV** **SUBSYSTEMS:** Subsystems- Pipelining, Data paths, 4-bit arithmetic processor as example of subsystem design. **UNIT-V** **FLOOR PLANNING:** Floor planning methods – Block placement and channel distribution, Global routing, power distribution, Clock distribution. Off-chip connections- Packages, I/O Architecture, Pad design. **UNIT-VI** **TESTING AND TESTABILITY:** System partitioning, Design for testability, Fault models. ATPG, Testing combinational logic, Testing sequential logic, Scan design techniques BIST.
Text Books and Reference Books	**TEXT BOOKS:** 1. S.M. Sze, "VLSI Technology", Mc Graw-Hill Int. Edn. 2. Wayne Wolf, "Modern VLSI design", Pearson Education Asia. **REFERENCE BOOKS:** 1. Douglas A. Pucknell and Kamran Eshraghian, "Basic VLSI design", Prentice-Hall of India Pvt. Ltd. 2. "Introduction to VLSI Circuits and Systems" – John. P. Uyemura. John wiley, 2003. 3. "Digital Integrated Circuits" – John M.Rabaey, PHI,
E-Resources	1. www.iue.tuwien.ac.at/phd/ceric/node8.html 2. www.eecs.berkeley.edu/~hu/ChenmingHu_ch3.pdfwww.nptel.ac.in/courses/111310602/Lec22.pdf

17EC32E4 – OPTOELETRONICS

Course category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Engineering physics	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The operation of semiconductor optoelectronic devices. 2. The Hetero junctions and quantum wells and their application to Optoelectronic devices. 3. The design, analysis and modelling of semiconductor lasers (D.C. & Modulation Properties). 4. The design and small-signal circuit modelling of various types of Photo Detectors. 5. The Fourier optics, nonlinear optical signal processing. 6. The Holography, pattern recognition.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Acquire knowledge about optical radiation, black body radiation and material interactions.
	CO2	Analyse radioactive processes, laser excitations and Gaussian characteristics of laser beam.
	CO3	Analyse Q-switching and mode locking.
	CO4	Analyse specific lasers, Helium, Neon, Argon ion, carbon dioxide, neodymium and Semiconductor free electron.
	CO5	Understand modulation of light, electro optic modulation, Acousto-optic modulation and magneto optic devices.
	CO6	Understand Image Binarization using photographic process.
Course Content	**UNIT-I** **OPTICAL RADIATION:** Radiometric and Photortietric definitions, Blackbody radiation, Material interactions, Temperature. **UNIT-II** **LASERS:** Radioactive Processes, Laser excitations, Gaussian characteristics of the laser beam, optical feedback, Q-switching and mode locking. **UNIT-III** **SPECIFIC LASERS** – Helium – Neon Laser, Argon ion Laser, Carbon dioxide Laser, Neodymium Laser, Semiconductor Laser, Free electron Laser	

Course Content	**UNIT-IV** **MODULATION OF LIGHT:** Polarization, Light propagation in crystals, Electro-optic modulation, Acousto-optic modulation, Magneto-optic devices, Image Binarization using photographic process **UNIT-V** **FOURIER OPTICS:** Scalar theory of diffraction, Fourier transform properties of Lenses, Optical information processing systems, special filtering using binary filters, Nonlinear optical signal processing using contact screens, Apodization. **UNIT-VI** **ELECTRO-OPTIC SYSTEMS:** Holography, phase contrast microscopy, Pattern recognition, Optical computing systems.
Text Books and Reference Books	**TEXT BOOKS:** 1. Electro-Optical Devices and systems by M. A. Karim PWS-KENT publishing company 2. Optical Electronics by A. K. Ghatak and K. Thygarajan, Cambridge University press. **REFERENCE BOOKS:** 1. Optoelectronics-Emmanual Rosencher & Borge Vinter by Cambridge University 2. Laser Principals and Applications by J. Wilson, J. F. B. Hawkes, PHI Publications.
E-Resources	1. http://nptel.ac.in/courses/117103063/26 2. https://www.youtube.com/user/nptelhrd

17AC3201 – AUDIT COURSE

Course category:	Basic sciences	**Credits:**	0
Course Type:	Theory	**Lecture - Tutorial - Practical:**	0 - 0 – 0
Prerequisite:	English and mathematics	**Sessional Evaluation :**	40
		External Evaluation:	60
		Total Marks:	100

Course Objective	Students undergoing this course are expected to understand:
	Keeping in mind the previous exposure of the students towards English & Quant, this focuses on improving the student's efficiency in Communicative English and quantitative ability can sharpen thinking ability and fasten their problem solving skills, which will be helpful for the students personally & professionally.
Course Outcome	Upon successful completion of the course , the students will be able to:
	Gain adequate knowledge on Quantitative Aptitude, Reasoning ,Professional Ethics and Human Values Business, Etiquette and Personal Grooming, Accent Neutralization Identifying and dealing with Mother Tongue Influence (MTI), Verbal Ability.
Course Content	**UNIT-I** **QUANTITATIVE APTITUDE**: Number System-L.C.M & H.C.F- Find the Unit digit-Remainder Theorem- Problems on Ages- Problems on Averages-Percentages-Simple Interest-Compound Interest-Profit and Loss, Permutations and Combinations, Probability, Boats and Streams- Pipes and Cisterns- Data Interpretation-Table Graph-Bar Graph- Line Graph- Pie Chart. **UNIT-II** **REASONING**: Number and Letter Series- Coding and Decoding, Directions, Classifications-Venn Diagrams- Syllogism-Seating Arrangement-Analogy-Blood Relation-Clocks-Calendars- Puzzle Test-Coded Inequality- Data Sufficiency. **UNIT-III** **PROFESSIONAL ETHICS AND HUMAN VALUES** :Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Cooperation – Commitment – Empathy – Self-Confidence – Character – Spirituality **UNIT-IV** **BUSINESS ETIQUETTE AND PERSONAL GROOMING MAKING A GREAT FIRST IMPRESSION**: How to present yourself to people, Greetings, Introductions The art of small talk - How to make proper introductions, Paying & Receiving

Course Content	Compliments, Small Talk & Networking ,Developing Professional and Personal Image, Personal Hygiene & Polish interpersonal skill. **ETIQUETTE OF DRESSING:** The do's and don'ts in dressing**,** Understanding various dress codes, Clothes and Corporate Culture **UNIT -V** **ACCENT NEUTRALIZATION: P** – Pitch, **I** – Inflection, **C** – Courtesy, **T** – Tone, **U** – Understanding, **R** – Rate of speech & E – Enunciation **IDENTIFYING AND DEALING WITH MOTHER TONGUE INFLUENCE (MTI) PREPARATION FOR INTERVIEWS**: Conducting Research & Commonly asked questions, speaking up during interviews, GDs, Debate & Resume Building. **UNIT - VI** **VERBAL ABILITY:** Essay Writing, Comprehension, Email writing, Correction of Sentences, Synonyms & Antonyms
Text Books and Reference Books	**TEXT BOOKS:** 1. Quantitative Aptitude by R.S.Agarwal 2. , Non-Verbal Reasoning by R.S.Agarwal 3. Dr. Alex,"Soft Skills"- Know Yourself & Know the World 4. Meenakshi Raman and Sangeeth Sarma- Communication 5. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint)

N.B.K.R. INSTITUTE OF SCIENCE & TECHNOLOGY

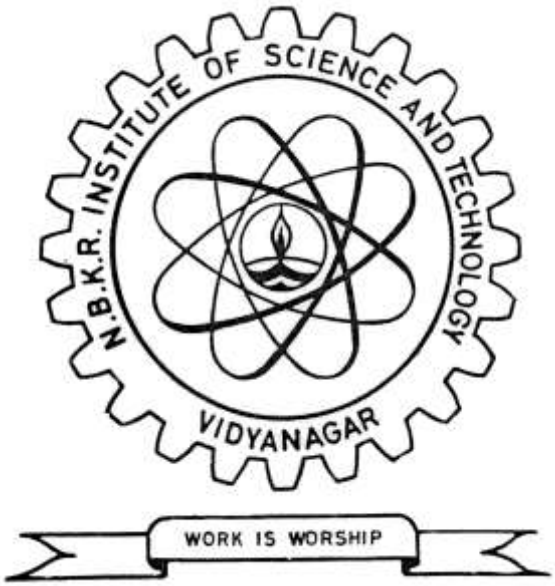
(AUTONOMOUS)

COLLEGE WITH POTENTIAL FOR EXCELLENCE (CPE)

Affiliated to JNTUA, Anantapuramu

Re-Accredited by NAAC with 'A' Grade

B.Tech. Courses Accredited by NBA under TIER-I



SYLLABUS

B.TECH. DEGREE COURSE

IV B.TECH

I & II Semesters

ELECTRONICS AND COMMUNICATION ENGINEERING

(With effect from the batch admitted in the academic year 2017-2018)

VIDYANAGAR - 524413

SPSR Nellore-Dist. Andhra Pradesh

www.nbkrist.org

INSTITUTE:

Vision:

To emerge as a comprehensive Institute that provides quality technical education and research thereby building up a precious human resource for the industry and society.

Mission:

1. To provide a learner-centered environment that challenges individuals to actively participate in the education process.

2. To empower the faculty to excel in teaching while engaging in research, creativity and public service.

3. To develop effective learning skills enabling students pick up critical thinking thus crafting them professionally fit and ethically strong.

4. To reach out industries, schools and public agencies to partner and share human and academic resources.

VISION AND MISSION OF THE DEPARTMENT

Vision:

To develop high quality engineers with sound technical knowledge, skills, ethics and morals in order to meet the global technological and industrial requirements in the area of Electronics and Communication Engineering.

Mission:

1. To produce high quality graduates and post-graduates of Electronics and Communication Engineering with modern technical knowledge, professional skills and good attitudes in order to meet industry and society demands.
2. To develop graduates with an ability to work productively in a team with professional ethics and social responsibility.
3. To develop highly employable graduates and post graduates who can meet industrial requirements and bring innovations.
4. Moulding the students with foundation knowledge and skills to enable them to take up postgraduate programmes and research programmes at the premier institutes.

Programme Educational Objectives (PEOs):

1. To provide the students with strong fundamental and advanced knowledge in mathematics, Science and Engineering with respect to Electronics and Communication Engineering discipline with an emphasis to solve Engineering problems.

2. To prepare the students through well - designed curriculum to excel in bachelor degree programme in Electronics and Communication Engineering in order to engage in teaching or industrial or any technical profession and to pursue higher studies.

3. To train students with intensive and extensive engineering knowledge and skill so as to understand, analyze, design and create novel products and solutions in the field of Electronics and Communication Engineering.

4. To inculcate in students the professional and ethical attitude, effective communication skills, team spirit, multidisciplinary approach and ability to relate engineering issues to broader social context.

5. To provide students with an excellent academic environment to promote leadership qualities, character molding and lifelong learning as required for a successful professional career.

Program Outcomes (POs):

PO1: Ability to acquire and apply knowledge of science and engineering fundamentals in problem solving.

PO2: Acquire in-depth technical competence in a specific information technology discipline.

PO3: Ability to undertake problem identification, formulation and providing optimum solution.

PO4: Ability to utilize systems approach to design and evaluate operational performance.

PO5: Understanding of the principles of inter-disciplinary domains for sustainable development.

PO6: Understanding of professional & ethical responsibilities and commitment to them.

PO7: Ability to communicate effectively, not only with engineers but also with the community at large.

PO8: Ability to Communicate effectively on complex engineering activities with the engineering community and with society at large.

PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO11: Understanding of the social, cultural, global and environmental responsibilities as a professional engineer.

PO12: Recognizing the need to undertake life-long learning, and possess/acquire the capacity to do so.

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY: VIDYANAGAR

(AUTONOMOUS)

(AFFILIATED TO JNTU ANANTAPUR: ANANTHAPURAMU)

SPSR NELLORE DIST

IV YEAR OF FOUR YEAR B.TECH DEGREE COURSE – I SEMESTER

ELECTRONICS AND COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the academic year 2017-2018)

(For the batch admitted in the academic year 2017-2018)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation									
							Sessional-I Marks			Sessional-II Marks			Total Sessional Marks(40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Test$^{\$}$-I	A$^{\#}$-I	Max. Marks	Test$^{\$}$-II	A$^{\#}$-II	Max. Marks		Duration In Hours	Max. Marks	100
1	17SH4102	Management Science**	3	0	-	3	34	6	40	34	6	40	0.8*Best of two+0.2* least of two	3	60	100
2	17EC4101	Cellular & Mobile Communications	2	2	-	3	34	6	40	34	6	40		3	60	100
3	17EC4102	DD using FPGA	2	2	-	3	34	6	40	34	6	40		3	60	100
4	17EC4103	Digital Image Processing	2	2	-	3	34	6	40	34	6	40		3	60	100
5	17EC41EX	Elective-III	3	0	-	3	34	6	40	34	6	40		3	60	100
6	17XX41OX	Open Elective-I	3	0	-	3	34	6	40	34	6	40		3	60	100
		PRACTICALS	**PRACTICALS**													
7	17EC41P1	Microwave & Optical Communication Lab	-	-	3	2	-	-	-	-	-	40	Day to Day Evaluation and a test (40 Marks)	3	60	100
8	17EC41P2	IOT Lab	-	-	3	2	-	-	-	-	-	40		3	60	100
9	17EC41P3	VLSI Lab	-	-	3	2	-	-	-	-	-	40		3	60	100
		TOTAL	15	6	09	24	-	-	-	-	-	360	-	-	540	900

**Common to ECE, EEE, CSE, IT

***** Common to ECE, EEE

A for Assignment (continuous evaluation)

$ Test (Descriptive & Objective) duration = 2 Hours

17SH4102 – MANAGEMENT SCIENCE
(Common to ECE, EEE and CSE)

Course Category:	Humanities	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-0-0
Pre-requisite:	Economics and accountancy	**Sessional Evaluation:** **Univ.Exam Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected:	
	1. To understand the disciplines of management science and manager's role in business and other decision-making 2. To gain an overview of the process of developing and using quantitative techniques in decision making and planning. 3. To aware of the ethical dilemmas faced by managers and the social responsibilities of business. 4. To know the significance of strategic management in competitive and dynamic global economy	
Course Outcomes	After completing the course the student will be able to :	
	CO1	Explain the concepts of management, ethical and social responsibilities and principles of Organization
	CO2	Evolution of Management Thought and hierarchy of layouts of plants.
	CO3	Apply work-study techniques for increased productivity in Corporate world.
	CO4	Manage human resources efficiently and effectively with best HR practices with marketing management plans.
	CO5	Develop marketing strategies based on product, price, place and promotion objectives with Project Cost Analysis.
	CO6	Determine activities' times (early start, early finish, late start, late finish, total float, and free float) and schedule the project using the CPM and PERT.
Course Content	**UNIT – I** **INTRODUCTION TO MANAGEMENT**: Concept of Management — Functions of Management, Evolution of Management Thought: Taylor's Scientific Management Theory, Fayal's Principles of Management- Maslow's theory of Hierarchy of Human Needs- Douglas McGregor's Theory X and Theory Y - Hertzberg Two Factor Theory of Motivation - Leadership Styles. **UNIT – II** **DESIGN OF ORGANIZATION:** principles of Organization –Organisation process- Types of organisation: line, line and staff organization, function, committee, matrix, virtual, cellular, team organization. Boundary less organization, inverted pyramid structure, lean and flat organization. Managerial objectives and social responsibilities. **UNIT-III** **STRATEGIC MANAGEMENT**: Corporate planning – Mission, Objectives, programmers, SWOT analysis – Strategy formulation and implementation. **MARKETING MANAGEMENT**: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.	

Course Content	**UNIT-IV** **HUMAN RESOURCES MANAGEMENT**- Manpower planning – Personnel management – Basic functions of personnel management, Job Evaluation and Merit Rating – Incentive plans. **UNIT-V** **PRODUCTION AND OPERATIONS MANAGEMENT**: Plant Location and Plant Layout concepts- methods of production (Job, Batch & Mass)-Production Planning and control. Work study- Basic procedure involved in Method Study -Work Measurement. **UNIT-VI** **PROJECT MANAGEMENT (PERT/ CPM):** Network Analysis- Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), identifying critical path, probability of completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).
Text Books & Reference Books	**TEXT BOOKS:** 1. Dr. T.P. Singh Er. Arvind Kumar "Applied management Science and Operations Research" 2. A.R.Aryasri "Management Science" 3. O.P.Kanna "Industrial Engineering and Management" **REFERENCE BOOKS:** 1. C.B.Gupta "Business organisations and management" 2. T.R.Banga,S.C.Sharma "Industrial Engineering and Management (Including Production Management)"
E-Resources	1. http://nptel.ac.in/courses 2. http://iete-elan.ac.in 3. http://freevideolectures.com/university/iitm

17EC4101-CELLULAR MOBILE COMMUNICATION

Course Category:	Program Open Elective	**Credits:**	3
Course Type:	Theory	**Lecture -Tutorial-Practical:**	2-2-0
Prerequisite:	Antenna and Wave Propagation, Radar Engineering	**Sessional Evaluation:**	40
		External Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The basic Cellular system 2. The elements of cellular radio system design. 3. The various Prediction models for cell coverage in terms of signal and traffic. 4. The interference problem and its reduction by designing proper antenna system. 5. Frequency spectrum utilization techniques channel & traffic management and evaluation of dropped call rate. 6. The need for digital mobile telephony and studying various mobile systems like GSM & CDMA.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand cellular communication system with cell splitting, consideration of cellular system, cell-site antennas like elements.
	CO2	Design elements for Analog and Digital cellular systems.
	CO3	Acquire knowledge about propagation mechanisms, Multipath fading, and channel modeling and co-channel interference.
	CO4	Know about different types of channel interferences with cell-site antenna heights and signals coverage cells
	CO5	Gain knowledge about Frequency management and Channel assignment and multiple access schemes
	CO6	Acquire knowledge about the evolution of GSM, TDMA & CDMA technologies for proper Frequency spectrum utilization.
Course Content	**UNIT-I** **INTRODUCTION TO CELLULAR MOBILE SYSTEM:** A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, Analog and Digital cellular systems. **UNIT-II** **ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN:** General description of the problem, concept of frequency reuse channels, channel interferences reduction factors, desired C/I from a normal case in an Omni-directional antenna system, cell splitting, consideration of cellular system, cell-site antennas & mobile antennas characteristics, antennas at cell-site, mobile antennas.	

Course Content	**UNIT-III** **CELL COVERAGE FOR SIGNAL & TRAFFIC:** General introduction, obtaining the mobile point-to-point model, propagation over water or flat open area, foiling loss, propagation in near distance, long distance propagation, point-to-point prediction model characteristics, cell-site antenna heights and signals coverage cells, mobile propagation. **UNIT-IV** **INTERFERENCE:** Introduction to co-channel interference, real time co-channel interference measurement, design of antenna system, diversity receiver, types of non-co-channel interference, interference between systems. **UNIT-V** **FREQUENCY MANAGEMENT & CHANNEL ASSIGNMENT:** Frequency spectrum utilization, setup channels, management & traffic channel assignment, Handoff & their characteristics, dropped call rates and their evaluations. Real-time co-channel interference measurement. **UNIT-VI** **DIGITAL CELLULAR SYSTEM:** Why digital, digital mobile telephony, practical multiple access schemes, Global System for Mobile (GSM), TDMA & CDMA, miscellaneous mobile systems.
Text Books and Reference Books	**TEXT BOOKS:** 1. Lee. W. C. Y – "Mobile Cellular Telecommunication – Analog and Digital Systems", Mc Graw Hill. 2. G.K. behere lopamudra das" Mobile communication" SciTech publications **REFERENCE BOOKS:** 1. Principles of communication systems Taub & shilling TMH 2. Celullar mobile communications –Willium stallings –PHI
E-Resources	1. www.iitg.ernet.in/scifac/qip/public_html/cd_cell/EC632.pdf 2. www.morse.colorado.edu/~tlen5510/text/

17EC4102 – DIGITAL DESIGN with FPGA

Course category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 – 2 - 0
Prerequisite:	Electronic Devices and Circuits, Switching Theory & Logic Design, Programming Skills	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to:	
	1. Learn various logic families. 2. Study various objects in VHDL along with libraries and packages. 3. Understand how digital circuit can be built in a methodological way, starting from Boolean logic and applying a set of rigorous techniques. 4. Study various design examples of combinational circuits 5. Design and analyze sequential circuits using V.H.D.L. language. 6. Learn various digital IC's of Registers and Counters.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Implement the various combinational circuits using logic families.
	CO2	Understand the various objects in VHDL along with libraries and packages.
	CO3	Implement the various combinational circuits using V.H.D.L. language
	CO4	Design and analyze sequential circuits for various practical problems using basic gates and flip flops
	CO5	Design the various counters using digital ICs
	CO6	Implement the various sequential circuits using V.H.D.L. language
Course Content	**UNIT – I** **DIGITAL LOGIC FAMILIES:** Evaluation of ICs, Advantages and classification of ICs. Digital IC characteristics, Introduction to Logic Families: Bipolar logic, DTL, HTL, ECL, TTL, MOS, CMOS, Comparison of Logic Families and IC packaging's. **UNIT – II** **VHDL:** History Of VHDL ,Features Of VHDL, Design Flow, VHDL Program Structure, Objects In V.H.D.L-Signals, Variable, Constants, Files ; Libraries And Packages, functions and procedures. **VHDL DESIGN ELEMENTS:** Structural Design Elements, Data Flow Design Elements, Behavioural Design Elements, Time Dimension And Simulation, Synthesis, Examples. **UNIT – III** **COMBINATIONAL LOGIC DESIGN:** Multiplexers And Demultiplexers, Decoders, Encoders, Three State Devices, Code Converters, Parity Circuits, Comparators, Adders And Subtractors. ALUs, Design considerations with relevant Digital ICs, VHDL modes for the above circuits.	

Course Content	**UNIT – IV** **SEQUENTIAL LOGIC DESIGN:** SSI Latches and Flip-Flops, Design considerations with relevant Digital ICs, VHDL modes for the above circuits. **UNIT – V** **COUNTERS AND REGISTERS:** Introduction to Counters, Design of Counters using Digital ICs, Ring Counter, Johnson Counter, Shift Registers, VHDL modes for the above circuits. **UNIT – VI** **PROGRAMMABLE LOGIC DEVICES**: Introduction, Evolution: PROM, PLA, PAL, Architecture of PAL's, Design Flow, Complex PLD's (MAX - 7000, APEX). **FPGA's**.: Introduction, Logic Block Architecture, Routing Architecture, Design Flow, Xilinx Vertex-II (Architecture).
Text Books and Reference Books	**TEXT BOOKS:** 1. "Design of Analog CMOS Integrated Circuits" by Behzad Razhavi. Mc. Graw-Hill 2. PLD, FPGA data sheets. 3. B.S. sonde, "Introduction to system design using ICs" Wiley Eastern. 4. S.S. Limaye, "VHDL – A design oriented Approach", 'TMH edition (2008). 5. John Wakerley "Digital Design Principles", PHI. **REFERENCE BOOKS:** 1. Stephen Brown and zvonkovranesic, 'Fundamentals of digital design with VHDL", TMH edition (2007). 2. Zainalabedin Navabi, VHDL, analysis and modeling of digital systems, McGraw-Hill. 3. Kevin Skahil, VHDL for programmable logic, Addison Wesley.
E-Resources	1. http://nptel.ac.in/courses/117106086/1 2. http://nptel.ac.in/courses/117106086/31 3. https://www.youtube.com/user/nptelhrd

17EC4103-DIGITAL IMAGE PROCESSING

Course Category:	Program Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	2-2-0
Prerequisite:	Engineering Mathematics ,Signals and Systems , Digital Signal Processing	**Sessional Evaluation:** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected:	
	1. To learn the fundamentals of digital image processing and the relationship between pixels. 2. To understand transformations used in digital image processing algorithms. 3. To understand the spatial and frequency domain image processing 4. To learn the restoration techniques used in image enhancement. 5. To learn how to code and compress the images. 6. To understand fundamentals of color image processing.	
Course Outcomes	After completing the course the student will be able to :	
	CO1	Describe how digital images are represented and how they are sampled and quantized and Define the image processing system and basic relations among pixels.
	CO2	Analyze the need for image transforms, types and their properties.
	CO3	Study different techniques employed for the enhancement of images in both spatial and frequency domain.
	CO4	Explore causes for image degradation and various restoration techniques.
	CO5	Understand the techniques for image segmentation and Define different image coding techniques and compression models.
	CO6	Describe the techniques of colour image processing.
Course Content	**UNIT-I** **DIGITAL IMAGE FUNDAMENTALS:** Digital Image Representation – Digital Image Processing System – Visual Perception – Sampling and quantization – Basic Relationship between pixels – Imaging geometry. **UNIT – II** **IMAGE TRANSFORMS:** Discrete Fourier Transform – Properties of 2-D Fourier transform – 2-D Fast Fourier Transform – Walsh Transform – Hadamard Transform – D.C.T. – Haar Transform – Slant Transform – Hotelling Transform. **UNIT – III** **IMAGE ENHANCEMENT:** Back ground enhancement by point processing – Histogram Processing – Spatial Filtering – Enhancement in frequency Domain – Image Smoothing – Image Sharpening.	

Course Content	**UNIT – IV** **IMAGE RESTORATION:** Degradation model – Algebraic approach to restoration – Inverse filtering – Least Mean Square filters – Constrained Least Mean Square restoration – Inverse Restoration. **IMAGE SEGMENTATION:** Detection of Discontinuities – Edge Linking – Boundary detection and Boundary Description – Thresholding – Region Oriented Segmentation. **UNIT – V** **IMAGE CODING & COMPRESSION:** Fidelity Criteria – Encoding Process – Transform Encoding – Redundancies and their removal methods – Image compression models and methods – Source coder and decoder – Error free compression – Lossy compression. **UNIT-VI** **COLOUR IMAGE PROCESSING:** Colour Image Processing – Colour Model, Pseudo colour image processing – Full colour image processing, Colour Image Filtering, Colour Image Segmentation
Text Books and Reference Books	**TEXT BOOKS :** 1. "Digital Image Processing" – Rafael C. Gonzalez, Richard E. Woods, 3rd Ed, Pearson. 2. "Fundamentals of Image Processing" – A. K. Jain, Prentice Hall India. **REFERENCE BOOKS :** 1. "Digital Image Processing" – William K. Pratt, John Wiley Publications 2. "Digital Image Processing" – K. R. Castleman, Pearson Publications 3. "Fundamentals of Electronic Image Processing" – Weeks Jr, SRIC/IEEE series, PHI.
E-Resources	1. nptel.ac.in/courses/117105079/ 2. www.ee.columbia.edu/~xlx/courses/ee4830-sp08/notes/lect1-parta.pdf

17EC41P1-MICROWAVE & OPTICAL COMMUNICATION LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Microwave techniques	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The reflex klystron, it is used as amplifier and oscillator in radar stations and radio stations etc. 2. The wave-guide characteristics 3. The antenna parameters 4. The unknown load impedance measurement using VSWR method. 5. The working of directional couplers.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Study reflex klystron characteristics and understands how it can be used as an amplifier, oscillator in microwave applications
	CO2	Calculate the power in the parts of direction couplers
	CO3	Know the cut off, free space and guided wavelength of waveguide.
	CO4	Know how to power can be mixed and split up phase reversal etc. using magic tee
	CO5	Measure Antenna Parameters like Gain , Aperture Area and the directivity
	CO6	Know how to measure numerical aperture and bending losses of OFC
Course Content	**LIST OF EXPERIMENTS** 1. Reflex klystron characteristics –I 2. Reflex klystron characteristics –II 3. Direction couplers 4. Wave guide parameters 5. Characteristics of GUNN diode 6. Characteristics of MAGIC TEE 7. Antenna measurements 8. Measurement of V.S.W.R. 9. Measurement of impedance 10. Measurement of numerical aperture	

17EC41P2- IOT LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Micro controllers and embedded systems	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. Use Embedded C language to develop embedded applications. 2. Apply, Construct and demonstrate various in-build interfaces/modules of Aurdino and MSP430 for specific applications. 3. Apply Embedded C code for utilizing Low power modes of MSP430.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Design the home appliances and toys using Microcontroller chips.
	CO2	Design Logic controller module and SIDU module.
	CO3	Design the high speed communication circuits using serial bus connection
	CO4	Interfacing and programming GPIO ports in c using MSP430
	CO5	Understand the PWM generation using timer on MSP430 GPIO
	CO6	Know how to connect and communicate to cloud
Course Content	**LIST OF EXPERIMENTS** 1. BASIC LED PROGRAMMING IN C USING AURDINO 1.1 Study and Install IDE of Arduino and different types of Arduino 1.2 Write program using Arduino IDE for Blink LED 1.3 Write Program for RGB LED using Arduino 2. INTERFACING AND PROGRAMMING GPIO PORTS IN C USING MSP430 2.1: Blink LED 2.2: Fade RGB LED (PWM) 2.3:Push Button (Input) 3. INTERFACING AND PROGRAMMING GPIO PORTS IN C USING MSP430 3.1: Multiple LED (Many Outputs) 3.2:Shift Register (Integrated Circuit) 3.3: Photoresistor (Light Sensor) 4. INTERFACING AND PROGRAMMING GPIO PORTS IN C USING MSP430 4.1: Spin the Motor 4.2: Seven-Segment Display (Digital Display) 5. A BASIC WI-FI APPLICATION – COMMUNICATION BETWEEN TWO SENSOR NODES	

Course Content	6. INTERFACING POTENTIOMETER WITH MSP430 6.1: Alter the threshold to 75% of Vcc for the LED to turn on. 6.2: Modify the code to change the Reference Voltage from Vcc to 2.5V. 7. CONNECT AND COMMUNICATE TO CLOUD 7.1: Creating a simple HTML web server using MSP430 Launch Pad& CC3100 Wi-Fi Booster Pack 7.2: Create a Wi-Fi-connected IoT sensor that calls you when sensor values exceed a threshold 8. CONNECT AND COMMUNICATE TO CLOUD 8.1: Playing Music – (Buzzer) 8.2: Potentiometer – (Rotary Angle Sensor) 9. PWM GENERATION USING TIMER ON MSP430 GPIO 9.1: Observe the PWM waveform on a particular pin using CRO. 9.2: What is the maximum resolution of PWM circuitry in MSP430G2 Launch Pad? 9.3: Change the above code to create a PWM signal of 75% duty cycle on particular PWM pin. 10. PWM BASED SPEED CONTROL OF MOTOR CONTROLLED BY POTENTIOMETER CONNECTED TO MSP430 GPIO 10.1: Interface a Stepper motor with MSP-EXP430G2 Launch Pad to run it in a Predetermined uniform speed. 10.2: Describe the applications of PWM in a digital power supply control. 10.3: Create Switch case code from the example code to run the DC Motor in 3 set of Speeds. 11. A BASIC WI-FI APPLICATION 11.1: In the terminal output window, we have received a debug message "Pinging…!" Search in the code and change the message to "Pinging the Website". Repeat the experiment to observe this change in the Serial Window. 12. INTERRUPT PROGRAMMING EXAMPLES THROUGH GPIOS 12.1: Write the code to enable a Timer interrupt for the pin P1.1. 12.2: Write the code to turn on interrupts globally.

17EC41P3 – VLSI LAB

Course Category:	Program Core	**Credits:**	2
Course Type:	Practical	**Lecture-Tutorial- Practice:**	0 - 0 - 3
Prerequisite:	Switching theory & logic design, Digital design and digital IC's	**Sessional Evaluation:** **External Evaluation :** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. How to write VHDL programs of different digital circuits. 2. How to simulate the VHDL programs of different digital circuits.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Write and simulate the various logic gates by using VHDL.
	CO2	Write and simulate the adders and subtractors by using VHDL.
	CO3	Verify the truth table of various digital circuits and IC's.
	CO4	Design the various digital circuits.
	CO5	Write and simulate the various counters by using VHDL.
	CO6	Write and simulate the various registers by using VHDL.
Course Content	Minimum of 10 experiments to be completed out of the following: **LIST OF EXPERIMENTS** 1. Logic Gates 2. Half Adder & Full Adder 3. Half Subtractor &Full Subtractor 4. 3 to 8 Decoder – IC 74x138 5. 8 to 3 Encoder-IC 74x148 6. 4 bit Comparator – IC 74x85 7. 8x1 Multiplexer – IC 74x151 8.16x1 Multiplexer – IC 74x150 9. 1x4 Demultiplexer–IC 74x155 10. D Flip-Flop - IC 74x74 11. Decade Counter – IC 74x90 12. Shift Register – IC 74x95 13. BCD to 7-segment display code converter 14. 3 bit up/down Ripple counter 15. 2 bit synchronous counter 16. Bi-directional shift register	

ELECTIVES-III

1. **OPTICAL COMMUNICATION**
2. **VLSI DIGITAL SIGNAL PROCESSING**
3. **RADAR SIGNAL PROCESSING**
4. **TELECOMMUNICATION & SWITCHING NETWORKS**

17EC41E1 – OPTICAL COMMUNICATION

Course category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Electro Magnetic Fields and waves, Antenna and Wave Propagation, Electronic Devices and Circuits.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. An overview of the Ray theory. 2. Optical materials, dispersion, diffraction, absorption, scattering, fiber losses, fiber modes and configurations, fiber types and rays and fiber materials. 3. L.E.D., Lasers and their excitations and noises of light sources and coupling to single mode fibers, splicing and connectors. 4. The operating principles of optical Detectors and Receivers. 5. The behavior of the optical amplifiers, semiconductor and doped optical amplifiers, and optical networks. 6. The knowledge of measurement of optical parameters and applications of optical fibers in different fields.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Acquire knowledge about optical materials, fiber characteristics, classification with different losses.
	CO2	Understand the fibre modes, configurations and fibre materials for proper optical propagation.
	CO3	Acquire knowledge of L.E.D., Laser excitations, fiber noises, coupling of fibers and its receivers.
	CO4	Analyse optical sources and detectors and receivers' performance and calculation
	CO5	Understand the optical amplifiers and basic noise networks in optical fiber applications.
	CO6	Understand the measurements of optical parameters and applications of optical fibers in different fields.
Course Content	**UNIT-I** **INTRODUCTION TO OPTICAL FIBERS**: Introduction- Ray theory transmission- Total internal reflection-Acceptance angle –Numerical aperture – Skew rays – Electromagnetic mode theory of optical propagation –EM waves modes in planar Guide – phase and group velocity – cylindrical fibers – SM fibers. **UNIT –II** **TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS:** Attenuation – Material absorption losses in silica glass fibers – Linear and Nonlinear Scattering losses - Fiber Bend losses – Midband and Farband infrared Transmission – Intra and inter Modal Dispersion – Over all Fiber Dispersion – Polarization- nonlinear Phenomena. Optical fiber connectors, Fiber alignment and Joint Losses – Fiber Splices – Fiber connectors –Expanded Beam Connectors – Fiber Couplers.	

Course Content	**UNIT –III** **FIBER OPTICAL SOURCES**: Light Emitting Diodes, LED structures, Surface and edge emitters, mono and hetero structures - internal - quantum efficiency, injection laser diode structures - comparison of LED and ILD **UNIT –IV** **FIBER OPTICAL DETECTORS AND RECEIVERS:** **OPTICAL DETECTORS**: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties, Comparison of performance, Photo detector noise -Noise sources, Signal to Noise ratio, Detector response time. **OPTICAL RECEIVERS**: Fundamental receiver operation, Pre amplifiers, Error sources – Receiver Configuration-Probability of Error – Quantum limit. **UNIT- V** **FIBER OPTICAL AMPLIFIERS AND NETWORKS**: Semiconductor Optical amplifiers – EDFA- Raman amplifier. **WDM SYSTEM**: Principles of WDM networks. Nonlinear effects in fiber optic links. Concept of self-phase modulation, group velocity dispersion and solution based communication. **UNIT- VI** **FIBER OPTICAL MEASUREMENTS**: Fiber Attenuation measurements- Dispersion measurements –Fiber Refractive index profile measurements – Fiber cut-off Wavelength Measurements –Fiber Numerical Aperture Measurements – Fiber diameter measurements. **OPTICAL FIBER APPLICATIONS**: Telephony Telemetry- video distribution and military applications.
Text Books and Reference Books	**TEXT BOOKS:** 1. "Optical Communications", C. Gerd Keiser 3rd Edition, Mc Graw-Hill-2000. 2. "Optical Fiber Communication", John M Senior, Pearson publications. **REFERENCE BOOKS:** 1. Electronic Communications Systems-Williams Schweber, Prentice Hall, 1999. 2. Optical Fiber Communication Systems- C.P. Saud Bance, John Wiley 1980. 3. Modern Electronic Communication-G.M. Miller 6th edition Prentice Hall 1999.
E-Resources	1. http://nptel.ac.in/courses/117103063/1 2. https://www.youtube.com/user/nptelhrd

17EC41E2– VLSI DIGITAL SIGNAL PROCESSING

Course Category:	Program core	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	2 - 2 – 0
Prerequisite:	VLSI Design, Digital Signal Processing algorithms, graph-theoretic concepts, and combinatorial algorithms.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. fundamentals of graph theory in VLSI signal processing 2. transformations for high speed using pipelining, retiming, and parallel processing techniques 3. area reduction using folding techniques 4. mapping of algorithms on array structures, DSP systems, and FPGAs 5. low Power Design Techniques 6. VLSI systems for some typical signal processing applications	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand VLSI design methodology for signal processing systems in different signal processing application.
	CO2	Apply the concepts with VLSI algorithms for computing digital signal processing applications**.**
	CO3	Be familiar with architectures for DSP and its Properties.
	CO4	Design Families of Architectures for specified algorithm complexity and speed constraints for Systolic Array Design
	CO5	Design low power constrained systems with Power estimation approach.
	CO6	Describe signal processing computation and its relevance to some specific applications with proper power management.
Course Content	**UNIT-I** **INTRODUCTION FOR DSP ALGORITHMS:** VLSI Design flow, Mapping algorithms into Architectures: Graphical representation of DSP algorithms – signal flow graph (SFG), data flow graph (DFG), critical path, dependence graph (DG). Data path synthesis, control structures, Optimization at Logic Level and architectural Design, Loop bound and iteration bound, Algorithms for computing iteration bound, Iteration bound of Multi-rate data-flow graphs. **UNIT-II** **PARALLEL AND PIPELINE OF SIGNAL PROCESSING APPLICATION:** Architecture for real time systems, latency and throughput related issues, clocking strategy, power conscious structures, array architectures; Pipelining processing of Digital filter, Parallel processing, Parallel and pipelining for Low power design, Optimization with regard to speed, area and power, asynchronous and low power system design, ASIC and ASISP design. **UNIT-III** **SYSTOLIC ARRAY ARCHITECTURE:** Methodology of systolic array architecture, FIR based Systolic Array, Selection of Scheduling Vector, Matrix Multiplication and 2D Systolic Array Design, Systolic Design for Space Representations Containing Delays.	

Course Content	**UNIT-IV** **ARCHITECTURE OF DIFFERENT SIGNAL PROCESSING MODULES:** Convolution technique, Folding /Unfolding Transformation, CORDIC architecture, Retiming: Introduction, Definition and Properties, Solving System of Inequalities, Retiming Techniques. **UNIT-V** **LOW POWER DESIGN:** Theoretical background, Scaling v/s power consumption, power analysis, Power reduction techniques, Power estimation approach. **UNIT-VI** **APPLICATION IN COMMUNICATION AND SIGNAL PROCESSING SYSTEM:** Transformation architectures, source and channel coding structures, Motion Estimation and motion compensation for video, Speech processing algorithm.
Text Books and Reference Books	**TEXT BOOKS:** 1. VLSI Digital Signal Processing Systems: Design and Implementation By K.K. Parhi, John Wiley & Sons, 1999 2. Richard J, Higgins, Digital Signal Processing in VLSI, Prentice Hall **REFERENCES BOOKS :** 1. M.A. Bayoumi, VLSI Design Methodology for DSP Architectures, Kluwer, 1994 2. U. Meyer – Baese, Digital Signal Processing with FPGAs, Springer, 2004
E-Resources	1. http://people.ece.umn.edu/users/parhi/SLIDES/

17EC41E3 – RADAR SIGNAL PROCESSING

Course category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Analog and digital communication systems, DSP, Basic Radar engineering.	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected:	
	1. To learn the fundamentals of radar block diagram and range equation. 2. To understand the matched filter receiver. 3. To understand detection criteria of radar signals in noise environment. 4. To learn the Radar waveform design requirements. 5. To learn the Pulse compression techniques. 6. To understand fundamentals different phase coding techniques.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand the components of a radar system and their relationship to overall system and measure of performance with and without noise.
	CO2	Analyze the radar performance and Frequency Response Characteristic of matched filter receiver with noise.
	CO3	Develop skills in designing Radar systems in different noise environments by choosing proper Waveform Design Requirements.
	CO4	Familiarized Detection Criteria of radar and ambiguity function and basic radar signals.
	CO5	Demonstrate knowledge in radar pulse compression techniques with coding techniques.
	CO6	Describe the different phase coding techniques in Decoding the received Waveforms.
Course Content	**UNIT-I** **RADA RRANGE EQUATION**: Introduction– Radar Frequencies, Radar Block Diagram, Radar Equation, Information Available from Radar Echo. Review of Radar Range Performance– General Radar Range Equation, Radar Detection with Noise Jamming, Beacon and Repeater Equations, Bistatic Radar. **UNIT – II** **MATCHED FILTER RECEIVER**: Impulse Response, Frequency Response Characteristic and its Derivation, Matched Filter and Correlation Function, Correlation Detection and Cross-Correlation Receiver, Efficiency of Non-Matched Filters, Matched Filter for Non-White Noise. **UNIT – III** **DETECTION OF RADAR SIGNALS IN NOISE**: Detection Criteria – Neyman-Pearson Observer, Likelihood-Ratio Receiver, Inverse Probability Receiver, Sequential Observer, Detectors –Envelope Detector, Logarithmic Detector, I/Q Detector. Automatic Detection – CFAR Receiver, Cell Averaging CFAR Receiver, CFAR Loss, CFAR Uses in Radar. Radar Signal Management –Schematics, Component Parts, Resources and Constraints.	

Course Content	**UNIT – IV** **WAVEFORM SELECTION**: Radar Ambiguity Function and Ambiguity Diagram – Principles and Properties; Specific Cases – Ideal Case, Single Pulse of Sine Wave, Periodic Pulse Train, Single Linear FM Pulse, Noise like Waveforms. Waveform Design Requirements. Radar clutter- Introduction, surface clutter, Land clutter, Detection of targets in Clutter. **UNIT – V** **PULSE COMPRESSION IN RADAR SIGNALS**: Introduction, Significance, Types. Linear FM Pulse Compression – Block Diagram, Characteristics, Reduction of Time Side lobes, Stretch Techniques, Generation and Decoding of FM Waveforms – Block Schematic and Characteristics of Passive System, Digital Compression, SAW Pulse Compression. **UNIT-VI** **PHASE CODING TECHNIQUES:** **Phase Coding Techniques**: Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN), Block Diagram of a Phase Coded CW Radar. **Poly Phase Codes :** Frank Codes, Costas Codes, Non-Linear FM Pulse Compression, Doppler Tolerant PC Waveforms – Short Pulse, Linear Period Modulation (LPM/HFM), Side lobe Reduction for Phase Coded PC Signals, Complementary codes, Huffman codes, Limiting in Pulse Compression, Cross Correlation Properties, compatibility.
Text Books and Reference Books	**TEXT BOOKS :** 1. M.I. Skolnik, *"*Introduction to Radar Systems*",* TMH, 3rd Edition, 2001. " 2. Fred E. Nathanson, *"*Radar Design Principles – Signal Processing and The Environment", McGraw Hill, Inc, 2nd Edition,1991. 3. M.I. Skolnik, *Radar Handbook*, McGraw Hill, 2nd Edition, 1991. **REFERENCE BOOKS :** 1. Peyton Z. Peebles Jr., Radar Principles, Wiley India Pvt. Ltd., 1998. 2. R. Nit berg, Radar Signal Processing and Adaptive Systems, Artech House, 1999. 3. F.E. Nathanson, Radar Design Principles, *1st* Edition, McGraw Hill, 1969
E-Resources	1. https://www.ll.mit.edu/outreach/introduction-radar-systems 2. https://ocw.mit.edu/resources/res-ll-001-introduction-to-radar-systems-spring-2007/ 3. http://lej4learning.com.pk/videos-introduction-to-radar-systems-mit/

17EC41E4 – TELECOMMUNICATION & SWITCHING NETWORKS

Course category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0- 0
Prerequisite:	Basics of Analog and Digital communication signals and Systems	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected:	
	1. To teach the basic concepts of analog and digital communication principles. 2. To educate the students about the concepts and principles of optical fiber communications 3. To get the knowledge and principles learnt to analyze, design, install and manage typical wired and wireless communication systems and networks 4. To educate the students satellite communication systems, public switched telephone networks, digital transmission system standards. 5. To get the knowledge about network planning and principle of digital Switching systems. 6. To educate the students about tele traffic theory	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand various multiplexers techniques like TDM, FDM, BPSK in different communication networks.
	CO2	Memorize SONET optical standards and describes frequency justification and utilization with different techniques.
	CO3	Describe network planning and principle of digital switching systems for proper network management.
	CO4	Understand the principles of network synchronization control and management with switching techniques.
	CO5	Gain the knowledge and principles digital subscriber access, ISDN and Network Blocking.
	CO6	Understand the Public switched telephone networks, tele traffic theory, digital transmission system standards and Digital Subscriber Loops.
Course Content	**UNIT-I** **MULTIPLEXING:** Introduction, Transmission Systems, FDM Multiplexing And Modulation, Time Division Multiplexing, Digital Transmission and Multiplexing, Pulse Transmission and line coding, Binary n-zero substitution, Digital bi phase, differential encoding, Time Division Multiplex loops and rings. **UNIT-II** SONET Multiplexing Overview, SONET Frame Formats, SONET operations, Administration and maintenance, Payload framing and frequency justification ,Virtual tributaries, ds3 Payload mapping, E4Payload mapping, SONET optical standards, networks, SONET rings: unidirectional, path switched bidirectional line switched rings	

Course Content	**UNIT-III** **DIGITAL SWITCHING:** Switching Functions, Space division Switching, Time Division Switching, Two dimensional Switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross Connect Systems, Digital Switching In Analog Environment, Elements of SS7signaling. **UNIT-IV** **NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT:** Timing, timing recovery, Phase locked loop, Clock instability, jitter measurements, Systematic jitter, Timing inaccuracies: slips, Asynchronous Multiplexing, Network synchronization, U.S. Network synchronization, Network Control, Network Management **UNIT-V** **DIGITAL SUBSCRIBER ACCESS, ISDN:** ISDN Basic Rate Access Architecture, ISDN U interface, ISDN D channel protocol, High Data Rate Digital Subscriber Loops, Asymmetric Digital Subscriber Line, VDSL, Digital Loop Carrier Systems, Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next generation Digital Loop Carrier , Fiber in the loop, Hybrid fiber coax systems, Voice band modems: pcm modems, Local microwave distribution service, Digital satellite services **UNIT-VI** **TRAFFIC ANALYSIS:** Traffic Characterization, Arrival Distribution, Holding Time Distribution, Loss Systems, Network Blocking Probabilities, End To End Blocking Probabilities, Overflow Traffic, Delay Systems, Exponential Service Times, Constant Service Time, Finite Queues
Text Books and Reference Books	**TEXT BOOKS:** 1. JE FLOOD,"Telecommunication Switching, Traffic and Networks" 2. Telecommunication Switching systems and networks by Viswanathan. **REFERENCE:** 1. J.Bellamy,"digital telephony", john wiley, 2003, 3rd edition 2. Fundamentals of Telecommunication Networks by T.N.Saawivi
E-Resources	1. http://www.nptel.ac.in. 2. http:/www.ebookee.com/Telecommunication switching networks

OPEN ELECTIVES-I

1. **DATA BASE MANAGEMENT SYSTEM**
2. **GREEN ENERGY SOURCES**
3. **INTRODUCTION TO ROBOTICS**
4. **NANO TECHNOLOGY**

17CS41O2– DATA BASE MANAGEMENT SYSTEM

Course category:	Open Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Basic foundations in mathematics and preliminary fundamentals of data and information	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand: 1. Understand the areas of databases and composition of queries using Structured Query Language 2. To study various database design models for building applications 3. Evaluate a business situation while designing a database system	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Master the basic concepts and their applicability
	CO2	Understand Relational Model and the Relational Algebraic operations.
	CO3	Learn ER model and its usage in applications.
	CO4	Familiar with SQL to create simple databases
	CO5	Identify the basic issues of normalization and exposure on relational database design.
	CO6	Acquire knowledge in Transaction Management and Recovery.
Course Content	**UNIT – I** **INTRODUCTION** : Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Data Storage and Querying, Transaction Management, Database Architecture, Database Users and Administrators. **UNIT – II** **RELATIONAL MODEL**: Structure of Relational Databases, Fundamental Relational-Algebra Operations, Additional Relational-Algebra Operations, Extended Relational-Algebra Operations, Null Values, Modification of the Database. **UNIT – III** **DATABASE DESIGN AND THE E-R MODEL**: Overview of the Design Process, The Entity-Relationship Model, Constraints, Entity- Relationship Diagrams, Entity-Relationship Design Issues, Weak Entity Sets, Extended E-R Features, Reduction to Relational Schemas, Other Aspects of Database Design. **UNIT – IV** **SQL:** Data Definition, SQL Data Types and Schemas, Integrity Constraints, Basic Structure of SQL Queries, Set Operations, Aggregate Functions, Null Values, Nested Sub queries, Complex Queries, Views, Modification of the Database, Joined Relations.	

Course Content	**UNIT – V** **RELATIONAL DATABASE DESIGN:** Features of Good Relational Design, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional Dependency Theory, Algorithms for Functional Dependencies, Decomposition Using Multivalued Dependencies ,More Normal Form, Database-Design Process . **UNIT – VI** **TRANSACTION MANAGEMENT AND RECOVERY**: Lock Based and timestamp based Protocols, Multiple Granularity, Multiversion Schemes, Deadlock Handling, Weak Levels of Consistency, Recovery and Atomicity, recovery algorithm, Buffer Management, Remote Backup Systems.
Text Books and Reference Books	**Text Books:** 1. Silberschatz, Korth, Sudarshan, "Database System Concepts", McGrawHill, 6th Edition , 2011. **Reference Books:** 2. Ramez Elmasri and Shamkant Navathe, Durvasula V L N Somayajulu, Shyam K Gupta, "Fundamentals of Database Systems", Pearson Education, 2006. 3. Thomas Connolly, Carolyn Begg, "Database Systems – A Practical Approach to Design, Implementation and Management", Pearson Education, 3rd Edition, 2002. 4. *Raghu ramakrishnan ,"Database Management Systems"*, Publisher: McGraw Hill, Third *edition.*
E-Resources	1. https://nptel.ac.in/courses 2. https://freevideolectures.com/university/iitm

17EE41O2-GREEN ENERGY SOURCES

Course category:	Open Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Nil	**Sessional Evaluation :**	40
		External Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The basic concepts of the energy scenario. 2. The operation, construction and design of various components of hydro power plant. 3. The working principle of PV cell and applications of solar energy. 4. The concepts of wind power generation. 5. The concepts of Biomass energy. 6. The concepts of Fuel cell and Geothermal systems.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand the basic concepts of the energy scenario.
	CO2	Gain the knowledge of operation, construction and design of various components of hydro power plant.
	CO3	Understand the working principle of PV cell and applications of solar energy.
	CO4	Gain the knowledge on wind power generation.
	CO5	Gain the knowledge on Biomass energy.
	CO6	Gain the knowledge on Fuel cell and Geothermal systems.
Course Content	**UNIT-I** **GLOBAL AND NATIONAL ENERGY SCENARIO**: Over view of conventional & renewable energy sources, need & development of renewable energy sources, types of renewable energy systems, Future of Energy use, Global and Indian Energy scenario, Renewable and Non renewable Energy sources, Energy for sustainable development, Potential of renewable energy sources, renewable electricity and key elements, Global climate change, CO2 reduction potential of renewable energy- concept of Hybrid systems. **UNIT-II** **HYDRO-ELECTRIC POWER PLANTS:** Introduction, Selection of site for Hydro – electric Power plants, classification of Hydro – electric plants, Layout of Hydro Electric Power plant, working principle, Description of main components, water power equation, types of turbines - Pelton, Fransis & Kaplan turbines, Pumped storage plant, Advantages and disadvantages of hydro power plant - Hydro power plants in India. **UNIT –III** **SOLAR ENERGY:** Introduction, solar radiation, solar energy collectors, Flat plate collectors, concentrating collectors, solar thermal power plant, working principle of photo voltaic cell, solar energy storage, solar applications.	

Course Content	**UNIT –IV** **WIND ENERGY:** Introduction, power in the wind mills, site selection considerations for installing wind mill, Construction details of the wind mill (Wind Turbine Gear System), working principle of wind mill, variation of power output with wind speed, Betz criterion, Applications. **UNIT –V** **BIOMASS**: Biomass Energy: Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing. **UNIT –VI** **FUEL CELL**: Classification – Efficiency – V-I characteristics. **GEOTHERMAL**: Classification – Dry rock and acquifer – Energy analysis.
Text Books and Reference Books	**TEXT BOOKS:** 1. "Acourse in power systems", by J.B.Guptha, S.K.Kataria&sons, Eleventh edition, Reprint-2014. 2. "Generation of Electrical Energy"- by B.R Gupta-S.Chand Publications,6th Edition, Reprint-2014. 3. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis - second edition, 2013. **REFERENCE BOOKS:** 1. Renewable Energy- Edited by Godfrey Boyle-oxford University, press, 3rd edition, 2013. 2. Renewable Energy Technologies /Ramesh & Kumar /Narosa. 3. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI. 4. Non-conventional energy source –B.H. Khan- TMH-2nd edition.
E-Resources	1. http://nptel.ac.in/courses 2. http://iete-elan.ac.in 3. http://freevideolectures.com/university/iitm

17ME41O1-INTRODUCTION TO ROBOTICS

Course category:	Program Open Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Physics, Differential Equations, Matrices and basic Geometry. Computer Simulation skills using MATLAB	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. Classification of robotic manipulators and related technologies. 2. Skills associated with robot control 3. Skills associated with sensors and machine vision systems to robot control 4. Kinematics analysis of robot systems 5. Robot programming. 6. Interactive applications of industrial robots	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand robotics in today and future and robot configuration and subsystems
	CO2	Gain knowledge about Control systems for motion control
	CO3	Understand about sensors and machine vision.
	CO4	Relate kinematics for robot motion
	CO5	Design and implement programming for robot systems by using programming.
	CO6	Gain knowledge about Industrial robots applications.
Course Content	**UNIT –I** **INTRODUCTION**: Need, Anatomy of robot, types of joints, types of constructions-degree of freedom, coordinate system workspace/work volume. Robot. Specification. **END-EFFECTORS**: Types - mechanical, magnetic, pneumatic **UNIT –II** **ACTUATORS**: Introduction, actuators – Characteristics, Types, comparison – Hydraulic, pneumatic, Electric- DC, AC, Servo, stepper. **MOTION CONTROL SYSTEMS**: Introduction, basic components and terminology, transfer function, open loop, feed-forward and closed-loop. Microprocessor control of electric motor. **UNIT-III** **SENSORS**: Introduction, characteristics. Types - Position, velocity, acceleration, force and pressure, torque, proximity, micro switches, touch and tactile, range finders. **MACHINE VISION**: Introduction to Machine Vision, the sensing and digitizing function in machine vision, Image processing and analysis- training the vision system. Robotic applications	

Course Content	**UNIT-IV** **KINEMATICS OF ROBOTS:** Introduction, reference frames. Robots as mechanisms - Matrix representation, transformations, forward and inverse kinematics of 2R and 3R robots. DH representation. degeneracy and dexterity **UNIT-V** **ROBOT PROGRAMMING**: Methods of robot programming- A robot program as a path in space Motion interpolation wait signal and delay commands branching **ROBOT LANGUAGES:** Introduction-Generation of Robot Programming Languages-robot language Structure –operating systems –Robot language elements and functions **UNIT-VI** **ROBOT APPLICATIONS**: manufacturing-material transfer and machine loading and unloading .Processing operations-welding-other processing operations, assembly and Inspection-robotic assembly, parts presentation methods. Inspection Automation
Text Books and Reference Books	**TEXT BOOKS:** 1. Industrial Robotics 2e by MP Groover McGraw-Hill Education (SIE) 2. Introduction To Robotics: Analysis,Control,Applications,2nd Edition Saeed B Niku Wiley **REFERENCE BOOKS:** 1. Introduction to Robotics by Subir Kumar Saha Tata McGraw-Hill Education. 2. Robotics: Fundamental Concepts And Analysis by Ashitava Ghosal oxford university press 3. Craig John J, Introduction to Robotics: Mechanics and Control, 3rd Edition, Prentice-Hall, 2005 4. P. Corke. Robotics, Vision and Control. Springer Verlag, 2011.
E-Resources	1. http://nptel.ac.in/courses 2. http://freevideolectures.com/university/iitm

17SH41O1-NANO TECHNOLOGY

Course Category:	Program Open Elective	**Credits:**	3
Course Type:	Theory	**Lecture -Tutorial-Practical:**	3-0-0
Prerequisite:	Basics of semiconductors	**Sessional Evaluation:**	40
		External Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The basic concepts of semiconductor nano devices. 2. Types of photonic and molecular materials 3. Design of thermal and gas sensors 4. Bio sensors and DNA based bio sensors 5. Criteria for the choice of materials 6. Protein based biosensors	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand various types of nano devices and nano mechanics
	CO2	Develop nano technology based LED,LASER…etc
	CO3	Develop the Electroluminescent Organic materials
	CO4	Develop the different thermal sensors
	CO5	Evaluate the response various materials
	CO6	Design different types of bio sensors
Course Content	**UNIT –I** **SEMICONDUCTOR NANODEVICES -I:** Single-Electron Devices; Nano scale MOSFET – Resonant Tunnelling Transistor - Single-Electron Transistors; Single-Electron Dynamics; Nanorobotics and Nano manipulation **UNIT-II** **SEMICONDUCTOR NANODEVICES -II:** Mechanical Molecular Nano devices; Nano computers: Theoretical Models; Optical Fibers for Nano devices; Photochemical Molecular Devices; DNA-Based Nano devices; Gas-Based Nano devices; Micro and Nano mechanics. **UNIT-III** **ELECTRONIC AND PHOTONIC MOLECULAR MATERIALS:** Preparation – Electroluminescent Organic materials - Laser Diodes - Quantum well lasers:-Quantum cascade lasers- Cascade surface-emitting photonic crystal laser- Quantum dotlasers- Quantum wire lasers:- White LEDs - LEDs based on nanowires - LEDs based on nanotubes- LEDs based on nanorods High Efficiency Materials for OLEDs- High Efficiency Materials for OLEDs - Quantum well infrared photo detectors.	

Course Content	**UNIT-IV** **THERMAL SENSORS:** Thermal energy sensors -temperature sensors, heat sensors- Electromagnetic sensors electrical resistance sensors, electrical current sensors, electrical voltage sensors, electrical power sensors, magnetism sensors - Mechanical sensors - pressure sensors, gas and liquid flow sensors, position sensors - Chemical sensors - Optical and radiation sensors. **UNIT-V** **GAS SENSOR MATERIALS:** Criteria for the choice of materials, Experimental aspects – materials, properties, measurement of gas sensing property, sensitivity; Discussion of sensors for various gases, Gas sensors based on semiconductor devices. **UNIT-VI** **BIOSENSORS:** Principles- DNA based biosensors – Protein based biosensors – materials for biosensor applications- fabrication of biosensors—future potential.
Text Books and Reference Books	**TEXT BOOKS:** 1. W. Ranier, ―Nano Electronics and Information Technology‖, Wiley, (2003). 2. K.E. Drexler, ―Nano systems‖, Wiley, (1992). **REFERENCE BOOKS:** 1. M.C. Petty, ―Introduction to Molecular Electronics‖1995.

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY: VIDYANAGAR

(AUTONOMOUS)

(AFFILIATED TO JNTU ANANTAPUR: ANANTHAPURAMU)

SPSR NELLORE DIST

IV YEAR OF FOUR YEAR B.TECH DEGREE COURSE – II SEMESTER

ELECTRONICS AND COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the academic year 2017-2018)

(For the batch admitted in the academic year 2017-2018)

S.No	Course Code	Course Title	Instruction Hours/Week			Credits	Evaluation									
							Sessional-I Marks			Sessional-II Marks			Total Sessional Marks(40)	End Semester Examination		Maximum Total Marks
		THEORY	L	T	D/P		Test$^{\$}$-I	A$^{\#}$-I	Max. Marks	Test$^{\$}$-II	A$^{\#}$-II	Max. Marks	0.8*Best of two+0.2* least of two	Duration In Hours	Max. Marks	100
1	17EC42EX	Elective-IV	3	-	-	3	34	6	40	34	6	40		3	60	100
2	17XX42OX	Open Elective-II	3	-	-	3	34	6	40	34	6	40		3	60	100
		PRACTICALS											Continuous Assessment and Seminar (80 Marks)			
3	17EC42PR	PROJECT WORK	-	-	3	11	-	-	-	-	-	-		3	120	200
4	17EC42MO	MOOCs	-	-	-	3	-	-	-	-	-	-		-	-	-
5	17EC42IS	INTERNSHIP	-	-	-	2	-	-	-	-	-	-		-	-	-
		TOTAL	6	-	3	22	-	-	-	-	-	-	-	-	240	400

A for Assignment (continuous evaluation)

$ Test (Descriptive & Objective) duration = 2 Hours

ELECTIVES-IV

1. **SATELLITE COMMUNICATION**
2. **ADAPTIVE SIGNAL PROCESSING**
3. **ERROR CONTROL CODING**
4. **RELIABILITY ENGINEERING**

17EC42E1 – SATELLITE COMMUNICATION

Course category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Antenna and Wave Propagation, Radar Engineering	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to:	
	1. Understand the origin, brief history, current state and future trends of Satellite Communications. 2. Understand the principles, concepts and operation of satellite communication systems. 3. Calculate and interpret key geometric and timing parameters for a variety of common satellite orbits. 4. Understand different types of satellite subsystems. 5. Describe the concepts of signal propagation affects, link design, rain fading, link availability and perform interference calculations. 6. Understand different components of satellite Earth Stations.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand history, current state and future trends of Satellite Communications.
	CO2	Identify, formulate and solve engineering problems related to orbital aspects of satellite communication.
	CO3	Know about working of different subsystems in the satellite.
	CO4	Design satellite link budgets to account for channel losses, noise, and interference in satellite communications systems for specific communications requirements.
	CO5	Gain knowledge about different multiple access techniques.
	CO6	Acquire knowledge about of Earth Station components.
Course Content	**UNIT-I** **INTRODUCTION:** The Origin of Satellite Communications, A brief history of Satellite Communications, Frequency allocations for Satellite Services, Applications, Current State of Satellite Communications and Future trends of Satellite Communications. **UNIT-II** **ORBITAL ASPECTS OF SATELLITE COMMUNICATION:** Orbital Mechanics, Lock Angle determination, Orbital perturbations, Orbit determination, Launches and Launch Vehicles, Orbital effects in Communication Systems Performance. **UNIT-III** **SATELLITE SUBSYSTEMS:** Introduction, Attitude and Orbit Control System (AOCS), Telemetry, Tracking, Command and Monitoring (TTC&M), Power Systems, Communication Subsystems, Satellite Antennas, Equipment reliability and Space Qualification.	

Course Content	**UNIT-IV** **SATELLITE LINK DESIGN:** Basic Transmission Theory, System Noise Temperature and G/T ratio, Design of Down Link, Up Link design, Design of Satellite links for specified C/N, System Design examples. **UNIT-V** **MULTIPLE ACCESS:** Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Frame Structure and Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception. **UNIT-VI** **EARTH STATION:** Types of Earth Station, Earth Station Architecture, Earth Station Design Considerations, Earth Station Testing, Earth Station Hardware and Satellite Tracking.
Text Books and Reference Books	**TEXT BOOKS :** 1. "Satellite Communication" - Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003. 2. "Satellite Communications" - Anil K.Maini and Varsha Agarwal, Wiley India Pvt. Ltd., 2011. **REFERENCE BOOKS :** 1. "Satellite Communication"- D.C Agarwal, Khanna Publications,5th edition 2. "Satellite Communications"- Dennis Roddy, McGraw Hill, 4th Edition, 2009.
E-Resources	1. http://ocw.mit.edu/courses/aeronautics-and-astronautics/16-851-satellite-engineering-fall-2003/lecture-notes/

17EC42E2- ADAPTIVE SIGNAL PROCESSING

Course Category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture -Tutorial-Practical:**	3-0-0
Prerequisite:	Signals & Systems Digital Signal Processing	**Sessional Evaluation:** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. know some practical aspects of signal processing, and in particular adaptive systems using adaptive signal processing algorithms (e.g., the LMS algorithm) and many applications, such as adaptive noise cancellation, interference canceling, system identification, etc.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand the concept of adaptive filter theory and develop a filter for any real time application.
	CO2	Know how to get desired response from a filter and various searching methods.
	CO3	Design a filter using Steepest Descent algorithm and LMS algorithm.
	CO4	Compare Eigen filters with LMS algorithm in any real time application.
	CO5	Apply RLS algorithm design an adaptive filter equalization and Kalman filtering.
	CO6	Develop an adaptive filter for target tracking using only DOA.
Course Content	**UNIT I** **INTRODUCTION TO ADAPTIVE SYSTEMS:** Definitions, Characteristics, Applications, Example of an Adaptive System. The Adaptive Linear Combiner - Description, Weight Vectors, Desired Response Performance function, Gradient & Mean Square Error. **UNIT II** **DEVELOPMENT OF ADAPTIVE FILTER THEORY AND SEARCHING METHODS:** Introduction to Filtering, Smoothing and Prediction, Linear Optimum Filtering, Problem statement, Principle of Orthogonality - Minimum Mean Square Error, Wiener- Hopf equations, Error Performance - Minimum Mean Square Error. Methods & Ideas of Gradient Search methods, Gradient Searching Algorithm & its Solution, Stability & Rate of convergence - Learning Curves. **UNIT III** **STEEPEST DESCENT ALGORITHMS, EIGEN VALUES AND VECTORS:** Gradient Search by Newton's Method, Method of Steepest Descent, Comparison of Learning Curves. Eigen Value Problem, Properties of Eigen values and Eigen vectors, Eigen Filters, Eigen Value computations.	

Course Content	**UNIT IV** **LMS ALGORITHM & APPLICATIONS:** Overview - LMS Adaptation algorithms, Stability & Performance analysis of LMS Algorithms - LMS Gradient & Stochastic algorithms, Convergence of LMS algorithm, Noise cancellation, Cancellation of Echoes in long distance telephone circuits. **UNIT-V** **RLS ALGORITHM** : Matrix Inversion lemma, Exponentially weighted recursive least square algorithm, update recursion for the sum of weighted error squares, convergence analysis of RLS Algorithm, Application of RLS algorithm on Adaptive Equalization. **UNIT-VI** **KALMAN FILTERING:** Statement of Kalman filtering problem, Filtering, Initial conditions, Variants of Kalman filtering, Extend Kalman filtering, Introduction to Recursive Mean Square Estimation Random variables, Target tracking using only DOA.
Text Books and Reference Books	**TEXT BOOKS:** 1. Adaptive signal processing- Bernard Widrow, Samuel D.Strearns, 2005, PE. 2. Adaptive Filter Theory - Simon Haykin-, 4th ed., 2002, PE Asia **REFERENCE BOOKS:** 1. Optimum signal processing: An introduction - Sophocles. J. Orfamadis, 2 ed., 1988, McGraw-Hill, New York 2. Adaptive signal processing-Theory and Applications, S.Thomas Alexander, 1986, Springer-Verilog.
E-Resources	1. https://nptel.ac.in/courses/117105075/

17EC42E3- ERROR CONTROL CODING

Course Category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture -Tutorial-Practical:**	3-0-0
Prerequisite:	Knowledge of Probability, Matrices, Modulation.	**Sessional Evaluation:** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. Know some aspects of mutual information, channels, coding, in particular to source coding, linear block codes, cyclic codes, convolutional coding and error control in data storage systems.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Acquire knowledge about various information sources, Fixed Length and Variable Length Coding.
	CO2	Develop skills in obtaining the Entropy and finding the Efficiency of source codes.
	CO3	Attain skills in creating various Hamming Codes, Syndrome decoding and parity check matrices
	CO4	Acquire knowledge in Error correction using syndrome vector and Cyclic Redundancy Check (CRC).
	CO5	Apply appropriate coding methods such as Golay Codes- BCH code and Error control for computer main processor.
	CO6	Develop skills for the Error control in IBM 3850 main storage system and able to compare the performance of Convolutional codes and Block codes.
Course Content	**UNIT – I** **INFORMATION AND CODING**: Definition of Information- sources-types - mathematical models-information content of discrete memory less source- information content of a symbol-Entropy-Information Rate-Discrete Memory less Channels-Types of channels-Mutual information-over view of error control coding techniques-classification of codes. **UNIT – II** **SOURCE CODING**: Fixed Length and Variable Length Coding, properties of Prefix codes, Shannon-Fanon Coding, Huffman code, Huffman code applied for pair of Symbols, Efficiency Calculations, Lempel-Ziv Codes	

Course Content	**UNIT – III** **LINEAR BLOCK CODES**: Structure of linear block code- Hamming Codes-Error detection and correction capabilities of Hamming code-Encoder of (7, 4) Hamming code-Syndrome decoding-Error correction using syndrome vector. **UNIT – IV** **CYCLIC CODES:** Definition- Generator polynomial for cyclic code-systematic and Non-systematic code words-Generator and parity check matrices of cyclic codes-Encoder for (n, k) cyclic code. Syndrome decoding –Cyclic Redundancy Check (CRC). **UNIT – V** **CONVOLUTIONAL CODES**: Golay Codes-Bose Chaudhri Hocquenghem (BCH) codes-Encoder for Convolutional code-Graphical representation for Convolutional encoding-Decoding methods- Viterbi algorithm-performance comparison of Convolutional codes and Block codes. Application of Viterbi and Sequential Decoding. **UNIT – VI** **ERROR CONTROL IN DATA STORAGE SYSTEMS**: Error control for computer main processor- Error control for magnetic tapes-syndrome computation- Error control in IBM 3850 main storage system.
Text Books and Reference Books	**TEXT BOOKS:** 1. Communication Systems – Dr.Sanjay Sharma-S.K. Kataria &sons-New Delhi. 2. Shu lin and Daniel J. Costello, Jr. "Error Control Coding – Fundamentals and Applications", Prentice Hall Inc. **REFERENCE BOOKS:** 1. Digital Communications-John G.Proakis, Masoud Salehi-Mc Graw Hill-5e 2. Bernard Sklar,"Digital Communications Fundamental and Application", Pearson Education, Asia. 3. B.P.Lathi,Zhi Ding-Modern Digitl and Analog communication systems-4/e - Oxford university press-2016 4. Simon Haykin- Communication systems-4/e,Wiley India,2011

17EC42E4 – RELIABILITY ENGINEERING

Course category:	Program Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 – 0
Prerequisite:	Basics of Analog and Digital communications Signals and Systems	**Sessional Evaluation :** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to:	
	1. To acquire Knowledge about Quality and reliability and Probability concepts and failure time of Electronic system. 2. To become familiar with system reliability and failure rates. 3. To cater the knowledge Device Reliability and faults. 4. To understand & analyze various Reliability Techniques of electronic systems. 5. Understanding the need of Reliability improvement methods of systems. 6. To analyze various Reliability Life Testing Methods	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Gain adequate knowledge about Quality and reliability and Probability concepts and failure time of Electronic system.
	CO2	Understand the system reliability and failure rates.
	CO3	Know about different faults and Device Reliability
	CO4	Able understand & analyze various Reliability Techniques of electronic systems.
	CO5	Analyse Reliability improvement methods of systems.
	CO6	Know about various Reliability Life Testing Methods
Course Content	**UNIT-I** **INTRODUCTION:** Quality and reliability, importance of reliability, reliability parameters, Methods of achieving reliability, Reliability fundamentals and bath tub curve, Reliability measures and parameters, Electronic system reliability, Hazard rate model, Probability concepts and failure time distribution. **UNIT-II** **SYSTEM RELIABILITY:** System reliability modeling, v-out of 'n' system, Analysis of complex reliability structures, System reliability estimation. Measure of central tendency and dispersion system reliability with constant and variable failure rates. **UNIT-III** **DEVICE RELIABILITY:** Accelerated life testing, Early life reliability, Long-term device reliability, Electrostatic discharge, Electrical stress, Steady state hazard rate.	

Course Content	**UNIT-IV** **RELIABILITY TECHNIQUES:** Reliability prediction, Cut set, Tie set, FME set, PTA, Markov, Monte Carlo Simulation, Application to electronic systems. VLSI reliability: reliability screening and modeling, electrostatic discharge damage, Metal Electro-migration phenomena, dielectric breakdown, instabilities in ICs. **UNIT-V** **MAINTAINABILITY AND AVAILABILITY CONCEPTS:** Guidelines for design for maintainability, MITR, BIT / BITE facility, Spares provisioning, Electronics system, packaging and interconnections. Serial and parallel reliability maintainability and availability failure mechanisms, reliability data and analysis, Reliability improvement methods. **UNIT-VI** **RELIABILITY LIFE TESTING METHODS:** Reliability Life Testing - Test time calculations, Burn-in testing, Acceptance testing, accelerated life testing and Experimental Design - Reliability Growth Testing - Growth process, Idealized growth curve and other growth modals.
Text Books and Reference Books	**TEXT BOOKS:** 1. David J. Klinger, Yoshinao Nakada and Maria A. Menendez, " AT & T Reliability Manual ", Von Nostrand Reinhold, New York, 5th Edition, 1998. 2. Gregg K. Hobbs, " Accelerated Reliability Engineering - HALT and HASS ", John Wiley & Sons, New York, 2000. 3. Lewis, " Introduction to Reliability Engineering ", 2nd Edition, Wiley International, 1996. **REFERENCE BOOKS:** 1. O' Connor, P.D.T., " Practical Reliability Engineering ", Hayden Book Company, New Jersey, 1981. 2. S. K. Sinha, Reliability and Life Testing, Wiley Eastern Ltd., 1986.
E-Resources	1. http://www.nptel.ac.in. 2. https://outofprint.cc/downloads/introduction-to-reliability-engineering-lewis.pdf

OPEN ELECTIVES-II

1. **PYTHON PROGRAMMING**
2. **DIGITAL CONTROL SYSTEMS**
3. **SMART GRID TECHNOLOGY**
4. **DISASTER MANAGEMENT AND MITIGATION**

17CS42O4 –PYTHON PROGRAMMING

Course Category:	Open Elective	**Credits:**	3
Course Type:	Theory	**Lecture -Tutorial-Practical:**	3-0-0
Prerequisite:	Require the fundamental concepts of computers and any programming basics	**Sessional Evaluation:** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected:	
	1. To introduce Object Oriented Programming using an easy to use language 2. To use iterators and generators. 3. To test objects and handle changing requirements. 4. To be exposed to programming over the web to develop various applications.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand the concepts of object oriented programming in python.
	CO2	Study to compose a group of characters and utilization of strings into various applications
	CO3	Use generators and iterators to develop different applications
	CO4	Develop test cases and handle refactoring to identify its advantages.
	CO5	Use serializing objects to program over the web.
	CO6	Lean how to create and utilize the advantages of packages
Course Content	**UNIT-I** **INTRODUCTION:** Function Declaration - Import - Objects - Indenting as Requirement - Exceptions – Unbound Variables - Case Sensitive - Scripts - Native Data Types - Booleans - Numbers - Lists -Tuples - Sets - Dictionaries - Comprehensions - List Comprehensions – Dictionary Comprehensions - Set Comprehensions. **UNIT-II** **STRINGS**: Strings - Unicode - Formatting - String Methods - Bytes - Encoding - Regular Expressions Verbose - Case Studies **UNIT-III** **CLASSES**: Closures - List of Functions - List of Patterns - File of Patterns - Generators – Defining Classes - Instantiating Classes - Instance Variables - Iterators – Iterators - Assert –Generator Expressions **UNIT-IV** **FILES**: Reading and Writing Text Files - Binary Files - Stream Objects - Standard Input, Output and Error. **UNIT-V** **XML and SERILIZATION**: XML - Atom Feed - Parsing HTML - Searching for Nodes - html - Generation – Serializing Objects - Pickle Files - Versions - Debugging - Serializing to JSON	

Course Content	**UNIT-VI** **PACKAGING PYTHON LIBRARIES**: Directory Structure, Writing Your Setup Script - Classifying Your Package - Examples of Good Package Classifiers - Checking Your Setup Script for Errors - Creating a Source Distribution - Creating a Graphical Installer - Building Installable Packages for Other Operating Systems - Adding Your Software to the Python Package Index - The Many Possible Futures of Python Packaging.
Text Books and Reference Books	**TEXT BOOKS:** 1. Mark Pilgrim, "Dive into Python 3", Apress, 2009. 2. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to Think Like a Computer Scientist - Learning with Python", Green Tea Press, 2002. **REFERENCE BOOKS:** 1. John V. Guttag, "Introduction to Computation and Programming using Python", Prentice Hall of India, 2014 2. Mark Lutz, "Learning Python: Powerful Object-Oriented Programming", Fifth Edition, O'Reilly, Shroff Publishers and Distributors, 2013
E-Resources	1. https://nptel.ac.in/courses 2.https://freevideolectures.com/university/iitm

17EE42O1-DIGITAL CONTROL SYSTEMS

Course Category:	Program Open Elective	**Credits:**	3
Course Type:	Theory	**Lecture -Tutorial-Practical:**	3-0-0
Prerequisite:	Signals and Systems, Linear Control Systems, Digital Design	**Sessional Evaluation:** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The Principles and techniques of A/D and D/A conversions and basics of Z-Transform. 2. The Stability analysis of digital control systems. 3. The design of digital control systems for different engineering model. 4. The state variable analysis, Routh criterion 5. The transient & steady state analysis 6. The design of feedback controller	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Obtain dynamic responses of linear systems and determine their stability, construct root-locus and bode plots, and apply Nyquist criterion in the context of controller design.
	CO2	Translate a set of performance specifications given in words to a formal description of a design problem, and then design a suitable feedback-controller using design tools, followed by simulation and verification using software tools.
	CO3	Know the techniques for relaxing the constraints or redesigning the controller for achieving closed-loop specifications either in the time-domain or in the frequency domain.
	CO4	Debug their controller design
	CO5	Design digital controllers, assess their design through the constraint specifications, and decide whether their initial design is acceptable or can be improved
	CO6	Obtain dynamic responses of linear systems and determine their stability, construct root-locus and bode plots, and apply Nyquist criterion in the context of controller design.
Course Content	**UNIT – I** **INTRODUCTION:** Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations. Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z- Transforms. **UNIT-II** **SIGNAL PROCESSING AND DIGITAL CONTROL:** Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.	

Course Content	**UNIT-III** State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and its Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations. **UNIT – IV** **STATE VARIABLE ANALYSIS:** Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function. Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion. **UNIT – V** **DESIGN OF DIGITAL CONTROLLER:** Transient & steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation & Design procedure in the w-plane, Lead, Lag & Lead Lag compensators & digital PID controllers. **UNIT – VI** **POLE PLACEMENT DESIGN AND STATE OBSERVERS:** Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula. State Observers–Full order and Reduced order observers.
Text Books and Reference Books	**TEXT BOOKS:** 1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition. 2. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003. **REFERENCES BOOKS:** 1. Digital Control and State Variable Methods by M. Gopal, TMH
E-Resources	1. nptel.ac.in/syllabus/108103008/ 2. http://ocw.mit.edu/courses/mechanical-engineering/2-171-analysis-and-design-of-digital-control-systems-fall-2006/

17EE42E4-SMART GRID TECHNOLOGY

Course Category:	Program Open Elective	**Credits:**	3
Course Type:	Theory	**Lecture -Tutorial-Practical:**	3-0-0
Prerequisite:	Nil	**Sessional Evaluation:** **External Evaluation:** **Total Marks:**	40 60 100

Course Objectives	Students undergoing this course are expected to:	
	1. Learn introduction to Smart Grid 2. Learn necessity of smart grid 3. Learn operation and construction of measuring the smart grid signals 4. Learn automation technologies of smart grid 5. Learn Island, protection and applications of smart grid 6. Learn Distributed Energy Resources	
Course Outcomes	After completing the course the student will be able to	
	CO1	Gain the knowledge on introduction to Smart Grid
	CO2	Gain the knowledge on necessity of smart grid
	CO3	Know the operation and construction of measuring the smart grid signals.
	CO4	Understand the automation technologies of smart grid
	CO5	Gain knowledge on Island, protection and applications of smart grid
	CO6	Understand the concepts on Distributed Energy Resources
Course Content	**UNIT-I** **INTRODUCTION TO SMART GRID:** Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient & Self-Healing Grid, Present development & International policies in Smart Grid. Case study of Smart Grid ,CDM opportunities in Smart Grid. **UNIT-II** **NECESSITY OF SMART GRID:** The Smart Grid Enables the ElectriNetSM, Local Energy Networks, Electric Transportation, Low-Carbon Central Generation, the Attributes of the Smart Grid- Need of a Smart Grid- Is the Smart Grid a "Green Grid"- Smart Grid Initiative for Power Distribution Utility in India. **UNIT –III** **SENSING AND MEASUREMENT:** Smart metering and demand-side integration, Introduction, Smart metering, Evolution of electricity metering, Key Components of smart metering, Smart meters: An overview of the hardware used Signal acquisition, Signal conditioning, Analogue to digital conversion, Computation, Input/output, Communication, Communications infrastructure and protocols for smart metering,	

Course Content	**UNIT –IV** **CONTROL AND AUTOMATION TECHNOLOGIES :**Home-area network, neighbourhood area network, Data concentrator, Meter data management system, Protocols for communications, Demand-side integration, Services provided by DSI, Implementations of DSI, Hardware support to DSI implementations, Flexibility delivered by prosumers from the demand side, System support from DSI. Smart Appliances, Automatic Meter Reading (AMR), Outage**.** Management System (OMS), Plug in Hybrid Electric Vehicles (PHEV), Vehicle to Grid, Grid to Vehicle, Coordination of PHEV charging and discharging cycle, Smart Sensors, Home & Building Automation, Phase Shifting Transformers. **UNIT –V** **CONCEPT OF MICRO GRIDS:** Concept of micro grid, need & applications of micro grid, formation of micro grid, issues of interconnection, protection & control of micro grid. Islanding, need and benefits, different methods of islanding detection. **UINT-VI** **DISTRIBUTED ENERGY RESOURCES:** Distributed Energy Resources: Small scale distributed generation, Distributed Generation Technology, Internal Combustion Engines, Gas Turbines, Combined Cycle Gas Turbines, Micro turbines, Fuel Cells, Solar Photovoltaic, Solar thermal, Wind power, Geothermal, - all sources as a DG. Advantages and disadvantages of DG.
Text Books and Reference Books	**TEXT BOOKS:** 1. "Integration of Green and Renewable Energy in Electric Power Systems", by Ali K., M.N. Marwali, Min Dai, -Wiley. 2. "The Smart Grid: Enabling Energy Efficiency and Demand Response", by Clark W. Gellings, - CRC Press. 3. "Smart Grid: Technology and Applications", by Janaka Ekanayake, N. Jenkins, K. Liyanage, J. Wu, Akihiko Yokoyama - Wiley. **REFERENCE BOOKS:** 1. "Smart Grids" by Jean Claude Sabonnadiere, Nouredine Hadjsaid - Wiley Blackwell. 2. "Securing the Smart Grid" by Tony Flick and Justin Morehouse- Elsevier Inc. 3. "Smart Power: Climate Change, the Smart Grid, and the Future of Electric Utilities"by Peter S. Fox-Penner - Island Press. 4. "SMART GRID Fundamentals of Design and Analysis "by James Momoh - IEEE press, A John Wiley & Sons, Inc., Publication.
E-Resources	1. http://nptel.ac.in/courses 2. http://iete-elan.ac.in 3. http://freevideolectures.com/university/iitm

17CE42O1-DISASTER MANAGEMENT AND MITIGATION

Course category:	Program Open Elective	**Credits:**	3
Course Type:	Theory	**Lecture - Tutorial - Practical:**	3 - 0 - 0
Prerequisite:	Environmental science	**Sessional Evaluation :**	40
		External Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to understand:	
	1. The basic knowledge of Environmental Hazards and disasters. 2. The basics of Endogenous and Exogenous hazards and gives a suitable picture on the different types of hazard and disaster mitigation methods and some case studies related to disasters 3. The cumulative atmosphere hazards, cyclones. 4. The soil erosion, sedimentation, population explosion 5. The approaches of pre-disaster, post disaster preparation 6. The various case studies.	
Course Outcomes	Upon successful completion of the course , the students will be able to:	
	CO1	Understand Hazards and disasters and different approaches to disaster and their mitigation
	CO2	Explore the types of disasters, exogenous disasters and their effects
	CO3	Explore the Endogenous disasters and their effects
	CO4	Know the man induced disasters and their effects
	CO5	Understand the Disaster management through engineering applications
	CO6	Understand the disasters in national and international level.
Course Content	**UNIT-I** **ENVIRONMENTAL HAZARDS & DISASTERS**: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches. **UNIT-II** **TYPES OF ENVIRONMENTAL HAZARDS & DISASTERS:** Natural hazards and Disasters - Man induced hazards & Disasters Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters Planetary Hazards- Endogenous Hazards - Exogenous Hazards Endogenous Hazards - Volcanic Eruption, Earthquakes, Landslides; Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Environmental impacts of volcanic eruptions Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of earthquakes - Human adjustment, perception & mitigation of earthquake.	

Course Content	**UNIT –III** Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters Infrequent events; Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms - causes , distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters; Floods- Droughts- Cold waves- Heat waves. Floods:- Causes of floods- Flood control measures (Human adjustment, perception & mitigation); Droughts:- Impacts of droughts- Drought control measures; Extra Planetary Hazards/ Disasters **UNIT –IV** Soil Erosion- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters - Release of toxic chemicals, nuclear explosion- Sedimentation processes. Sedimentation processes: - Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation. Biological hazards/ disasters: - Population Explosion. **UNIT –V** Emerging approaches in Disaster Management- Three Stages 1. Pre- disaster stage (preparedness) 2. Emergency Stage 3. Post Disaster stage-Rehabilitation **UNIT – VI** Case study of - Bhuj earthquake, Gujarat 2001 Indian Ocean earthquake and Tsunami, 2004 Chernobyl disaster, Ukraine 1986 Bhopal Gas tragedy, 1984 Kerala Floods, 2018.
Text Books and Reference Books	**TEXT BOOKS:** 1. Disaster Management by Rajib Shah, Universities Press, India, 2003 2. Disaster Science and Management by Tushar Bhattacharya, TMH Publications. 3. Disaster Mitigation: Experiences And Reflections by PardeepSahni 4. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning **REFERENCES:** 1. The Environment as Hazards by Kates, B.I & White, G.F, Oxford Publishers, New York, 1978 2. Disaster Management by R.B. Singh (Ed), Rawat Publication, New Delhi, 2000 3. Disaster Management by H.K. Gupta (Ed), Universiters Press, India, 2003 4. Space Technologyfor Disaster Mitigation in India (INCED) by R.B. Singh,, University of Tokyo,1994.
E-Resources	1.nptel.ac.in/courses/117105079/