VASAVI COLLEGE OF ENGINEERING(AUTONOMOUS)

Ibrahimbagh, Hyderabad-31
Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

Sponsored by
VASAVI ACADEMY OF EDUCATION
Hyderabad

SCHEME OF INSTRUCTION AND SYLLABI UNDER CBCS FOR B.E. (ECE) III and IV Semesters With effect from 2018-2019 (For the batch admitted in 2017-18)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
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VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION FOR B.E. III-SEMESTER w.e.f. 2018-19
(Students admitted in A.Y. 2017-18) - CBCS

S. No.	Course Code	Course	Scheme of Instruction				Scheme of Examination			Credits
			Hours / week				Duration in Hrs	Max Marks		
			L	T	D	P		SEE	CIE	
THEORY										
1	BS310MA	Engineering Mathematics – III	3	1	-	-	3	60	40	3
2	ES310EC	Networks Analysis	3	1	-	-	3	60	40	3
3	PC310EC	Electronic Materials & Devices	3	1	-	-	3	60	40	3
4	PC320EC	Electromagnetic Theory	3	2	-	-	3	60	40	4
5	MC320CE	Environmental Science	2	-	-	-	3	60	40	2
6	MC310ME	Introduction to Entrepreneurship	1	-	-	-	2	40	30	1
7	HS310EH	FS-I: Communication Skills in English-I	2	2	-	-	3	60	40	2
8	OE3XXXX	Open Elective-I	2	-	-	-	3	60	40	2
PRACTICALS										
9	ES321EC	Basic Circuits Lab & Electronics Workshop	-	-	-	3	3	50	30	2
10	PC311EC	Electronic Devices Lab	-	-	-	3	3	50	30	2
		Total	**19**	**7**	**-**	**6**	**-**	**560**	**370**	**24**
		Grand total	**32**					**930**		

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INTERDISCIPLINARY COURSES OFFERED BY ECE TO EEE

S.No.	Code	Subject	Scheme of Instruction				Scheme of Examination			Credits
			Hours/ week				Duration in Hrs	Maximum Marks		
			L	T	D	P		SEE	CIE	
THEORY										
1	PC330EC	Electronics Engineering - I	3	-	-	-	3	60	40	3
PRACTICALS										
1	PC321EC	Electronics Engineering - I Lab	-	-	-	2	3	50	30	1

SYLLABUS FOR B.E III SEMESTER
ENGINEERING MATHEMATICS – III
(Common to all Branches except IT)

Subject Code : BS310MA	Instruction : 3+1 Hrs/week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 03

Course Objectives	Course Outcomes
1. ***Study*** the Fourier series, conditions for expansion of function and half range series **2.** ***Formulate*** and solve linear and nonlinear partial differential equations and apply partial differential equations to engineering problems viz., wave, heat and Laplace's equations. **3.** ***Study*** the methods to solve equations, apply numerical methods to interpolate, differentiate and integrate functions and to solve differential equations using numerical methods and solve systems of equations. **4.** ***Understand*** Random variables Probability Distributions, Statistics and their applications. **5.** ***Understand*** how to fit a curve to a given data, how correlation between variables can be measured.	**At the end of the course, students will be able to:** 1. ***Expand*** any function which is continuous, discontinuous, even or odd in terms of its Fourier series. 2. ***Find*** the partial differential equations by eliminating arbitrary constants and functions and solve linear, nonlinear Partial differential equations and also will be able solve wave, heat and Laplace's equations in engineering problems. 3. ***Solve*** algebraic and transcendental equations using Bisection method Regula-Falsi, Newton-Raphson, apply numerical methods to interpolate, differentiate functions, solve systems of equations and solve differential equations using numerical methods. 4. ***Apply*** various probability distributions to solve practical problems, to estimate unknown parameters of populations and apply the tests of hypotheses. 5. ***Solve*** problems on how fitting of a curve to given data using curve fitting, and also to find co-efficient of correlation and to determine regression lines and their applications.

UNIT- I:

Fourier Series: Introduction to Fourier series – Conditions for a Fourier expansion – Functions having points of discontinuity – Change of Interval - Fourier series expansions of even and odd functions - Fourier Expansion of Half- range Sine and Cosine series.

UNIT –II:

Partial Differential Equations and its Applications: Formation of first and second order Partial Differential Equations - Solution of First

Order Equations – Linear Equation - Lagrange's Equation, Non-linear first order equations - Charpit's method

Applications of Partial Differential Equations: Classification of second order Partial Differential Equations- Method of Separation of Variables - Solution of One Dimensional Heat Equation - One Dimensional Wave Equation –Two Dimensional Heart Equation - Laplace's Equation.

UNIT-III :

Numerical Methods: Solution of Algebraic and Transcendental equations**-**Bisection method - Regula Falsi method- Newton-Raphson Method - Interpolation- Newton's Forward and Backward Interpolation Formulae - Lagrange's Interpolation Formula - Newton's Divided Difference Formula - Numerical Differentiation -Interpolation approach- Numerical Solutions of Ordinary Differential Equations - Taylor's Series Method - Euler's Method - Runge-Kutta Method of 4^{th} order (without proofs).

UNIT–IV:

Probability and Statistics: Random variables – Probability Distribution function for Discrete and Continuous Random variables - Expectation – Variance – Moments -Moment Generating Function- Poisson and Normal Distributions – Testing of Hypothesis - Tests of Significance - t-test - F-test - χ^2 - test for small samples.

UNIT-V:

Curve Fitting: Curve fitting by the Method of Least Squares **-**Fitting of Straight line –Regression - Lines of Regression – Correlation – Karl Pearson's Co-efficient of Correlation.

Suggested Readings:

1. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Third Edition, Narosa Publications, 2007.
2. Dr.B.S Grewal Higher Engineering Mathematics, 40^{th} Edition, Khanna Publishers.
3. Dr.B.S Grewal Numerical Methods, Khanna Publishers.
4. Gupta & Kapoor, Fundamentals of Mathematical Statistics, Sultan chand& sons, New Delhi.
5. Kreyszig E Advanced Engineering Mathematics, 8th Edition, John Wiley & Sons Ltd, 2006.
6. N.P.Bali& Manish Goyal A text book of Engineering Mathematics by, Laxmi Publication.
7. S.S.SastryNumerical Analysis–PHI Learning Ltd.,

SYLLABUS FOR B.E III SEMESTER
NETWORKS ANALYSIS

Subject Code : ES310EC	Instruction : 3+1 Hrs/week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 03

Course Objectives	Course Outcomes
1. To make the students capable of analyzing any given electrical networks. 2. To make the students learn how to synthesize network from given immittance function.	**At the end of the course, students will be able to:** 1. Calculate circuit parameters for given circuit. 2. Analyze given circuit in time domain and frequency domain 3. To perform transient and steady state analysis for RLC circuits. 4. Determine two port network parameters from given network 5. Synthesize from driving point function in Foster and Cauer forms using R,L,C.

Unit-I

Network reduction techniques: Review of Kirchoff's laws. Nodal and super nodal analysis, mesh and super mesh analysis, source transformation, star and delta transformations, graph theory.

Unit-II

Network Theorems to AC and DC circuits: Super position theorem, Thevenin's and Norton's theorem, maximum power transfer theorem, Reciprocity theorem, Millman's theorem, Tellegen's theorem.

Unit-III

Transient and Steady state response of circuits: Zero input response(ZIR), Zero state response (ZSR), complete response. Transient and steady state analysis of RL,RC,RLC circuits for unit step , sinusoidal and exponential inputs.

UNIT-IV

Two port networks: Z,Y,h,g, ABCD parameters. Equivalence of two port networks .T,pi transformations, Inter connection of two ports.

UNIT-V

Frequency domain Analysis: Concept of poles, zeros, impedance and admittance functions. Analysis of series and parallel resonance, Q factor, selectivity, bandwidth

Network Synthesis: Hurwitz polynomials, positive real functions, LC immitance functions, RC impedance functions, RL admittance functions, RL imedance functions, RC admittance functions. Cauer and Foster's forms of RL impedance and RC admittance

Suggested Reading:

1. William H. Hayt, Jr., Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, 5th edition, McGraw Hill, 2010.
2. Van Valkenberg M.E., Network Analysis, PHI, New Delhi, 3rd edition 2002.
3. Chakrabarti, Ciruit Theory Dhanapati Rai & Co(Pvt.)Ltd., Educational & Technical Publishers,
4. Charles A. Desoer and Ernest S Kuh, Basic Circuit Theory, McGraw Hill, 2009.
5. Raymond A. DeCarlo and Penmin Lin, Linear Circuit Analysis, 2nd edition, Oxford Univ. Press, 2003.
6. Lawrence P. Huelsman, Basic Circuit Theory, 3rd edition,2009.

SYLLABUS FOR B.E III SEMESTER
ELECTRONIC MATERIALS & DEVICES

Subject Code : PC310EC	Instruction : 3+1 Hrs/week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 03

Course Objective	Course Outcomes
1. To familiarize the students with various two terminal and three terminal electronic devices working and implementation and use in the design of real time electronic products.	**At the end of the course, students will be able to:** 1. Analyze the operation of PN-Junction as a diode under different biasing and temperature conditions. 2. Employ PN- Junction diode as a rectifier in power supplies. 3. Study the principles of Special devices (includes LED, Photodiode, tunnel diode, SCR etc.) 4. Design simple regulated power supplies using zener diode as a reference. 5. Perform the small signal analysis (including h-parameters) for BJT's and FET's. 6. Apply different biasing techniques (including self bias) for BJT's and FET's

UNIT - I

Materials: Types of materials – gasses, Liquids & solids, Different types of solids – conductors, insulators & semiconductors (intrinsic, N-type & P-type), Interface between metal-metal, metal-semiconductor and semiconductor-semiconductor (PN &shotkey contact).

Junction Diode : Different types of PN Junction formation techniques, PN Junction Characteristics, biasing- band diagrams and current flow, Diode current equations under forward bias and reverse bias conditions, Junction breakdown in diodes and breakdown voltages, effect of temperature on diode characteristics, Diode as a circuit element, small signal diode models, Junction capacitance under forward bias and reverse bias, Diode switching characteristics, Zener Diodes, Zener voltage regulator and its limitation.

UNIT - II

PN Diode Applications: Half wave, Full wave and Bridge rectifiers - their operation, performance characteristics, and analysis; Filters (L, C, LC and RLC filters) used in power supplies and their ripple factor calculations, design of Rectifiers with and without Filters. **Specials Diodes**: Elementary treatment on the functioning of Tunnel, Varactor, Photo, Light Emitting diodes. **Display devices**: Study of block diagram of typical display device.

UNIT - III

Bipolar Junction Transistor : Transistor Junction formation (collector-base, base-emitter Junctions) Transistor biasing-band diagram for NPN and PNP transistors, current components and current flow in BJT, Early effect, BJT input and output characteristics in CB, CE CC configuration, BJT as an amplifier, BJT biasing techniques, Thermal runway, heat sinks and thermal stabilization, operating point stabilization against temperature and device variations, stability factors, Bias stabilization .

UNIT - IV

Small Signal Transistors equivalent circuits : Small signal low frequency h-parameter model of BJT, Determination of h parameters, analysis of BJT amplifiers using h-parameter, comparison of CB, CE and CC amplifier configurations, Analysis of BJT amplifier with approximate model. **Special Devices:** working of UJT, SCR, DIAC, TRIAC

UNIT - V

Junction Field Effect Transistors (JFET): JFET formation, operation & current flow, pinch-off voltage, V-I characteristics of JFET. JFET biasing-zero drift biasing. Low frequency small signal model of FETs. Analysis of CS, CD and CG amplifiers and their comparison. FET as an amplifier and as a switch. MOSFETs: MOSFETs, Enhancement & Depletion mode MOSFETs, V-I characteristics. MOSFET as resistor, MOSFET as a switch. Introduction to CMOS.

Suggested Reading:

1. Millman and Halkias," Electronic devices and circuits", 2nd Edition, McGraw Hill Publication, 2007
2. Adel S. Sedraand Kenneth C.Smith “Micro Electronic Circuits theory and applications” sixth edition Oxford publications.
3. M Satyam, K Ramkumar, “ Foundations of Electronic Devices”, Wiley Eastern Limited, 1990.
4. Robert L. Boylestad, Louis Nashelsky "Electronic Devices and Circuit Theory", 10th Edition, PHI, 2009
5. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008.
6. Ben G Streetman and Sanjay Banerjee, "Solid State Electronic Devices", 6thEdition, Pearson Education, 2005.
7. Jacob Millman, Christos C. Halkias, "Integrated electronics: analog and digital circuits and systems", 2nd Ed, Mc Graw-Hill, 2010

SYLLABUS FOR B.E III SEMESTER
ELECTROMAGNETIC THEORY

Subject Code : PC320EC	Instruction : 3+2 Hrs/week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 04

Course Objective	Course Outcomes
1. To understand and analyze electromagnetic field theory, with an emphasis's on electromagnetic waves.	**At the end of the course, students will be able to:** 1. Apply the knowledge of vector calculus to solve for electric fields from point charge and charge distributions. 2. Interpret the meaning of Maxwell's equations for static and dynamic fields and the boundary conditions for different media boundaries. 3. Analyse the behavior of electric and magnetic fields in the presence of dielectric and magnetic materials. 4. Formulate and solve electromagnetic wave equations and make calculations of propagation characteristics of EM waves. 5. Analyze electromagnetic wave propagation, attenuation, reflection, and refraction in various media.

UNIT - I

Cartesian, Cylindrical and spherical coordinate systems - review of vector analysis - Coulomb's Law. Electric Field Intensity. Electric field due to different charge distributions. Line of charge, sheet of charge and volume charge distributions. Electric flux, flux density, Gauss's Law and application. Divergence theorem.

UNIT-II

Energy and potential, Potential field of system of charges, potential gradient. Energy density, Boundary conditions in static electric field, Capacitance of two-wire line, Continuity equation, current density, Poisson's equation, Laplace equation, Uniqueness theorem, Applications of simple practical cases.

UNIT -III

Steady magnetic field, Biot-Savart's law, Ampere's law, Stroke's theorem, Magnetic scalar and vector potentials. Magnetic boundary conditions, Magnetomotive force, Permeability, self and mutual inductances, Evaluation of inductance of solenoid, toroid, coaxial cable, two-wire transmission line.

UNIT-IV

Time varying fields, Maxwells equations, Boundary conditions in Em field. Em wave equations in free space and conductors. Sinusoidal variations. Uniform plane wave, wave motion in free space. Wave motion in perfect dielectrics, lossy dielectrics and conductors. Polrization - linear, elliptical and circular polarizations.

UNIT-V

Energy theorem and Poynting vector, Instantaneous, average and complex Poynting vector. Reflection of plane waves by a perfect conductor, normal and oblique incidence. Reflection of plane waves by a perfect dielectric, normal and oblique incidence. Reflection coefficient. Transmission coefficient, power and energy calculations.

Suggested Reading:

1. Jordan, E.C., Balmain, K.G. electromagnetic Waves and Radiating Systems, 2nd Edition, Prentice Hall of India, 2001.
2. Hayt. W.H. Engineering Electromagnetics, Tata McGraw Hill, 5th Edition, 1994
3. J.D.Krauss and Fleish, Electromagnetics with applications, 5th Edition, McGraw Hill, 1999.
4. Nannapaneni Narayana Rao, Elements of Engineering Electromagnetics, 6th edition, 2009.
5. Matthew N.O.Sadiku, Principles of Electromagnetics, 4th edition, Oxford Univ. Press, 2009.

SYLLABUS FOR B.E III SEMESTER
ENVIRONMENTAL SCIENCE

Subject Code : MC320CE	Instruction : 2 Hrs/week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 02

Course Objectives	Course Outcomes
1. Describe various types of natural resources available on the earth surface. 2. Explain the concepts of an ecosystem and the biotic and abiotic components of various aquatic ecosystems. 3. Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity. 4. Explain the causes, effects and control measures of various types of environmental pollutions. 5. Describe the methods for water conservation, the causes, effects of global warming, climate change, acid rain, ozone layer depletion, various types of disasters and their mitigation measures.	**At the end of the course, students will be able to:** 1. Describe the various types of natural resources. 2. Differentiate between various biotic and abiotic components of ecosystem. 3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India. 4. Illustrate causes, effects, control measures of various types of environmental pollutions. 5. Explain the methods of water conservation, causes, effects of climate change, global warming, acid rain and ozone layer depletion, various types of disasters and their mitigation measures.

UNIT-I

Environmental Studies: Definition, importance of environmental studies. Natural resources: Water resources; floods, drought, conflicts over water, dams-benefits and problems. Food resources; Effects of modern agriculture, fertilizer-pesticide problems, water logging salinity. Energy resources: Renewable and non-renewable energy resources. Land Resources, soil erosion and desertification.

UNIT-II

Ecosystems: Structure and function of an ecosystem, producers, consumers and decomposers, food chains, food webs, ecological pyramids, aquatic ecosystem (ponds, oceans, estuaries).

UNIT-III

Biodiversity: Genetic species and ecosystem diversity. Values of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-IV

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and solid waste & e-waste management.

UNIT-V

Social Aspects and the Environment: Water conservation, Climate change, global warming, acid rain, ozone layer depletion. Environmental Impact Assesment, population explosion.

Suggested Books:

1. Deswal S. and Deswal A., A Basic Course on Environmental studies, Dhanpat Rai & Co Pvt. Ltd. 2013.
2. Benny Joseph, Environmental Studies, Tata McGraw-Hill, 2006.
3. Suresh K. Dhameja, Environmental Studies, S.K. Kataria& Sons, 2010.
4. De A.K., Environmental Chemistry, New Age International, 2003.
5. Odum E.P., Fundamentals of Ecology, W.B. Sunders Co., USA, 2004.
6. Sharma V.K., Disaster Management, National Centre for Disaster Management, IIPE, Delhi, 2013.
7. Rajagopalan R., Environmental Studies, Second Edition, Oxford University Press, 2013.

SYLLABUS FOR B.E III SEMESTER
INTRODUCTION TO ENTREPRENEURSHIP

Subject Code : MC310ME	Instruction : 1 Hrs/week	CIE Marks : 30
SEE – Marks : 40	SEE - Duration : 2 Hours	Credits: 01

Course objectives	Course Outcomes
1. Inspire students and help them imbibe an entrepreneurial mind-set. 2. Introduce key traits and the DNA of an entrepreneur 3. Provide the information about the facilities, schemes available to start enterprise in INDIA 4. Improve the entrepreneur skills	**At the end of the course, students will be able to:** 1. Develop awareness about entrepreneurship and successful entrepreneurs. 2. Understand the supporting organizations available to establish the business in the country 3. Understand the different government policies which support the entrepreneur 4. Develop how to improve the communication and sales skills and generate and anlyze the business idias

UNIT -I

Entrepreneurship, myths about entrepreneurship, entrepreneur characteristics and its styles – Classification of Entrepreneurship – Forms of Business organizations –Role of Entrepreneurship in economic development. Managing risks and learning from failures.

E-cells, successful entrepreneurs, start-ups and incubators, institutions supporting small business enterprises.

UNIT -II

Central level supporting institutions: NABARD, SIDBI, NIC, KVIC, NIESBUD, SIDO, DST, EDI, FICCI, CII, ASSOCHAM etc. – state level institutions – DICs – SFC – SIDC. Design thinking and its process

Idea Generation and evaluation: Ideas in Entrepreneurships – Sources of New Ideas – Techniques for generating ideas – Opportunity Recognitionand evaluation, Entrepreneurial skills, selling and selling skills – communication and modes of it, be an entrepreneur.

Learning Resources:

1. Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship: successfully launching new ventures", 3rd edition, Pearson Prentice Hall, 2009.
2. P. Denning and R. Dunham, "The Innovator's Way", MIT Press: Cambridge, Massachusetts, 2010.
3. Arya Kumar, "Entrepreneurship", Pearson Education, Delhi, 2012.
4. Michael H. Morris, D.F.Kuratko, J G Covin, "Corporate Entrepreneurship and Innovation", Cengage learning, New Delhi,2010
5. Peter F. Drucker, "Innovation and Entrepreneurship", Routledge Classics, 2015 .
6. https://www.wfglobal.org/initiatives/national-entrepreneurship-network/

SYLLABUS FOR B.E III SEMESTER
FS – I: COMMUNICATION SKILLS IN ENGLISH-I

Course Code : HS310EH	Instruction : 2+2Hrs/week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 02

Course Objectives	Course Outcomes
1. The four major skills of language learning listening, speaking reading and writing provide the right key to success. 2. The main objective of this finishing school curriculum is to involve content for all the above mentioned four skills in teaching English and to get students proficient in both receptive and productive skills	**At the end of the course, students will be able to:** 1. Respond to questions and Engage in an informal conversation. 2. Narrate a message/story/incident, both verbally and in writing. 3. Describe an event / a session / a move / an article and recognize and list the key points in a topic/message/article. Debate on a topic by picking up the key points from the arguments placed.. 4. Respond to others while being in a casual dialogue and participate in group and form discussions by providing factual information, possible solutions, and examples. 5. Comprehend facts given and respond in an appropriate manner and provide logical conclusions to the topics under discussion. 6. Construct sentences in a coherent form and provide explanations to prepare, present, and analyze reports.

UNIT I – FUNDAMENTALS OF COMMUNICATION

Competencies:

- Basic conversational ability.
- Write e-mails introducing themselves & their purpose

Topics covered

Greeting and Introductions
Small Talk
Recalling

Topic Level Details

Greeting & Introductions

Competencies:

- Greeting appropriately
- Introducing themselves, a friend
- Responding to simple statements and questions both verbally and in writing
- Seeking introduction from others about themselves or about any

topic.
- Writing an email with appropriate salutation, subject lines, self introduction, and purpose of mail.

Small Talk
Competencies:
- Identifying the topic of conversation.
- Speaking a few sentences on a random list of topics
- Reading simple information like weather reports, advertisements
- Seeking clarifications.

Recalling
Competencies:
- State takeaways from a session or conversations

UNIT II: NARRATIONS AND DIALOGUES
Competencies:
- Framing proper phrases and sentences to describe in context
- Speaking fluently with clarity and discrimination
- Responding to others in the dialogue.

Topics covered
Paraphrasing
Describing
Topic Level Details

Paraphrasing
Competencies:
- Listen for main ideas and reformulating information in his/her own words
- Draw appropriate conclusions post reading a passage.
- Writing an email confirming his/her understanding about a topic

Describing
Competencies:
- Speaking, Reading, and Writing descriptive sentences and paragraphs.

UNIT-III: RATIONAL RECAP
Competencies:
- Organizing and structuring the communication
- Detailing a topic
- Summarizing a topic.

Topics Covered:
Organizing

Sequencing
Explaining
Summarizing

Topic Level Details

Organizing

Competencies:

- Organizing the communication based on the context and audience

Sequencing

Competencies:

- Structuring the content based on the type of information.

Explaining

Competencies:

- Explaining a technical/general topic in detail.
- Write an email giving detailed explanation/process

Summarizing

Competencies:

- Recapitulating

UNIT-IV: PROFESSIONAL DISCUSSIONS AND DEBATES

Competencies:

- Analytical and Probing Skills
- Interpersonal Skills

Topics Covered:

Discussing
Debating

Topic Level Details

Discussing

Learning Outcome:

The students should be able to explore and support issues by adding explanations and examples.

Competencies:

- Thinking
- Assimilating

Debating

Competencies:

- Comprehending key points of the debate and note decisive points including supporting details.
- Construct a logical chain of arguments and decisive points.
- Writing a review about a product by providing reasons, causes, and effects

UNIT - V: DRAWING CONCLUSIONS AND REPORTING

Competencies:

- Reasoning skills - Coherent and logical thinking
- Reporting and Analyzing skills.

Topics Covered:

Concluding
Reporting

Topic Level Details

Concluding

Competencies:

- Analyzing the points discussed.
- Connecting all points without gaps.
- Identifying clinchers.
- Communicating the decisions

Reporting

Competencies:

- Reporting an incident
- Writing/Presenting a project report

SYLLABUS FOR B.E III SEMESTER
BASIC CIRCUITS LAB AND ELECTRONICS WORKSHOP

Subject Code : ES321EC	Instruction : 3Hrs/ week	CIE – Marks : 30
SEE – Marks : 50	SEE - Duration : 3 Hours	Credits: 02

Course Objective	Course Outcomes
1. To apply the concepts of circuit theory for a given complex circuit and verify its response using discrete components and CAD tools.	**At the end of the course, students will be able to:** 1. Identify the appropriate network theorem to analyze for a given network. 2. To determine different two port network parameters for a given network and also characterize the network from the two port parameters. 3. To simulate and find the response of a given circuit using CAD tools.

List of Experiments:

Part –A

1. Soldering and Desoldering of components
2. Design of PCB

Part -B

1. Verification of superposition theorem and Thevenin's theorems
2. Verification of maximum power transfer theorem
3. Verification of Tellegan's theorem
4. Measurement of two-port network parameters
5. Design & verification of Series Resonance
6. Design & verification of Parallel Resonance

Part –C (using SPICE)

1. Determination of two port network parameters in the presence of at least one dependent source.
2. Transient response of RL and RC circuits.
3. Verification of network theorems in the presence of dependent source.
4. Transient response of RLC series and parallel circuits.
5. Measurement of power factor and power relationships.

Suggested Reading:

1. Muhammad H. Rashid, "Spice for Circuits and Electronics Using PSPICE" 2/e, 2001, PHI.
2. John O. Attia, "PSPICE and MATLAB for Electronics: An Integrated Approach" 2/e, CRC Press, 2002.

SYLLABUS FOR B.E III SEMESTER
ELECTRONIC DEVICES LAB

Subject Code : PC311EC	Instruction : 3 Hrs/ week	CIE – Marks : 30
SEE – Marks : 50	SEE - Duration : 3 Hours	Credits: 02

Course Objective	Course Outcomes
1. To develop an understanding of the underlying concepts of Electronic devices and circuits with Qualitative approach	**At the end of the course, students will be able to:** 1. Verify the working of PN Junction diodes, transistors and their characteristic behavior. 2. Design of different rectifiers with various filter combinations. 3. Design of transistor biasing circuits for the given operating point. 4. Carryout analysis of single stage RC coupled amplifiers.

List of Experiments:

CYCLE - I

1. Zener Diode Characteristics and Zener as Voltage Regulator
2. Design of Half wave and Full wave Rectifiers with and without Filters
3. Characteristics of PHOTO DIODE
4. Common Base characteristics of BJT and measurement of h – parameters
5. Common Emitter characteristics of BJT and measurement of h-parameters,
6. JFET Characteristics and measurement of its small signal parameters.
7. Characteristics of UJT and Seven Segment LED Display

CYCLE - II

8. BJT Biasing
9. FET Biasing
10. Analysis and bandwidth calculation of Single stage RC coupled CE Amplifier.
11. Analysis and bandwidth calculation of Single stage RC coupled CC Amplifier.
12. Single stage FET Common Source RC coupled Amplifier
13. Characteristics of SCR and study of TRIAC characteristics
14. Analysis & Design of circuits using PSPICE(Minimum of five experiments).

Suggested Reading:

1. Robert Diffenderfer, "Electronic Devices Systems and Applications", Cengage Learning India Private Limited, 2010
2. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7thEdition, TMH 2001

SYLLABUS FOR B.E III SEMESTER
ELECTRONICS ENGINEERING – I (For EEE)

Subject Code : PC330EC	Instruction : 3 Hrs/ week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 03

Course Objective:	Course Outcomes
1. To give understanding on semiconductor materials and characteristics of the p-n junction diode. 2. To understand the operation of BJT,FET,MOSFET and characteristics of special purpose electronic devices. 3. To familiarize students with biasing circuits of BJT, FET.	**At the end of the course, students will be able to:** 1. Define and describe the principle of operation of electronic devices like PN junction diode, Zener diode, BJT and FET etc. 2. Analyze and design various rectifier circuits with and without filters for a regulated DC power supply. 3. Illustrate the use of diode in practical applications and gain knowledge on special diodes. 4. Design biasing circuits to operate transistor in active region. 5. Analyze and compare the small signal low frequency Bipolar junction Transistor and Field effect transistor amplifiers in different configurations with the help of their equivalent circuits.

UNIT-I

Semiconductor Diodes and Rectifiers:P-n junction as a rectifier, V-I characteristics, temperature dependence of V-I characteristics, Breakdown of junctions – Zener and Avalanche, halfwave, fullwave, bridge rectifiers, L,C, π –section filters, Regulation and Ripple characteristics.

UNIT-II

Transistors and their biasing:BJT current components, modes of transistor operation, Early effect, BJT input and output characteristics in CB, CE and CC configuration.BJT as an amplifier. BJT biasing techniques thermal runaway, operating point, bias stabilization circuits.

UNIT-III

Small Signal Transistor Equivalent Circuits: Small signal low frequency h-parameters model of BJT, h-parameters, analysis of BJT amplifier with approximate model, comparison of CB, CE and CC amplifier configurations, Miller's theorem, High input impedance transistor circuit, frequency response of RC coupled amplifier, effect of emitter bypass capacitor on frequency response.

UNIT-IV

Filed effect transistors:V-I characteristics of JFET, JFET biasing,low frequency small signal model of FETs, FET as a CS amplifier, MOSFETs: self biasing, biasing for zero current drift, Enhancement and depletion mode MOSFETs, V-I characteristics.

UNIT-V

CRO: Study of CRO block diagram.

Special devices: Elementary treatment on the functioning of tunnel diode, varactor diode, photo diode, light emitting diode, LCD, UJT, SCR, photo transistor.

Suggested Reading:

1. Jacob Millman and Christos C. Halkias, Satyabratajit "Electronics Devices and Circuits", McGraw hill, 3rd edition, 2010.
2. Jacob Millman and Christos C. Halkias, "Integrated Electronics" Mc Graw Hill, 1991.
3. Robert L.Boylestad and Louis Nashelsky,"Electronic Devices and Circuit Theory",PHI,10th edition 2006.
4. David L Schilling and Charles Belove,Electronics Circuits Discrete & Integrated ,3rded.,McGraw Hill Education (India) Private Limited,1989.

SYLLABUS FOR B.E III SEMESTER
ELECTRONICS ENGINEERING – I LAB(For EEE)

Subject Code : PC321EC	Instruction : 2 Hrs/ week	CIE – Marks : 30
SEE – Marks : 50	SEE - Duration : 3 Hours	Credits: 01

Course Objective	Course Outcomes
1. To develop an understanding of the characteristics of Electronic devices and circuits with Qualitative approach	**At the end of the course, students will be able to:** 1. Estimate the parameters from V-I characteristics of different diodes and evaluate the performance of rectifiers. 2. Estimate the parameters from BJT and FET characteristics. 3. Compute the bandwidth of RC coupled BJT and FET amplifiers from the frequency response.

List of Experiments:

CYCLE – I

1. V-I Characteristics of Si, Ge and Zener diode
2. Zener as Voltage Regulator
3. Design of Half wave and Full wave Rectifiers with and without Filters
4. Common Base characteristics of BJT and measurement of h – parameters
5. Common Emitter characteristics of BJT and measurement of h-parameters,
6. JFET Characteristics and measurement of its small signal parameters.
7. Applications of Cathode ray oscilloscope.

CYCLE – II

8. BJT biasing.
9. Analysis and bandwidth calculation of Single stage RC coupled CE Amplifier.
10. Analysis and bandwidth calculation of Emitter follower.
11. Single stage FET Common Source RC coupled Amplifier
12. Analysis and bandwidth calculation of Source follower.
13. Characteristics of UJT.
14. V-I Characteristics of Light Emitting Diode.

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7th Edition, TMH 2001
2. S.PoornaChandra,B. Sasikala, Electronics Laboratory Primer,A design approach, Wheeler publishing,1998.

OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS
B.E- III SEMESTER (2018-19)

B.E- III SEM OPEN ELECTIVE-I COURSES			
Dept	**Title**	**Code**	**credits**
CIVIL	Geographical Information Systems	OE310CE	2
	Building Materials	OE320CE	2
CSE	Introduction to Data Structures	OE310CS	2
ECE	Introduction to Signals & Systems	OE310EC	2
	Introduction to Communication Systems	OE320EC	2
EEE	Electrical Installation and Safety	OE310EE	2
Mech	Basic Mechanical Engineering	OE300ME	2
	Mechanical Technology	OE310ME	2
IT	Introduction to Scripting Languages	OE310IT	2
Maths	Linear Algebra and its Applications	OE310MA	2

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR B.E. III-SEMESTER
GEOGRAPHICAL INFORMATION SYSTEMS
Open Elective – I (to other branches)

Instruction :2Hours/week	SEE Marks: 60	Course Code: OE310CE
Credits :2	CIE Marks: 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	*Upon the completion of this course the students will be expected to:*
1. Provide theoretical framework on fundamentals and basic concepts of GIS applications with its capabilities 2. have an in-depth understanding of the functionality of GIS and be critically aware of the potential and limitations of GIS in integrated analysis of spatial and non-spatial data	1. Explain Geographic Information Systems, become familiar with the basic principles of map projections and coordinate systems and understand the requirements of different user disciplines for applying GIS technology. 2. Describe the basics of working of geographical databases, various data structures and understand the concepts of data capture, storage, 3. Analyse outputs in a GIS environment. 4. Identify various analytical tools and functions in GIS and address various geospatial problems.

UNIT-I

Introduction: Map, definitions, representations-Point, line, polygon, common coordinate systems, Map projections – Transformations – Coordinate system – Map Analysis. History of development of Geographic Information Systems (GIS) - Standard GIS packages.

UNIT-II

Data Entry, Storage and Maintenance: Data types – spatial, non-spatial (attribute data) – data structure, data format – point line vector – Raster – Polygon – Object structural model –filters and files data in computer – Keyboard entry, Manual Digitizing, Scanner, Remotely sensed data, Existing Digital data Cartographic database, Digital elevation data, data compression.

UNIT-III

Data Analysis and Modelling: Spatial analysis, data retrieval, query (SQL) – Simple analysis, Recode overlay, Vector data analysis, Raster data analysis – Modeling in GIS – Digital elevation model – Cost and path analysis – Knowledge based systems.

UNIT-IV

Geographic Information Systems (GIS) Analysis Functions: Organizing data for analysis, classification of GIS, analysis function, maintenance and analysis of spatial data – transformations, conflation, edge matching and editing. Maintenance and analysis of non-spatial attribute data – editing and query functions.

Suggested Books:

1. Kang-Tsung Chang, Introduction to GIS, Tata McGraw Hill Edition, 2015.
2. Burrough, P.A., Principles of GIS for land resource assessment, Oxford publication, 1986.
3. Anji Reddy M., Remote Sensing and Geographic Information System, 2012

References Books

1. John R Jensen, Ryan R Jensen, Introduction to Geographic Information System, 2013.
2. Krawkiwsky E.J. and Wells D. E., Coordinate Systems in Geodesy, 1984.
3. Stan Aronoff, Geographic Information Systems: A management perspective, Wdl Publications, 1991.

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR B.E. III-SEMESTER
BUILDING MATERIALS
Open Elective – I (to other branches)

Instruction :2Hour/week	SEE Marks : 60	Course Code : OE 320CE
Credits :2	CIE Marks : 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
In this subject the students will	*Upon the completion of this course students will be able to*
1. Acquire basic knowledge on building materials such as stones, bricks, cement, aggregates, mortar and concrete. 2. Study various aspects of paints, varnishes and timber.	1. Explain the characteristics of stones and bricks. 2. Describe the properties of cement, aggregate, concrete, mortar. 3. Identify the suitability of timber 4. Application of paints and varnishes for building works.

UNIT-I

Stones: Classifications of stones, uses of stones as building materials, characteristics of good building stones.

Bricks: Composition of brick clay. Process of manufacturing bricks. Characteristics of good building bricks, classification of bricks. Introduction to light weight bricks.

Timber: Timber as a building material and its uses. Various types of timber. Seasoning and its importance. Preservation of wood. Plywood & Laminates and their uses.

UNIT-II

Cement: Chemical composition of cement, manufacturing process. Specifications for Ordinary Portland Cement, Types of cements.

Fine Aggregate: Characteristics of good sand and its classifications, bulking of sand. Quarry sand.

Coarse Aggregate: Characteristics of good coarse aggregates for manufacture of concrete.

UNIT-III

Cement Mortar : Types and uses.

Concrete: Designation, workability of concrete – factors affecting, Slump test, Ready Mix Concrete (RMC).

UNIT-IV

Reinforcing steel: Types of reinforcement, specifications - M.S., HYSD, TMT.

Paints : Constituents, characteristics of good paints, varnishes.

Suggested Books:

1. Gambhir M.L., Neha Jamwal, Building Materials: Products, Properties and Systems, McGraw Hill Education (India) Private Limited, 2014.
2. Varghese P.C., Building Materials, PHI Learning Pvt. Ltd., Delhi, 2015.
3. Advances in Building Materials and Construction, Central Building Research Institute, Roorkee, 2004.

References Books:

1. Duggal S.K., Building Materials, New Age Publishers, 2012
2. Rangwala, Engineering Materials, Charotar Publishers, 2015

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E III SEMESTER
INTRODUCTION TO DATA STRUCTURES
Open Elective-I (for other Departments)

Instruction: 2 Hrs /week	SEE Marks :60	Course Code :OE310CS
Credits :2	CIE Marks: 40	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
Students should be able to	At the end of the course, Students will be able to
• Identify and use appropriate data structure for a given problem with effective utilization of space and time. • Describe the linear and nonlinear data structures.	1. Implement linear data structures. 2. Develop an application using stacks and queues. 3. Choose the appropriate nonlinear data structure and perform operations on them. 4. Analyze the time and space complexities of Algorithms.

UNIT - I

Arrays: Arrays - ADT, Polynomials, Sparse matrices,

Linked Lists: Singly Linked Lists, Circularly linked lists, Doubly Linked Lists.

UNIT – II

Stacks: Array Representation, Linked Representation, Applications**.**

Queues: Array Representation, Linked Representation, Applications.

UNIT – III

Introduction to non-linear Data Structures : Tree Definitions and Properties, Representations of Binary Trees, Operations, Binary Tree Traversal, Graph Definitions, properties and representations.

UNIT – IV

Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations

Suggested Books:

1. Horowitz E, Sahni S and Susan Anderson-Freed, Fundamentals of Data structures in C, 2nd Edition(2008), Universities Press

Reference Books:

1. Mark A Weiss, Data Structures and Algorithm Analysis In C, Second Edition (2002), Pearson
2. Kushwaha D. S and Misra A.K, Data structures A Programming Approach with C, Second Edition (2014), PHI.,
3. Gilberg R. F and Forouzan B. A, Data structures: A Pseudocode Approach with C, Second Edition (2007), Cengage Leeming
4. Tanenbaum A. M ,Langsam Y. Augenstein M. J, Data Structures using C, Second Edition (2008), Pearson.
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, Introduction to Algorithms, Third Edition (2009), MIT Press
6. YedidyahLangsam , Moshe J. Augenstein ,Aaron M. Tenenbaum, Data Structures Using C and C++ , Second Edition (2009), PHI.

Online Resources:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos
2. http://nptel.ac.in/courses/106106127/
3. http://www.nptel.ac.in/courses/106102064

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SYLLABUS FOR B.E. III SEMESTER
INTRODUCTION TO SIGNALS & SYSTEMS (Open Elective-I)
(for other Departments)

Instruction: 2 Hrs /week	SEE Marks :60	Course Code : OE310EC
Credits : 2	CIE Marks: 40	Duration of SEE : 3Hrs

Course Objectives	Course Outcomes
1. Define and classify continuous and discrete time signals and systems. 2. Determine frequency domain characteristics of continuous and discrete time signals.	**At the end of the course, students will be able to:** 1. Analyze basic signals and systems in continuous and discrete time domain. 2. Apply the properties of different transformation techniques to convert a continuous time domain signal to frequency domain. 3. Apply the properties of different transformation techniques to convert a discrete time domain signal to frequency domain. 4. Describe the distortion less transmission through an LTI system.

UNIT - I

Continuous time signals, types of signals, representation of signals, basic elementary signals, operations on signals.

Continuous time systems, classification of systems: static and dynamic, linear and non linear, time invariant and time variant.

UNIT - II

Continuous time Fourier transforms: Introduction, existence, properties, magnitude and phase spectrums.

Laplace transforms: Introduction, existence, Laplace transform of basic elementary signals, properties, inverse Laplace transforms.

UNIT - III

Discrete time signals, types of signals, representation of signals, basic elementary signals, operations on signals.

Discrete time systems, classification of systems: static and dynamic, linear and non linear, time invariant and time variant.

UNIT - IV

Introduction to continuous and discrete time LTI systems, properties, impulse response, causality, stability, transfer function, distortion less transmission through systems. Z-transform: Introduction, existence, Z-transform of basic elementary signals, properties, inverse Z-transforms.

Suggested Readings:

1. P. Ramakrishna Rao, *Signals and Systems,*McGraw Hill, 2008.
2. Alan V. Oppenheim, Alan S. Wilsky and S. Hamid Nawab, *Signals and Systems*, 2nd ed., PHI, 2009.
3. Nagoorkani , *Signals and Systems* McGraw Hill, 2013

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
SYLLABUS FOR B.E. III SEMESTER
Introduction to Communication Systems (Open Elective-I)
(for other Departments)

Instruction: 2 Hrs /week	SEE Marks :60	Course Code : OE320EC
Credits : 2	CIE Marks: 40	Duration of SEE : 3Hrs

Course Objectives	Course Outcomes
1. Distinguish between Amplitude and Frequency modulation methods and their application in Communication Receivers 2. Explain why multiplexing methods are necessary in communications and compare FDM with TDM 3. Compare and contrast FSK and BPSK modulation schemes employed in digital data transmission 4. Draw the block diagrams of different types of communication systems and explain their operation	**At the end of the course, students will be able to:** 1. Identify the Radio frequency spectrum and the bands of different types of radio systems 2. Analyze the power, efficiency and transmission bandwidth of Amplitude and Frequency Modulated signals. 3. Convert the Radio frequency to Intermediate frequency and explain the operation of Superheterodyne Receiver. 4. Compare and contrast Frequency Division Multiplexing and Time Division Multiplexing used in the Communication systems 5. Detect and correct errors present in bit stream data using parity check 6. Explain the basic principles of different types of communication systems.

UNIT - I

Introduction to Electronic Communication: Communication systems, Types of Electronic Communication, Modulation and Multiplexing, The Electromagnetic Spectrum, Bandwidth, Communication Applications, Gain and Attenuation definitions

Amplitude Modulation Fundamentals: AM concepts, Modulation Index and Percentage of Modulation, Sidebands and the Frequency Domain, AM Power.

UNIT - II

Fundamentals of Frequency Modulation: Basic principles of Frequency Modulation, Principles of Phase Modulation, Modulation Index and Sidebands, Noise – Suppression Effects of FM, Frequency Modulation verses Amplitude Modulation.

Communication Receivers: Basic Principles of Signal Reproduction, Superheterodyne Receivers, Frequency Conversion, Intermediate Frequency and Images, Noise.

UNIT - III

Digital Communication Techniques: Digital Transmission of Data, Parallel and Serial Transmission, Data Conversion, Pulse Modulation.

Multiplexing and De-multiplexing: Multiplexing Principles, Frequency Division Multiplexing, Time Division Multiplexing, PCM Multiplexing.

UNIT - IV

Transmission of Binary Data in Communication Systems: Digital Codes, Principles of Digital Transmission, Transmission Efficiency, Modem Concepts and Methods – FSK, BPSK, Error Detection and Correction.

Different Types of Communication Systems: Microwave Concepts, Optical Principles, Optical Communication System.

References:

1. Louis E. Frenzel, Principles of Electronic Communication Systems, 3rd Edition. Tata Mcgraw Hill.
2. Wayne Tomasi, Electronic Communications Systems, 5th Edition, Pearson Education.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SYLLABUS OF B.E III- SEMESTER
ELECTRICAL INSTALLATION AND SAFETY (Open Elective –I)

Instruction: 2Hrs /week	SEE Marks :60	Course Code :OE310EE
Credits :2	CIE Marks: 40	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
Enable the student to	After completion of the course student will be able to
Have a fair knowledge about the fundamentals of wiring systems, electrical safety procedures, Estimation of lighting & Power loads.	1. **Identify** and **choose** the proper type wiring for domestic & industrial applications. 2. **Apply** and **implement** the Electrical safety procedures for repairs & hazards. 3. **Design** and **Estimate** the domestic lighting installation. 4. **Design** and **Draw** the wiring layout for a big office building, electrical laboratory, big industry and big hotel with lift arrangement

Unit – I

Wiring Systems: Introduction, size of wires, standard wires, types of wires, CTC, PVC, Lead sheathed VIR, weather proof wires, flexible wires different types of cable wires – Types and Installation of House Wiring Systems & Wirings Accessories : Methods of installing wiring, clips, screws -round blocks switch boards, sockets socket pins - CTS wiring - Installation of surface conduit wiring - Rigid conduits, flexible conduits – Conduit accessories - elbows bushings - reducers, conduit box saddles, PVC conduit wiring - Concealed wiring.

Unit – II

Safety Procedures: Distribution fuse boards - Main switches – Different types of fuses and fuse carriers - Safety procedures – Electric shock and first aid, causes for fire hazards in Electrical installations

Unit – III

Estimation of Lighting: Estimation of domestic lighting installation service main - types of wire - specification - quantity of materials required for service main – estimation and selection of interior wiring system suitable to a given building - number of circuits - quantity of accessories required - estimates of materials for execution of the domestic wiring installation as per National Electrical act 2003.

Unit – IV

Estimation of power loads: Power wiring installation - Drawing wiring layout for a big office building, electrical laboratory, big industry, big hotel with lift arrangement and a residential building with 2 bed room house.- estimation upto 20 kVA calculation of load current based on ratings of various equipment's to be installed - size of wire.

Suggested Books:

1. J.B.Gupta –A course in Electrical installation Estimating & costing-9th edition 2014, S.K.Kataria& Sons.
2. S.L.Uppal-Electrical Wiring ,Estimating& costing Electrical wiring.

Reference Books:

1. Balbir Singh-Electrical Drawing
2. Arora -Electrical wiring
3. BVS Rao -Maintenance and Operation of Electrical Equipment –Vol-I-TMH
4. S.Rao -Testing, Commissioning Operation & Maintenance of Electrical equipment -TMH
5. CRDargar -Electrical Installation design and drawing -New Asian publishers.

Online resources:

1. http://ocw.tufts.edu
2. http://ocw.upm.es
3. www.open.edu/openlearn/
4. http://nptel.ac.in/courses/

DEPARTMENT OF INFORMATION TECHNOLOGY
SYLLABUS FOR B.E. III SEMESTER
INTRODUCTION TO SCRIPTING LANGUAGES (Open Elective-I)
(for other Departments)

Instruction: 2 Hrs /week	SEE Marks :60	Course Code :OE310IT
Credits : 2	CIE Marks: 40	Duration of SEE : 3Hrs

Course Objectives	**Course Outcomes**
The course will enable the students to:	**At the end of the course student will be able to:**
This course will enable the students to acquire basic skills for writing python scripts.	1. Write a python script to solve a basic problem using structured programming constructs 2. Write a python script to solve a basic problem using object oriented programming constructs 3. Create and use python modules. 4. Create a project skeleton 5. Use automated testing to test a python module

Unit – I

Introduction to Python, running a python script, writing comments, using variables, operators, strings and text, format specifiers , printing information. passing command line arguments, prompting users, parameters, unpacking variables.

Unit – II

Decision making : if and else if, repetition : while loops and for loops, lists , operations on list , tuples, dictionaries , operations on dictionaries.

Unit – III

Defining functions, passing arguments to functions , returning values from functions, Exception handling.

Unit – IV

Modules, Classes and Objects, is – a relationship : inheritance, has-a relationship : composition. Creating project skeleton and automated testing.

Learning Resources

1. Allen B. Downey, Think Python, 2nd Edition, Green Tea Press
2. https://www.python.org

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. III SEMESTER
BASIC MECHANICAL ENGINEERING (Open Elective-I)
(for other Departments)

Instruction : 2Hours/week	SEE Marks : 60	Course Code : OE300ME
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The course will enable the students to: • Learn the basic principles of Mechanical Engineering in the areas of Heat transfer, Refrigeration, power generation and Manufacturing processes.	At the end of the course, students will be able to: 1. understand the modes of heat transfer and different types heat exchangers. 2. Study the working principles of IC engines and gas turbines. 3. know the principles of refrigeration and psychrometry. 4. study the basic manufacturing processes.

UNIT– I

Heat Transfer: Basic modes of heat transfer, Fourier's law of conduction, Newton's Law of cooling, Stefan– Boltzman Law of radiation and one dimensional steady state conduction heat transfer through plane walls without heat generation.

Heat Exchangers: classification and applications of heat exchangers in industry, derivation of LMTD in parallel and counter– flow heat exchangers and problems.

UNIT– II

IC Engines: Working of Four Stroke and Two Stroke Petrol and Diesel Engine with p– V diagrams, Valve timing diagram, Calculation of Indicated power, Brake power, Specific Fuel Consumption, Mechanical and Thermal efficiencies.

Gas Turbines: Classification, calculation of efficiency of simple open gas turbine cycle (Joule cycle/Brayton cycle) and applications.

UNIT– III

Refrigeration: Types of Refrigeration systems–Air Refrigeration system, vapor compression system, COP and representation of cycle on T-S and p-h diagrams, Types and properties of refrigerants, eco– friendly refrigerants, Introduction to Psychrometry and Psychrometry processes.

UNIT– IV

Manufacturing Processes: Welding, Brazing, Soldering, brief description of process and parameters, associated principles of gas welding, arc welding.

Machining Processes: Turning, Milling and Drilling.

Introduction to Additive Manufacturing and its applications.

Learning Resources:

1. RK Rajput, "Thermal Engineering", Laxmi Publications, 2005
2. C. Sachdeva," Fundamentals of Engineering heat and mass transfer", Wiley Eastern Ltd., 2004.
3. PN Rao,"Manufacturing Technology, Vol. 1 & 2", Tata McGraw hill Publishing Co., 2010.
4. V K Manglik , "Elements of Mechanical Engineering", PHI Learning Pvt Ltd, 2013
5. Chua CK, Leong K.F, "Rapid Prototyping Principles – Principles and applications in Manufacturing", 3rd Edition, Cambridge University Press India Private Limited, 2000

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. III SEMESTER
MECHANICAL TECHNOLOGY (Open Elective-I)
(for other Departments)

Instruction : 2 Hours / week	SEE Marks :60	Course Code : OE310ME
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objective of this course is to: • Learn the basic principles of excavating equipment, conveying equipment hoisting equipment, concrete producing equipment and pneumatic equipment	On completion of the course the student will be able to: 1. Identify the operations of various earth moving equipments for maintenance and selection with respect to their applications. 2. Justify various conveying equipment for transporting material based on working principles. 3. Study various types of hoisting equipment in civil engineering applications. 4. Examine various aggregate and concrete producing equipments used in concrete production and working of pneumatic equipment.

UNIT-I

Excavating Equipment: General description, operation, maintenance and selection of the following: Earth moving and Excavating Equipment: Shovels, Dragline, Clamshell, Cable excavator, Bucket wheel excavator, Tractor, Bulldozer, Scraper, Trenchers, Grader, Earth Compactors.

UNIT-II

Conveying Equipment: Belt conveyor, Screw Conveyor, Bucket Conveyor, Apron Conveyor, Aerial Ropeway.

UNIT-III

Hoisting Equipment: Hoist winch, Differential and Worm geared chain hoists, Fork lift trucks, Guyed and stiffly derricks, swing and non– swing mobile crane, whirler crane, Construction elevator, passenger lift and Bucket elevators.

UNIT– IV

Aggregate and Concrete Producing Equipment: Crushers – Jaw, Gyratory, Hammer and Roll Crushers, Screens – Stationary, Shaking and Vibrating screens. Concrete mixers and Concrete pumps.

Pneumatic Equipment: Reciprocating air– compressor, construction pneumatic tools; jack hammer, paving breaker, Rock drill, concrete vibrator.

Learning Resources:

1. R.L. Peurifoy, "Construction Planning Equipment and Methods", 7th Ed., McGraw-Hill Publishers, 1956
2. Mahesh Varma, "Construction Equipment and its planning and application", Metropolitian books Co, Delhi, 2004
3. Goodes Spence,"Building and Civil Engineering Plant", Crosby Lock Wood, 1995

DEPARTMENT OF MATHEMATICS
SYLLABUS FOR B.E. III SEMESTER
LINEAR ALGEBRA AND ITS APPLICATIONS (Open Elective-I)

Instruction :2 Hours / week	SEE Marks :60	Course Code : OE310MA
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

Course Outcomes: At the end of the course the students will learn:

1. The concepts of vector spaces, bases and dimension and change of bases. These concepts are useful to generate Code Words to improve the quality of transmissions.
2. The concepts of linear transformations and isomorphism and these concepts are useful in Computer Graphics.
3. The concepts of inner product spaces Orthonormal bases. These concepts are useful in Least Square Approximations, which is used in engineering applications and statistics.

UNIT – I: 8 hrs
Vector Spaces: Definition of Vector Space, Subspaces, Basis and Dimension, Coordinates and Change of Basis

UNIT – II: 7 hrs
Linear Transformations: The Null Space and Range, Isomorphisms, Matrix Representation of a Linear Transform

UNIT – III: 6 hrs
Inner Product Spaces: The Dot Product on R^n and Inner Product Spaces

UNIT – IV: 6 hrs
Inner Product Spaces: Orthonormal Bases, Orthogonal Complements

Text Books:

1. Introduction to linear algebra with applications, Jim DeFranza, Daniel Gagliardi, Tata McGraw-Hill
2. An introduction to Linear Algebra, V.P Mainra, J.L Arora, Affiliated to East-West Press Pvt Ltd

Reference Books:

1. Elementary Linear algebra, Anton and Rorres, Wiley India Edition
2. Advanced Engineering Mathematics, Erwin Kreysing, Wiley Publication
3. Elementary Linear algebra, ron Larson, Cengage Learning

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION FOR B.E. IV-SEMESTER w.e.f. 2018-19
(Students admitted in A.Y. 2017-18) - CBCS

S. No.	Course Code	Course	Scheme of Instruction				Scheme of Examination			Credits
			Hours / Week				Duration in Hrs	Maximum Marks		
			L	T	D	P		SEE	CIE	
THEORY										
1	BS410MA	Engineering Mathematics – IV	3	1	-	-	3	60	40	3
2	ES410ME	Basic Thermodynamics	3	-	-	-	3	60	40	3
3	PC410EC	Analog Electronic Circuits	3	-	-	-	3	60	40	3
4	PC420EC	Signal Analysis & Transform Techniques	3	1	-	-	3	60	40	3
5	PC430EC	Pulse, Digital and Switching Circuits	3	1	-	-	3	60	40	3
6	MC300EH	Human Values and Professional Ethics-I	1	-	-	-	2	40	30	1
7	HS420EH	FS-II:Communication Skills in English-II	2	2	-	-	3	60	40	2
8	OE4XXXX	Open Elective – II	1	-	-	-	2	40	30	1
9	OE4XXXX	Open Elective – III	2	-	-	-	3	60	40	2
PRACTICALS										
10	PC441EC	Electronic Circuits Lab	-	-	-	3	3	50	30	2
11	PC451EC	Simulation Lab for Signals and Systems	-	-	-	3	3	50	30	2
		Total	**21**	**5**	**-**	**6**		**600**	**400**	**25**
		Grand total	**32**					**1000**		

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINERING
SCHEME OF INSTRUCTION AND EXAMINATION UNDER CBCS

INTERDISCIPLINARY COURSES OFFERED BY ECE TO EEE

S. No.	Code	Subject	Scheme of Instruction				Scheme of Examination			Credits
			Hours/ Week				Duration in Hrs	Maximum Marks		
			L	T	D	P		SEE	CIE	
THEORY										
1	PC440EC	Electronics Engineering - II	3	1	-	-	3	60	40	3
PRACTICALS										
2	PC461EC	Electronics Engineering - II Lab	-	-	-	2	3	50	30	1

SYLLABUS FOR B.E IV SEMESTER
ENGINEERING MATHEMATICS – IV
(For Civil, EEE, CSE, ECE, MECH Branches)

Subject Code : BS410MA	Instruction : 3+1 Hrs/ week	CIE Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 03

Course Objectives	Course Outcomes
1. Understand the Definition of Laplace and inverse Laplace Transforms-Shifting Properties and various theorems and how to apply them in solving Differential Equations. 2. Analyze the characteristics and properties of and Z – transforms and solve the Difference Equations. 3. Study the concept of Fourier and inverse Fourier Transform of a function and various Properties. 4. Understand the Analytic functions, to evaluate a line integral of a function of a complex variable using Cauchy's integral formula, to evaluate real integrals using complex integration and how to evaluate Laurent Series and residues.	**At the end of the course, students will be able to:** 1. Evaluate Laplace transforms and inverse Laplace transforms of functions. Apply Laplace transforms to solve ordinary differential equations arising in engineering problems. 2. Apply Z-transform in the analysis of continuous time and discrete time systems and also solve the Difference Equations using Z-transform. 3. Determine Fourier transform, Fourier sine and cosine transform of a function. 4. Know the condition(s) for a complex variable function to be analytic and/or harmonic and state and prove the Cauchy Riemann Equation and use it to show that a function is analytic and to define singularities of a function, know the different types of singularities, evaluate contour integrals using the Cauchy Integral Theorem and the Cauchy Integral Formula and will be able to determine transformation in complex space.

UNIT - I

Laplace Transforms: Introduction to Laplace transforms - Inverse Laplace transform - Sufficient Condition for Existence of Laplace Transform –Properties of Laplace Transform- Laplace Transform of Derivatives - Laplace Transform of Integrals - Multiplication by t^n - Division by t – Evaluation of Integrals by Laplace Transforms- Convolution Theorem - Application of Laplace transforms to Linear Differential Equations with Constant Coefficients.

UNIT - II

Fourier Transforms: Mathematical Transforms**,** Fourier Integral Theorem - Fourier Transforms – Inverse Fourier Transform - Properties of Fourier Transform –Fourier Cosine & Sine Transforms - Convolution Theorem.

UNIT - III

Z-Transforms: Introduction - Z-transforms of Standard sequences - Linearity Property – Damping Rule - Shifting Properties- Multiplication by n - Initial and Final value theorems – Inverse Z-Transforms- Convolution Theorem – Application of Z-Transforms to Difference Equations.

UNIT - IV

Functions of Complex Variables:Limits and Continuity of function - Differentiability and Analyticity - Necessary & Sufficient Condition for a Function to be Analytic - Milne-Thomson's method - Cauchy-Riemann Equations in Polar Form - Harmonic Functions - Complex Integration - Cauchy's Theorem - Extension of Cauchy's Theorem for multiply connected regions- Cauchy's Integral Formula.

UNIT - V

Power series - Taylor's Series - Laurent's Series (without proofs) - Zeros and Singularities –Residues – Cauchy's Residue Theorem -Evaluation of Real Integrals using Residue Theorem -Bilinear Transformation.

Suggested Reading:

1. R.K.Jain&S.R.K.Iyengar , Advanced Engineering Mathematics - 3rd Edition, Narosa Publications
2. Dr.B.S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publishers.
3. Goyal & Gupta, Laplace's and Fourier transforms, 23rd Edition, PragatiPrakashan, 2009
4. Kreyszig E, Advanced Engineering Mathematics, 8 th Edition, John Wiley & Sons Ltd, 2006.
5. N.P.Bali& Manish Goyal A text book of Engineering Mathematics, Laxmi Publication.
6. H.K. Dass, Er.RajnishVerma, Higher Engineering Mathematics, 2011 Edition S.Chand& company Ltd.
7. R.V. Churchill, "Complex Variables & its Applications".McGraw-Hill Book Company, INC

SYLLABUS FOR B.E IV SEMESTER
BASIC THERMODYNAMICS

Subject Code : ES410ME	Instruction : 3 Hrs/ week	CIE Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 03

Course Objectives	Course Outcomes
1. Study the basic laws of thermodynamics and principles of refrigeration and air-conditioning. 2. Apply the knowledge of thermodynamics to power cycles.	**At the end of the course, students will be able to:** 1. **Explain** the basic concepts of thermodynamics. 2. Apply the first law and the second law of thermodynamics to various engineering problems 3. **Evaluate** the thermodynamic properties of steam for various thermodynamic processes. 4. **Distinguish** between refrigeration and air-conditioning and **apply** principles of psychrometry to various air-conditioning systems. 5. **Analyze** the performance of power cycles.

UNIT - I

Introduction: Basic Concepts-System, Types of Systems, Control Volume, Surrounding, Boundaries, Universe, Macroscopic and Microscopic viewpoints, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi–static process; Zeroth Law of Thermodynamics – Principles of Thermometry, Reference Points, Constant Volume ideal gas thermometer. Energy in state and in transition-Work and Heat.

UNIT - II

First and Second Law of Thermodynamics: PMM I – Joule's Experiment – First law of Thermodynamics, First law applied to - process, flow system, Steady Flow Energy Equation, Limitations of the First Law; Second Law of Thermodynamics- Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM II, Carnot cycle and its specialties, Clausius inequality, introduction to entropy.

UNIT - III

Pure Substances: Concept of Phase change; p-v-T- surfaces, T-s and h-s diagrams, triple point, critical point, properties during change of phase, Dryness Fraction – Property tables and Mollier chart – Various

thermodynamic processes and energy transfers for non-flow and flow processes.

UNIT - IV

Principles of Refrigeration & Air-conditioning: Introduction to Refrigeration, Types of Refrigeration- Air refrigeration system and vapour compression refrigeration system**,** Types of Refrigerants, Atmospheric air - Psychometric Properties – Dry Bulb Temperature, Wet Bulb Temperature, Dew point Temperature, thermodynamic Wet Bulb Temperature, specific humidity, relative humidity, saturated air, vapour pressure, degree of saturation – Adiabatic Saturation, Carrier's Equation – Psychrometric chart.

UNIT - V

Power Cycles-Gas Cycles: Otto, Diesel, Dual-combustion cycles and Joule-Brayton Cycle – description and representation on p–v and T-s diagrams, thermal efficiency, Mean Effective Pressures on air standard basis – comparison of cycles. **Steam Cycle**: Rankine cycle – Performance Evaluation – combined cycles,

Learning Resources:

1. P.K. Nag, "Engineering Thermodynamics", Tata Mc Graw Hill, 4th Edition, 2008.
2. YunusCengel& Boles, "Thermodynamics – An Engineering Approach", TMH New Delhi 2008.
3. P. Yadav, "Fundamentals of Engineering Thermodynamics", Central Publishing, Allahabad, 2009.
4. Sonntag, Borgnakke and Van Wylen "Fundamentals of Thermodynamics", John Wiley 2010.
5. D S Kumar, "Ëngineering Thermodynamics", S K Kataria& Sons, 1st Edition, 2013
6. ISI Steam Tables in SI Units, Indian Standards Institution, New Delhi, SP: 26-1983
7. Dr. S SBanwait& Dr. S C Laroiya, Properties of Refrigerants & Psychrometric Tables and Charts in SI Units, Birla's Publications, New Delhi-2008.

SYLLABUS FOR B.E IV SEMESTER
ANALOG ELECTRONIC CIRCUITS

Subject Code : PC410EC	Instruction : 3 Hrs/ week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 03

Course Objective	Course Outcomes
1. To familiarize the students with design and working of various amplifiers and analyze concepts of positive and negative feedback.	**At the end of the course, students will be able to:** 1. Analyze and design various small signal amplifier circuits. 2. Analyze the effect of negative feedback in amplifier circuits. 3. Design of oscillator circuits for the given specifications. 4. Design of power amplifier circuits for audio frequency applications. 5. Analyze the characteristics of differential amplifier and its use in building Op-amps.

UNIT - I

Small signal amplifiers: Classification of amplifiers, BJT and FET high frequency equivalent circuits, Mid-band analysis if single and multistage amplifiers, low frequency and high frequency analysis of single and multistage RC coupled and Transformer coupled amplifiers with BJT and FET..

UNIT - II

Feedback amplifiers: The feedback concept, general characteristics of negative feedback, Effect of negative feedback on input output impedances, voltage series and shunt feedbacks. Stability considerations, local versus global feedback

UNIT - III

Oscillators: Positive Feedback and conditions for sinusoidal oscillations, RC oscillator, LC oscillator Crystal oscillator, Amplitude and frequency stability of oscillator.

Regulators: Transistorized series and shunt regulators

UNIT - IV

Large signal amplifiers: BJT as large signal audio amplifier, Classes of operation, Harmonic distortion, power dissipation, efficiency calculations. Design considerations of transformer coupled and transformer less push-pull audio power amplifiers under Class-A, Class-B, Class-D, Class –AB operations, Qualitative analysis on

R.F. Tuned amplifiers.

UNIT - V

Differential Amplifiers: Classification, DC and AC analysis of single/dual input Balanced and unbalanced output Configurations using BJTs. Level Translator.

Operational Amplifier: Op-amp Block Diagram, ideal Op-amp Characteristics, op-amp and its features, Op-Amp parameters & Measurements, Input and Output Offset voltages and currents, Slew Rate, CMRR, PSRR. Frequency Response and Compensation techniques.

Suggested Reading:

1. Adel S.Sedraand KennethC.Smith “Micro Electronic Circuits theory and applications” sixth edition Oxford publications.
2. Jacob Millman, Christos Halkias, Chetan Parikh, "Integrated Electronics", 2nd Edition, McGraw Hill Publication, 2009
3. Donald Schilling, Charles Belove, TuviaApelewicz Raymond Saccardi, "Electronic Circuits: Discrete and Integrated", TMH, 3rd Edition
4. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008
5. Robert L. Boylestad, "Electronic Devices and Circuit Theory", 6th Edition, PHI, 1998
6. Ben G Streetman and Sanjay Banerjee, "Solid State Electronic Devices", 6th Edition, Pearson Education, 2005
7. Roody and Coolen, "Electronic Communications", 4th Edition, Pearson Education, Reprint 2007.

SYLLABUS FOR B.E IV SEMESTER
SIGNAL ANALYSIS & TRANSFORM TECHNIQUES

Subject Code : PC420EC	Instruction : 3+1 Hrs/ week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 03

Course Objectives	Course Outcomes
1. To define and classify continuous and discrete time signals & systems 2. To determine the frequency domain characteristics of continuous and discrete time signals using various transform techniques. 3. To verify the causuality and stability of LTI system and find its response using convolution.	**At the end of the course, students will be able to:** 1. Analyse continuous time signals and systems and transform them to frequency domain using CTFT, LT. 2. Convert continuous time signals to discrete time signals using sampling. 3. Represent the continuous and discrete time signals as a linear combinational of mutually orthogonal signals. 4. Analyse discrete time signals and systems and transform them to frequency domain using ZT. 5. Determine the response of an LTI system using convolution.

UNIT - I

Continuous Time Signals & Systems: Introduction, Elementary signals, Basic operations on signals and its classification. Introduction to systems and its classification. Analogy between vectors and signals - signal representation by a set of mutually orthogonal functions, Evaluation of mean square error, Orthogonality in complex functions.

Fourier Series: Review of Fourier series, Existence and Convergence, Trigonometric and exponential Fourier series representations and their relations, Symmetry conditions, Properties, Complex Fourier spectrum, Power Spectral Density (PSD).

UNIT - II

Signal Representation by Continuous Exponentials: Introduction to Fourier Transform, Existence, Fourier transform of singularity functions and signals, Properties, Fourier transform of a periodic function, Energy Spectral Density (ESD).

Signal Transmission Through Linear Systems: Introduction to Linear Time Invariant (LTI) system, Unit Impulse and step response, Transfer function of an LTI system, Filter characteristics of an LTI system, Distortion less transmission, Signal bandwidth, System bandwidth, Ideal filter characteristics, Causality and Paley-wiener criterion for physical realization.

UNIT - III

Sampling: Introduction to Sampling, Sampling Theorem, Aliasing, Sampling Techniques, Reconstruction.

Signal Representation by Generalized Exponentials: Introduction to Laplace transforms, Existence, Region of convergence (ROC) and it properties. Properties of Laplace transform. Inverse Laplace transform. Analysis and characterization of continuous LTI systems using Laplace Transform.

UNIT - IV

Discrete Time Signals & Systems: Introduction, Elementary signals, Basic operations on signals and its classification. Introduction to systems and its classification. Linear Shift invariant systems, Stability and Causality, Linear constant coefficient systems. Discrete Fourier Series (DFS), Discrete Time Fourier Transform (DTFT).

Z-Transforms: Introduction to Z-Transform, Existence, Region of Convergence (ROC) and its properties. S-plane and Z-plane correspondence, Properties of Z-Transform, Inverse Z-Transform, Analysis and characterization of discrete LTI systems using Z-Transform

UNIT - V

Convolution & Correlation: Continuous convolution - Graphical interpretation and Convolution properties. Discrete convolution- Graphical interpretation and Convolution properties. Continuous correlation-Cross correlation and Auto correlation, their graphical interpretation and properties. Discrete correlation- Cross correlation and Auto correlation, their graphical interpretation and properties.

Suggested Reading:

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2 Ed., PHI.
3. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2 Ed.
4. Signals and Systems – A.Rama Krishna Rao – 2008, TMH.
5. M.J. Robert " Fundamentals of signals and systems", McGraw Hill, 2008

SYLLABUS FOR B.E IV SEMESTER
PULSE, DIGITAL AND SWITCHING CIRCUITS

Subject Code : PC430EC	Instruction : 3+1 Hrs/ week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 03

Course Objectives	Course Outcomes
1. To familiarize the students with the concepts of wave shaping using linear & nonlinear circuits, switching characteristics of diodes. 2. To design & analyze various Multi vibrators. 3. To understand the concepts of combinational and sequential circuits, analyze and Design the Combinational and sequential systems.	**At the end of the course, students will be able to:** 1. Analyze the responses of RLC circuits for standard test input signals. 2. Synthesize Non-linear wave shaping circuits for given transfer characteristics. 3. Analyze and design Multivibrator circuits using BJTs. 4. Analyze and design various combinational and sequential circuits at gate level. 5. Design finite state machines for real time applications.

UNIT - I

Wave-Shaping: RC, RL and RLC circuits, response to Step, Pulse, Square, Exponential and Ramp inputs. Integrating and differentiating circuits, Compensated attenuators. Non-linear wave shaping using Diodes and Transistors. Clipping and Clamping circuits, Clamping circuit theorem.

UNIT - II

Multi vibrators: Analysis and design of Transistor Multi vibrators – Bistable, Mono-stable and Astable circuits. Operation of regenerative comparator (Schmitt Trigger). Time base generators: Speed, transmission and displacement errors.

Analysis and Design of sweep circuits using UJT and SCR.

UNIT - III

Boolean – Algebra: Introduction to Boolean Algebra, DeMorgan's theorem, Canonical forms and standard forms, Introduction to Logic Gates, Ex-OR, Ex-NOR operations, Simplification of switching functions using theorems,

Karnaugh map method, Quine McCluskey /Tabular method. Realization of Logic functions using AND-OR, OR-AND and NAND / NOR.

UNIT - IV

Combinational Logic Design: Binary Adders, Subtractors, Code converters, Decoders and Encoders, Priority Encoder, static and hazard free design.
Introduction to Sequential Logic: Types of Flip-Flops, Excitation Tables and Flip-Flop Conversions, Classification of sequential circuits.

UNIT - V

Sequential Logic Design: State Diagram and State Table, Design of synchronous and asynchronous counters, registers.
Finite State Machines: Moore Type and Mealy Type FSM, Design of Sequence Detector using Moore and Mealy FSM. One Hot Encoding.

Suggested Reading:

1. Jacob Millman and Herbert Taub, Pulse, Digital and Switching Waveforms, TMH, 3rd edition, 2011.
2. M. Morris Mano and Michael D. Ciletti, "Digital Design", 4thEdition., PrenticeHall, 2007
3. ZviKohavi, Switching And Finite Automata Theory, TMH, 2nd edition, 2001.
4. David A. Bell, Pulse, Switching and Digital Circuits, 5th edition, OXFORD Higher Education, 2015.
5. Stephen Brown and ZvonkoVranesic, Fundamentals of Digital Logic with VHDL Design, TMH, 3rd edition, 2010.

SYLLABUS FOR B.E IV SEMESTER
HUMAN VALUES AND PROFESSIONAL ETHICS – I

Subject Code : MC300EH	Instruction : 1 Hrs/ week	CIE Marks : 30
SEE Marks : 40	SEE - Duration : 2 Hours	Credits: 01

Course Objectives	Course Outcomes
• Get a holistic perspective of value- based education. • Grasp the meaning of basic human aspirations vis-a-vis the professional aspirations. • Understand professionalism in harmony with self and society. • Develop ethical human conduct and professional competence. • Enrich their interactions with the world around, both professional and personal.	**At the end of the course, students will be able to:** 1. Gain a world view of the self, the society and the profession and obtain a holistic vision about value-based education and professional ethics. 2. Make informed decisions. 3. Start exploring themselves in relation to others and their work –constantly evolving into better human beings and professionals 4. Inculcate Human values into their profession. 5. Validate their aspirations through right understanding of human relationship and see the co-relation between the human values and prevailing problems. 6. Strike a balance between physical, mental, emotional and spiritual parts their being

UNIT-I

Human and Ethical values

What are they? --The Indian concept of values-- Modern approach to the study of values - Basis for Moral Judgement--- A new approach to Human Values-- freedom, creativity, love, wisdom, concern.

UNIT-II

Canons of Ethics

Virtue Ethics-- Ethics of Duty-- Ethics of Responsibility-- Factors to be considered in making Ethical Judgments.

UNIT-III

The Value of time

The importance of managing time-- Factors that hinder time management--Benefits of time management-- Using time judiciously-- practical strategies to manage time.

UNIT-IV

The Power of Positive thinking

Nature and Scope of Positive thinking-- Methods to change one's thinking---Strategies to change the cycle of one's thinking.

UNIT-V

The Value of Setting Goals

Goal setting-- Importance of setting goals for oneself--Achieving excellence through SMART goals.

Learning Resources:

1. B.L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. A.N Tripathy, 2003 Human values, New Age International Publishers.
3. EG Seebauer & Robert L. Berry,2000,Fundamentals of Ethics for Scientists and Engineers, Oxford University Press.
4. Mike Martin and Ronald Schinzinger "Ethics in Engineering "McGraw Hill
5. Charles E Haris, Micheal J Rabins, " Engineering Ethics "Cengage Learning
6. Caroline Whitback < Ethics in Engineering Practice and Research, Cambridgs University Press
7. Georgs Reynolds, Ethics in Information Technology", Cengage Learning
8. Charles D.Fleddermann, " Engineering Ethics", Pearson Education /Prentice Hall, New Jersey,2004 (Indian Reprint)

Relavant Websites,CD's and Documentaries

- Value Education website, Http://www.universalhumanvalues.info
- UPTU webiste, Http://www.uptu.ac.in
- Story of stuff, Http://www.storyofstuff.com
- AlGore, As Inconvenient Truth, Paramount Classics ,USA
- Charlie Chaplin, Modern Times, United Artists, USA
- IIT Delhi, Modern Technology-The Untold story-Anand Gandhi, Right Here Right Now, Cyclewala production

SYLLABUS FOR B.E IV SEMESTER
FS - II: COMMUNICATION SKILLS IN ENGLISH-II

Subject Code : HS420EH	Instruction : 2+2 Hrs/ week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 02

Course Objectives	Course Outcomes
1. Identify the various features and functions of human language and communication. 2. Develop the habit of listening effectively so as to analyze the speaker's tone and tenor. 3. Choose appropriate words so as to speak and write accurately. 4. Read various types of texts and sift information correctly. 5. Study organizational structures and behavioral patterns and adapt appropriately.	**At the end of the course, students will be able to:** 1. Participate in group and forum discussions by providing factual information, possible solutions, and examples. 2. Debate on a topic by picking up the key points from the arguments placed. 3. Provide logical conclusions to the topics under discussions and summarize with 70% comprehension. 4. Prepare, present, and analyze reports. 5. Choose appropriate words and tone to present accurate, specific, and factual reports and apply reading skills, including how to approach different types of literature 6. Compose a summary of beginning high level reading text that identifies the thesis and key supporting details.

Unit 1: Professional Discussions and Debates

Module Overview:

The module enables the students to build strategies for effective interaction and help them in developing decisive awareness and personality maintaining emotional balance.

Learning Outcome:

The students should be able to:

- Participate in group and forum discussions by providing factual information, possible solutions, and examples.
- Debate on a topic by picking up the key points from the arguments placed.

Competencies:

- Analytical and Probing Skills
- Interpersonal Skills

Topics Covered:

Topic1 - Discussing
Topic 2 - Debating

Topic Level Details

Topic1 - Discussing

Learning Outcome:

The students should be able to explore and support issues by adding explanations and examples.

Competencies:

- Thinking
- Assimilating

Topic 2 - Debating

Learning Outcome:

The students should be able to develop their case and present their points using relevant facts and logic.

Competencies:

- Comprehending key points of the debate and note decisive points including supporting details.
- Construct a logical chain of arguments and decisive points.
- Writing a review about a product by providing reasons, causes, and effects

Unit 2: Drawing Conclusions

Unit Overview:

This module is intended to provide necessary inputs that enable the students to draw conclusions out of a discussion and provide reports.

Learning Outcome:

Students should be able to:

- Provide logical conclusions to the topics under discussion.
- Prepare, present, and analyze reports.

Competencies:

- Reasoning skills - Coherent and logical thinking
- Reporting and Analyzing skills.

Topics Covered:

Topic 1 - Concluding

Topic 2 - Importance of Logic

Topic Level Details:

Topic 1 - Concluding

Learning Outcome:

The students should be able to conclude a discussion or deliberation with appropriate reasoning.

Competencies:

- Analyzing the points discussed.
- Connecting all points without gaps.
- Identifying clinchers.
- Communicating the decisions

Unit 3 - Reporting

Learning Outcome:

The Students should be able to choose appropriate words and tone to present accurate, specific, and factual reports.

Competencies:

- Reporting an incident
- Writing/Presenting a project report

Unit 4 - Reading for Context

Learning Outcomes

Upon completion of the course, students should be able to:

1. Compose a summary of beginning high level reading text that identifies the thesis and key supporting details.
2. Summarize with 70% comprehension..
3. Apply reading skills, including how to approach different types of literature.

Competencies

Develop metacognitive strategies

Topics

a. Recognition of author's purpose
b. Awareness of stylistic differences
c. Discernment of fact and opinion
d. Evaluation of fact and opinion
e. Recognition of propaganda techniques

2. Present vocabulary building methods
3. Use comprehension and vocabulary strategies to raise reading rate.

Unit 5- Develop critical reading skills:

- Theme Detection
- Note making and Inference
- Summary and main idea identification

SYLLABUS FOR B.E IV SEMESTER
ELECTRONIC CIRCUITS LAB

Subject Code : PC441EC	Instruction : 3 Hrs/ week	CIE – Marks : 30
SEE – Marks : 50	SEE - Duration : 3 Hours	Credits: 02

Course Objective	Course Outcomes
1. To develop an understanding of the underlying concepts of analog electronic circuits, wave shaping circuits and low pass/high pass filters.	**At the end of the course, students will be able to:** 1. Design different types of clippers, clampers and multi vibrators for the given specifications 2. Analyze the circuits (amplifiers and oscillators) behavior with and without feedback. 3. Analyze and compare performance of power amplifiers. 4. Analyze the working of symmetrical and asymmetrical networks. 5. Design T and π section filters for given specifications.

List of Experiments:

1. Frequency response of single stage and two stage RC-Coupled amplifier using BJT.
2. Frequency response of single stage and two stage RC-Coupled amplifier using FET.
3. Clipping and Clamping Circuits
4. Measurement of Image impedance and characteristic impedance
5. Frequency response of Voltage series feedback amplifier
6. Frequency response of Current Shunt feedback amplifier
7. Bistable Multi vibrator, Schmitt trigger
8. Astable Multi vibrator and Voltage to frequency Converter
9. Monostable Multi vibrator
10. Design and verification of constant K- LPF (Frequency response)
11. Design and verification of m-derived- HPF (Frequency response)
12. Design and verification of L type matching network
13. Design of Oscillators: RC Phase Shift , Hartley, Colpitts
14. Design of tuned Amplifier
15. Design of Power amplifiers : Class – A and Class – B

Suggested Reading:

1. Robert Diffenderfer, "Electronic Devices Systems and Applications", Cengage Learning India Private Limited, 2010.
2. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7thEdition, TMH 2001.

SYLLABUS FOR B.E IV SEMESTER
SIMULATION LAB FOR SIGNALS AND SYSTEMS

Subject Code : PC451EC	Instruction : 3 Hrs/ week	CIE – Marks : 30
SEE – Marks : 50	SEE - Duration : 3 Hours	Credits: 02

Course Objective:	Course Outcomes
• To impart the knowledge to write MATLAB codes for the generation of signals, to perform different operations and to verify various transforms for converting time domain signal to frequency domain signal.	**At the end of the course, students will be able to:** 1. Write MATLAB codes for the generation of signals. 2. Apply various transforms on signals to find it's Spectrum using MATLAB. 3. Correlate two signals and can remove noise using correlation. 4. Find the response of the system using convolution function in MATLAB. 5. Perform sampling of continuous time signal.

List of Experiments:

1. Basic operations on Matrices
2. Signal Representation.
3. Continuous Systems
4. Convolution Representation
5. Fourier Series
6. The Fourier Transform
7. Mini project-1
8. Frequency domain analysis of Systems
9. Fourier analysis of Discrete time signals and Systems
10. The Laplace transform and the transfer function representation
11. System analysis using the transfer function
12. State space and linear systems
13. Verification of Sampling theorem
14. Correlation between signals and Systems
15. Mini project -2

Suggested Reading:

1. Taan S. ElAli and Mohammad A. Karim, "Continuous Signals and systems with MATLAB", 2/e, 2009, CRC Press.
2. Edward W.Kamen and Bonnie S. Heck, "Fundamentals of Signals and Systems Using MATLAB", PHI Inc.

SYLLABUS FOR B.E IV SEMESTER
ELECTRONICS ENGINEERING – II (For EEE)

Subject Code : PC 440EC	Instruction : 3+1 Hrs/ week	CIE – Marks : 40
SEE – Marks : 60	SEE - Duration : 3 Hours	Credits: 03

Course Objective:	Course Outcomes
1. To familiarize the student with the analysis & design of feedback amplifiers, oscillators, multistage amplifiers and power amplifiers. 2. To understand the operation and design of linear and non-linear wave shaping circuits. 3. To study and analyze the frequency response of amplifier circuits. 4. To know the fundamental concepts of Operational amplifier.	**At the end of the course, students will be able to:** 1. Analyze and design various feedback, multistage and large signal amplifiers. 2. Design a sinusoidal oscillator. 3. Analyze drift compensation techniques and differential amplifiers. 4. Design and analyze linear and non-linear wave shaping circuits.

UNIT - I

Multi stage amplifiers: Cascading amplifier stages, classification of amplifiers, frequency responses of RC coupled amplifiers, Transformer coupled amplifiers, effect of cascading on band width.

D.C. Amplifiers: Problems of D.C amplifiers, Drift Compensation techniques, Differential amplifiers, importance of CMRR.

UNIT - II

Feedback amplifiers: Concept of Feedback, General characteristics of negative feedback amplifier, Effect of negative feedback on input and output impedances, voltage and current, series and shunt feedbacks.

UNIT - III

Oscillators: Barkhausen criterion, RC oscillators, Wien bridge, phase shift, LC Hartley and Colpitts oscillator, Crystal oscillators (BJT only), frequency stability of oscillator.

UNIT - IV

Power amplifiers: Classification of power amplifiers, Analysis of class A and B power amplifiers, Harmonic distortion, Power dissipation, efficiency calculations, Push pull amplifiers, Complementary symmetry Power amplifiers.

UNIT - V

Wave-Shaping Circuits: RC low pass and high pass circuit, response to step, pulse, Ramp and square wave inputs, Clipping circuits for single level and two levels, clamping circuits.

Suggested reading:

1. Jacob Millman and Christos C. Halkias, "Integrated Electronics" Mc Graw Hill, 1991.
2. Jacob Millman and Christos C. Halkias, Satyabratajit "Electronics Devices and Circuits", McGraw hill, 3rd edition, 2010.
3. Jacob Millman and Taub: "Pulse, Digital and switching wave forms", Mc Graw hill, 2003.
4. Sedra and smith, "Microelectronic Circuits" oxford university press, 5th edition, 2009.

SYLLABUS FOR B.E IV SEMESTER
ELECTRONICS ENGINEERING – II Lab (For EEE)

Subject Code : PC 461EC	Instruction : 2 Hrs/ week	CIE – Marks : 30
SEE – Marks : 50	SEE - Duration : 3 Hours	Credits: 01

Course Objective:	Course Outcomes
1. To develop an understanding of the underlying concepts of analog electronic circuits including feedback amplifiers, power amplifiers & oscillators, and design linear wave shaping and non-linear wave shaping circuits.	**At the end of the course, students will be able to:** 1. Analyze the small signal amplifiers behavior with and without feedback 2. Design and verify the functioning of various sinusoidal oscillators 3. Examine the characteristics of a difference amplifier 4. Design different types of clippers and clampers

List of Experiments:

1. Analysis and bandwidth calculation of Multi stage RC coupled CE Amplifier.
2. Frequency response of Voltage series feedback amplifier
3. Frequency response of Voltage Shunt feedback amplifier
4. Frequency response of Current series feedback amplifier
5. Frequency response of Current Shunt feedback amplifier
6. Design of Hartley Oscillator
7. Design of Colpitt's Oscillator
8. Design of RC Phase Shift
9. Difference amplifier(Op-Amp)
10. Transformer coupled Class A power amplifier
11. Class B Power amplifier
12. Linear wave shaping-Integrator & Differentiator
13. Clipping circuits
14. Clamping Circuits

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7thEdition, TMH 2001.
2. Paul B. Zbar, Industrial Electronics, A Text-Lab Manual, 3rd Edition, TMH 1983.

OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS
B.E- IV SEMESTER (2018-19)

B.E- IV SEM OPEN ELECTIVE-II COURSES			
CIVIL	Green Buildings	OE410CE	1
CSE	Cyber Security	OE410CS	1
ECE	Medical Electronics	OE 410EC	1
EEE	Non-Conventional Energy Sources	OE410EE	1
IT	Introduction to Software Engineering	OE410IT	1
Mech	Value Analysis and Value Engineering	OE400ME	1
B.E- IV SEM OPEN ELECTIVE-III COURSES			
CIVIL	Disaster Management	OE420CE	2
CSE	Introduction to Python Programming	OE420CS	2
ECE	Sensors for Engineering Applications	OE420EC	2
	Basics of Wireless Communications	OE430EC	2
EEE	Electric Heating and Illumination	OE420EE	2
IT	Introduction to Database Management Systems	OE420IT	2
Mech	Cooling of Electronic Components	OE410ME	2

B.E- IV SEM OPEN ELECTIVE-I COURSES			
Dept	**Title**	**Code**	**credits**
CHEM	Electronic engineering materials	OE400CH	1
	Polymer Technology	OE410CH	1
	Industrial Pollution and its Control	OE420CH	1
PHY	Display Devices	OE400PH	1
	Fundamentals of Vacuum technology	OE410PH	1
	Introduction to Non- Destructive Testing	OE420PH	1
B.E- IV SEM OPEN ELECTIVE-II COURSES			
CHEM	Electrochemical Energy Systems	OE430CH	2
	Corrosion Science and Technology	OE440CH	2
PHY	Fundamentals of Cryogenics	OE430PH	2
	Smart Materials and Applications	OE440PH	2
	Fundamentals of thin film Technology	OE450PH	2

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER
GREEN BUILDINGS
Open Elective-II (to other Branches)

Instruction :1 Hours/week	SEE Marks : 40	Course Code : OE410CE
Credits :1	CIE Marks : 30	Duration of SEE: 3 Hours

Course Objective:	Course Outcomes
• Learn the principles of the planning and the orientation of the buildings. • Acquire the knowledge on various aspects of green buildings.	At the end of the course, students will be able to: 1. Explain the principles of the building planning 2. Study the by-laws and provide facilities for rain water harvesting. 3. Application of renewable energy system for green building 4. Benefit to the environment with the green building technique

UNIT-I

Planning of building: Principles of planning, Relevant building bylaws, site selection for buildings, orientation of buildings, common errors in planning, Provision of rain water harvesting

UNIT-II

Green Building Technologies: Introduction- Necessity - Concept of Green building. Principles of green building – Selection of site and Orientation of the building – usage of low energy materials – effective cooling and heating systems – effective electrical systems – effective water conservation systems - Certification systems- Green Rating for Integrated Habitat Assessment (GRIHA) and Leadership in Energy and Environmental Design (LEED), case studies

Suggested Books:

1. Shahane, V. S, "Planning and Designing Building", Poona, 2004.
2. Michael Bauer, Peter Mösle and Michael Schwarz "Green Building – Guidebook for Sustainable Architecture" Springer, 2010.
3. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison "Green Building Handbook" Volume I, Spon Press, 2001.

References Books:

1. MiliMajumdar, "Energy-efficient buildings in India" Tata Energy Research Institute, 2002.
2. TERI "Sustainable Building Design Manual- Volume I & II" Tata Energy Research Institute, 2009.

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER
DISASTER MANAGEMENT
Open Elective-III (to other Branches)

Instruction :2 Hours/week	SEE Marks : 60	Course Code : OE420CE
Credits :2	CIE Marks : 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	*Upon the completion of this course the students will be expected to:*
1. Know about the state of art of disaster management in world and explore the history of the disasters and comprehend how past events have helped shape the future. 2. Study the various natural and manmade disasters and apply the mitigation measures 3. Expose students to various technologies used for disaster mitigation and management.	1. Attain knowledge on various types, stages, phases in disaster with international & national policies and programmes with reference to the disaster reduction. 2. Understand various types of natural disaster, their occurrence, Effects, Mitigation and Management Systems in India 3. Understand different types of manmade disasters, their occurrence, Effects, Mitigation and Management Systems in India. 4. Explain the utility of geography information systems (GIS), Remote sensing technology in all phases of disaster mitigation and management.

UNIT-I

Introduction – Hazard, vulnerability and risk, Types of disasters , Disaster management cycle, Progress of disaster management in world, vulnerability profile of India, Disaster management act, Disaster management in India

UNIT-II

Natural Disasters – Hydro- meteorological based disasters – Tropical cyclones, floods, drought and desertification zones, Geographical based disasters – Earthquake, Tsunamis, Landslides and avalanches – Causes, Types, effects and Mitigation measures.

UNIT-III

Human induced hazards – chemical industrial hazards, major power breakdowns, traffic accidents, etc.

UNIT-IV

Role of Remote Sensing and Geographical Information Systems (GIS) in Disaster Management: Introduction to remote sensing and GIS, its applications in disaster management.

Suggested Books:

1. Rajib, S and Krishna Murthy, R.R.(2012) "Disaster Management Global Challenges and Local Solutions", Universities Press, Hyderabad, 2012.
2. Navele, P & Raja, C.K. (2009), Earth and Atmospheric Disasters Management, Natural and Manmade, B.S. Publications, Hyderabad, 2009.
3. Battacharya, T. Disaster Science and Management, Tata McGraw Hill Company, New Delhi, 2012.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E IV SEMESTER
CYBER SECURITY (open elective-II)
(for other Branches)

Instruction: 1Hr /week	SEE Marks :40	Course Code :OE410CS
Credits :1	CIE Marks: 30	Duration of SEE : 2Hrs

Course objectives	Course outcomes
Students should be able to	At the end of the course, Students will be able to
• Utilize the concepts of cyber security to safeguard from threats and infection spread through the internet	1. Explain the concepts of confidentiality, availability and integrity 2. Explain the basics of fraud techniques used by a hacker 3. Explore the common exploitation mechanisms and inspect data sniffing over the network 4. Determine the ways an organization attempts to discover threats

UNIT I- CYBER SECURITY FUNDAMENTALS

Network and Security concepts: Information assurance fundamentals, Basic Cryptography, Public key encryption, DNS, Firewalls, Virtualization. Attacker Techniques and Motivations: How hackers cover their tracks, Fraud Techniques, Threat Infrastructure

UNIT II – EXPLOITATION

Techniques to gain foothold: Shellcode, Integer overflow, Stack based buffer overflow, Format String Vulnerabilities, SQL Injection, Web Exploit Tools, Misdirection, Reconnaissance, and Disruption Methods. Malicious Code-Worms, Virus, Rootkits, Spyware, Escalation of privileges, Stealing information – MITM attack.

Suggested Books:

1. James Graham, Ryan Olson, Rick Howard, "Cyber Security Essentials", Auerbach Publications , CRC Press, 2011
2. Mike Shema, "Anti-Hacker Tool Kit (Indian Edition)", Mc Graw Hill, 2014
3. Cyber Security - Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and SunitBelpure, Publication Wiley , 2011

Online Resources:

1. https://www.edx.org/micromasters/ritx-cybersecurity
2. https://www.coursera.org/specializations/cyber-security
3. http://nptel.ac.in/courses/106105031/

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E IV SEMESTER
INTRODUCTION TO PYTHON PROGRAMMING
(open elective-III for other Branches)

Instruction: 2 Hrs /week	SEE Marks :60	Course Code :OE420CS
Credits :2	CIE Marks: 40	Duration of SEE : 3Hrs

Course objective	Course outcomes
Students should be able to	At the end of the course, students will be able to
• Acquire problem solving skills • Develop flow charts • Learn programming and solve problems using Python language	1. Design python programs using arithmetic expressions and decision making 2. Design modular python programs using functions 3. Design programs using strings and list 4. Develop programs using tuples and dictionaries

UNIT-I

Introduction to Python – variables, expressions and statements, order of operations

Conditionals-Modulus operators, Boolean expressions, logical operators, conditional execution, alternative executions, chained conditional, nested conditional

Iteration - *while* statement

UNIT-II

Functions- function calls, type conversion and coercion, mathematical functions, User-defined functions, parameters and arguments.
Recursion

UNIT-III

Strings – string length, string traversal, string slices and string comparison with examples, strings are immutable, find function, string module

List –list values, accessing elements, list traversal, list length, list membership, list and for loop, list operations with examples

UNIT-IV

Tuples-Mutability, tuple assignment, tuple as return values

Dictionaries- dictionary operations, dictionary methods, aliasing and copying, counting letters using dictionaries

Suggested Books:

1. Downey A, How to think like a Computer Scientist :Learning with Python, 1st Edition(2015), John Wiley
2. Lambert K.A, Fundamentals of Python –First Programs, 1st Edition(2015), Cengage Learning India
3. Perkovic L, Introduction to Computing using Python,2/e, (2015), John Wiley

Reference Books:

1. Stewart Venit and Elizabeth Drake, Prelude to Programming: Concepts and Design, 6th Edition(2015), Pearson India
2. Mark J Guzdial, Introduction to Computing and programming in Python, 3rdEdition(2013), Pearson India
3. Allen Downey, Think Python, 2nd Edition(2015), Shroff Publisher Orielly

Online Resources:

1. http://nptel.ac.in/courses/117106113/34
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electrical-engineering-and-computer-science-i-spring-2011/python-tutorial/
3. www.scipy-lectures.org/intro/language/python_language.html

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SYLLABUS FOR B.E. IV SEMESTER

MEDICAL ELECTRONICS (Open Elective-II)

(for other Branches)

Instruction: 1 Hr /week	SEE Marks : 40	Course Code : OE410EC
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course Objective:	Course Outcomes
1. Will study the human body and various physiological systems 2. Will understand various transducers used in bio-medical applications 3. Will acquire good knowledge about various ICU, Electro surgery and imaging equipment	**At the end of the course, students will be able to:** 1. Identify the instruments used for physiological measurements and bio-potential recordings 2. Demonstrate the working principles and operation of life supporting and medical imaging systems 3. Analyse the advanced hospital equipment used in health care industry. 4. Apply different medical imaging techniques for diagnosis purposes.

UNIT –I

Human Body: An overview – the Cell Body fluids – Musculo Skeletal Systems – circulatory system respiratory system – Gastro Intentestinal System – Nervous system – Endo Crine System – the body as a control system components of the man instrument system. Sources of Bio electric potentials – Bio-potential electrodes – Electrodes for ECG, EEG, EMG, EOG and ERG.

Bio Signal Acquisition: types of bio signals, noise reduction strategies, physiological signal amplifiers, differential amplifiers, isolation amplifiers, chopper stabilized amplifiers, multiple input circuits,

UNIT - II

Bio Medical Instruments/Equipment: Operation theatre: surgical diathermy - OT table - OT lamps – Anesthesia Machine – Multi-para patient monitor.

Therapeutic Equipment: Short wave diathermic, microwave diathermy, ultrasound diathermy - bladder simulators.

Life supporting: Ventilators, pace makers, dialysis machines.

Specialized Medical Equipment: Defibrillator, blood gass analyser blood cell counter – multi channel ECG and EEG m/c – foetal dopller and foetal monitor – Heart-lung machine.

Medical Imaging Systems: Operation and working principles – X-ray m/c – C-arm – CT Scanner – Ultra Sound Scanner – Colour Doppler – Gamma Camera – MRI – OPG – Pet Scanner – Video Endo scope.

Suggested Reading:

1. Joseph J.Carr, John M. Brown "Introduction to Biomedical Equipment Technology", 4/e, 2001.
2. Leslie Cromwell, Fred J. Weibell, Erich A. P Feiffer, "Biomedical Instruments and Measurements", 2/e, PHI.
3. RS Khandpur "Hand Book of Bio Medical Instrumentation", 3/e, McGraw Hill Education (I) Pvt. Ltd., 2014.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
SYLLABUS FOR B.E. IV SEMESTER
SENSORS FOR ENGINEERING APPLICATIONS (Open Elective-III)
(for other Branches)

Instruction: 2 Hrs /week	SEE Marks : 60	Course Code :OE420EC
Credits : 2	CIE Marks: 40	Duration of SEE : 3 Hrs

Course Objective:	Course Outcomes
1. The student will come to know the various stimuli that are to be measured in real life instrumentation. 2. He will be able to select the right process or phenomena on which the sensor should depend on 3. He will be aware of the various sensors available for measurement and control applications.	**At the end of the course, students will be able to:** 1. Appreciate the operation of various measuring and control instruments which they encounter in their respective fields. 2. Visualize the sensors and the measuring systems when they have to work in areas of interdisciplinary nature and also think of sensors and sensors systems when for a new situation they encounter in their career 3. Identify and select the right process or phenomena on which the sensor should depend on. 4. Know various stimuli that are to be measured in real life instrumentation.

UNIT - I

Introduction: What is a sensor and what is a transducer? Electrical sensor – need for sensors in the modern world. Different fields of sensors based on the stimuli - various schematics for active and passive sensors.
General characteristics and specifications of sensors – Implications of specifications uses of sensors – measurement of stimuli - block diagram of sensor system. Brief description of each block.

UNIT - II

Sensors for mechanical systems or mechanical sensors - Displacement - acceleration and force - flow of fluids – level indicators – pressure in fluids – stress in solids. Typical sensors - wire and film strain gauges, animometers, piezo electric and magnetostrictive accelerometers, potentiometric sensors, LVDT.

UNIT - III

Thermal sensors – temperature – temperature difference – heat quantity. Thermometers for different situation – thermocouples thermistors – color pyrometry.

Optical sensors: light intensity – wavelength and color – light dependent resistors, photodiode, photo transistor, CCD, CMOS sensors.

Radiation detectors : radiation intensity, particle counter – Gieger Muller courter (gas based), Hallide radiation detectors.

UNIT - IV

Magnetic sensors: magnetic field, magnetic flux density – magneto resistors, Hall sensors, super conduction squids.

Acoustic or sonic sensors: Intensity of sound, frequency of sound in various media, various forms of microphones, piezo electric sensors.

Electrical sensors: conventional volt and ammeters, high current sensors, (current transformers), high voltage sensors, High power sensors.

High frequency sensors like microwave frequency sensors, wavelength measuring sensors.

MEMs and MEM based sensors.

Suggested Reading:

1. Doebelin, “Measurement Systems: Application and Design”, McGraw Hill Kogakusha Ltd.
2. Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim “Microsensors, MEMS and Smart Devices”, New York: Wiley, 2001.
3. Henry Bolte, “Sensors – A Comprehensive Sensors”, John Wiley.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SYLLABUS FOR B.E. IV SEMESTER

BASICS OF WIRELESS COMMUNICATIONS (Open Elective-III)

(for other Branches)

Instruction: 2 Hrs /week	SEE Marks : 60	Course Code :OE430EC
Credits : 2	CIE Marks: 40	Duration of SEE : 3 Hrs

Course Objective	Course Outcomes
1. To provide fundamental principles and concepts required to understand the wireless communication systems.	**At the end of the course, students will be able to:** 1. Demonstrate the fundamental knowledge of wireless communication systems. 2. Differentiate between large scale & small scale fading channel effects. 3. Calculate the path loss, coverage area and power budgeting related aspects. 4. Acquaint with recent advancements and developments in the area of wireless communication systems.

UNIT - I

Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communications, Examples of Wireless Communications Systems.

The Cellular Concept – System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Improving Coverage and Capacity in Cellular Systems.

UNIT - II

Mobile Radio Propagation: Large Scale Path Loss: Introduction to Radio wave Propagation, Free Space Propagation Model, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering.

Mobile Radio Propagation: Small Scale Fading and Multipath: Small Scale Multipath Propagation, Small – Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small-Scale Fading.

UNIT - III

Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Space Division Multiple Access (SDMA).

UNIT - IV

Wireless Systems and Standards: Global System for Mobile (GSM), CDMA Digital Cellular Standard (IS-95), Bluetooth and Personal Area Networks (PANs).

Suggested Reading:

1. Theodore S. Rappaport, Wireless Communications Principles and Practices, 2nd edition, Pearson Education.
2. David Tse, Pramodh Viswanath, Fundamentals of Wireless Communication, 2005, Cambridge University Press.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SYLLABUS OF B.E IV- SEMESTER
NON-CONVENTIONAL ENERGY SOURCES (Open Elective –II)

Instruction: 1Hrs /week	SEE Marks :40	Course Code :OE410EE
Credits :1	CIE Marks: 30	Duration of SEE : 2Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
To provide a survey of the most important renewable energy resources and the technologies for harnessing these resources within the framework of a broad range of simple to state- of -the-art energy systems.	After completion of the course, students will be able to: 1. Demonstrate the generation of electricity from various Non-Conventional sources of energy, have a working knowledge on types of fuel cells. 2. Estimate the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation. 3. Explore the concepts involved in wind energy conversion system by studying its components, types and performance. 4. Illustrate ocean energy and explain the operational methods of their utilization. 5. Acquire the knowledge on Geothermal energy.

UNIT-I:

Need for Non-conventional energy sources, Types of Non-Conventional energy sources
Fuel cells: Definition-Design and Principle of operation with special reference to H2O2-Solid oxide electrolyte cells-Advantages and Disadvantages of fuel cells-Applications of Fuel cells.
Solar Energy: Solar radiation and its measurements-Solar energy collectors: Flat Plate and Concentrating Collectors- solar pond - Applications of Solar energy.
Biomass Energy: Definition-Biomass conversion technologies.

UNIT-II:

Wind Energy: Nature of wind-Basic components of Wind Energy Conversion System(WECS)-Wind energy collectors: Horizontal and vertical axis rotors- Advantages and Disadvantages of WECS - Applications of wind energy.

Ocean Energy: Ocean thermal electric conversion (OTEC) methods: Open cycle and Closed cycle- Principles of tidal power generation-Advantages and limitations of tidal power generation.

Geothermal Energy: Types of Geothermal resources- Applications of Geothermal Energy.

Suggested Reading:

1. G.D. Rai, *Non-Conventional Energy Sources* ,Khanna Publishers, New Delhi, 2011.
2. B H KHAN, *Non-Conventional Energy Resources*, McGraw Hill, 2nd Edition, 2009.
3. Ashok Desai V, Non-Conventional Energy, Wiley Eastern Ltd, 1990.
4. Mittal K.M, Non-Conventional Energy Systems, Wheeler Publishing Co. Ltd, 1997.
5. Ramesh R, Kurnar K.U, Renewable Energy Technologies, Narosa Publishing House, New Delhi, 1997.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SYLLABUS OF B.E IV- SEMESTER
ELECTRIC HEATING AND ILLUMINATION (Open Elective –III)

Instruction: 2 Hrs /week	SEE Marks :60	Course Code :OE420EE
Credits :2	CIE Marks: 40	Duration of SEE : 3Hrs

Course objective:	**Course Outcomes:**
1. This subject gives a comprehensive idea in utilization of electrical power such as electric heating, electric welding and illumination	**At the end of the course, students will be able to:** 1. Identify a heating schemes for heating application 2. Welding schemes for welding application 3. Describe and measure units illumination. 4. Identify various lamps and fittings for street, factory and flood lighting schemes.

UNIT-I

Industrial Heating: Advantages and methods of electric heating. Description, operation and performance of resistance ovens, Design of elements. Core type furnace, Coreless type furnace, High frequency eddy current heating, Dielectric heating, Arc furnace.

UNIT-II

Electric Welding : Resistance welding, Welding transformer and its rating. Various types of Electric arc welding and Electric resistance welding.

UNIT-III

Illumination fundamentals: Introduction, nature and production of light, Sensitivity of the eye, Units of light. The inverse square law and cosine law, Solid angle, Lighting calculations, Determination of M.S.C.P, Rousseau's construction

UNIT-IV

Various illumination methods

Discharge lamps, Sodium vapour lamps, Mercury vapour lamps, Flourescent lamps, LED Lamps, Starting and power factor corrections, Stroboscopic effects, Noen signs, Application to factory lighting, Street lighting and Flood lighting.

SUGGESTED READING:

1. Art & Science of Utilization of Electrical Energy-Partab,Dhanpat Rai & Sons
2. Utilization of Electrical Power including Electric drives and Electric traction – J.B.Gupta, S.K. Kataria& Sons
3. Generation, Distribution and Utilization of Electrical Energy – C.L.Wadhwa New Age international (P) Limited,1997

DEPARTMENT OF INFORMATION TECHNOLOGY
SYLLABUS FOR B.E. IV SEMESTER
INTRODUCTION TO SOFTWARE ENGINEERING (Open Elective-II)
(for other Branches)

Instruction: 1 Hr /week	SEE Marks : 40	Course Code : OE410IT
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course Objectives	**Course Outcomes**
The course will enable the students to:	**At the end of the course student will be able to:**
Understand the various SDLC models	1. Apply SW engineering methods, practices and their appropriate application. 2. Analyze the software engineering layered technology and Process frame work. 3. Demonstrate the significance of software requirements. 4. Develop the ability to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project.

UNIT- I

Software Engineering framework and process models: Software Engineering, Process Frameworks, Process pattern, Perspective Models, Evolutionary Process Models, Agile Process Models

UNIT-II

Requirements Engineering: Requirements Engineering and Analysis, Scenario Based Modeling, Flow-Oriented Modeling, Creating a Behavioral IModeling.

Learning Resources:

1. Roger S.Pressman, Software Engineering: A Practitioner's Approach, Seventh Edition, Mcgraw Hill, 2009.
2. Pankaj Jalote An Integrated Approach To Software Engineering, Third Edition, Narosa Publishinghouse.2008
3. James F.Peter, WitoldPedrycz, Software Engineering. An Engineering Approach to John WileyInc.,2000
4. Ali Behforoz and Fedric J. Hadson, Softwre Engineering Fundamentals, Oxford University Press, 1997.
5. http://www.nptelvideos.in/2012/11/softwre-engineering.html

DEPARTMENT OF INFORMATION TECHNOLOGY
SYLLABUS FOR B.E. IV SEMESTER
INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS
(Open Elective-III)
(for other Branches)

Instruction: 2 Hrs /week	SEE Marks : 60	Course Code :OE420IT
Credits : 2	CIE Marks: 40	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
The course will enable the students to:	**At the end of the course student will be able to:**
The objective of the course is to explain the need of database for storing, accessing and updating the data, eliminate redundant data, allow multiple users to be active at one time and protect the data from unauthorized access.	1. Develop ER model for a given problem and understand functional components of the DBMS. 2. Devise queries using SQL. 3. Design a normalized database schema using different normal Forms. 4. Comprehend the properties of a transaction and understand the concept of transaction processing.

UNIT – I

Introduction: Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Databases Design, Database Architecture.

Database Design and the E-R Model: Overview of the Design Process, The E-R Model, Constraints, E-R Diagrams, Reduction of E-R model to relational schema.

UNIT – II

Relational Algebra: Fundamental Relational-Algebra Operations.

Structured Query Language: Data Definition, Basic Structure of SQL Queries, Set Operations, Aggregate Functions, Null Values, Nested Sub queries, Joined Relations, Integrity Constraints.

UNIT – III

Relational Database Design: Features of Good Relational Design, Functional-Dependency Theory, Normalization-Decomposition Using Functional Dependencies.

UNIT – IV

Transactions: Transaction Concepts, Transaction State, Implementation of Atomicity and Durability.

Learning Resources:

1. Abraham Silberschatz, Henry F Korth, S. Sudarshan, Database System Concepts, Sixth Edition, McGrah-Hill International Edition, 2010.
2. Ramakrishnan, Gehrke, Database Management Systems, Third Edition, McGrah-Hill International Edition, 2003.
3. ElmasriNavathe, Somayajulu, Fundamentals of Database System, Fourth Edition, Pearson Education, 2006.
4. http://www.nptelvideos.in/2012/11/database-management-system.html

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER
COOLING OF ELECTRONIC COMPONENTS (Open Elective -III)
(for other Departments)

Instruction : 2 Hours/week	SEE Marks : 60	Course Code : OE410ME
Credits : 2	CIE Marks: : 40	Duration of SEE : 3 Hours

Course Objective	Course Outcomes
The objectives of this course are to: expand the scope of the engineer to include the importance of effective heat transfer in electronic equipments. This should include the heat transfer processes occurring in electronic equipment, the methods of cooling and finally the analysis of thermal failure for electronic components.	On completion of the course the student will be able to: 1. anlyse heat transfer processes involved in cooling of electronics components. 2. analyse and define solution for thermal failure of electronic components. 3. identify the best cooling method for each individual application. 4. design of heat sinks and heat pipes for cooling purpose.

UNIT – I

Introduction To Electronics Cooling: Needs, Goals. Temperature effects on different failure modes, Fundamentals of heat transfer: Conduction, Convection and Radiation, Electronic equipment for Airplanes, Missiles, Satellites and spacecraft; electronic equipment for Ships and Submarines; electronic equipment for Communication systems and Ground support system; chassis and circuit boards cooling.

UNIT – II

Heat Transfer Principles in Electronics Cooling-I: Conduction Heat Transfer, Contact resistance, Extended surfaces, Transient Conduction

UNIT – III

Heat Transfer Principles in Electronics Cooling-II: Natural Convection in Electronic Devices, Forced Convection Heat Transfer, Forced Convection Correlations, Radiation Heat Transfer.

UNIT – IV

Electronics Cooling Methods in Industry: Heat Sinks, Heat Pipes and its selection.

Learning Resources:

1. Dave S. Steinberg, "Cooling Techniques for Electronic Equipment", Second Edition, John Wiley & Sons, 1991.
2. Frank P. Incropera, "Introduction to Heat Transfer ", Fourth Edition, John Wiley, 2002.
3. Yunus A. Cengel, Heat Transfer: A Practical Approach. McGraw-Hill, 2003.
4. YounesShabany, Heat Transfer: Thermal Management of Electronics, CRC Press Inc, 2010.
5. Chapman, A. J., "Heat Transfer", Macmillan Publishing Company, New York, 1974.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. IV-SEMESTER
VALUE ANALYSIS AND VALUE ENGINEERING (Open Elective -II)
(for other Departments)

Instruction:1 Hour/week	SEE Marks : 40	Course Code: OE400ME
Credits: 1	CIE Marks: 30	Duration of SEE: 2 Hours

Course Objectives	Course outcomes
The objectives of this course are to: Understand the importance of value engineering and its application in their respective fields and its implementation.	**On completion of this course, students will be able to:** 1. choose the Concept of value engineering in their respective program to improve overall effectiveness. 2. Examine orientation and information phases of value engineering to provide training and analyse information. 3. Study the creative, evaluation and recommendation phases for implementation of value analysis. 4. perceive the concept of auditing process and its certification of value engineering.

UNIT-I

Introduction: Meaning of Value Engineering (VE), Difference from other initiatives, Value and its types, Relationship between value vis-à-vis person, time and environment, History of Value Engineering / Value Analysis / Value Management, World bodies of Value Engineering & their activities, Multi-disciplinary team approach in Value Engineering study.

VALUE ENGINEERING JOB PLAN: Introduction, comparison of job plans of various value engineering. Finance and human relations in VE.

ORIENTATION PHASE: training associates in Value Analysis and Value Engineering (VAVE). Different trainings and certifications available in VAVE, Method to conduct VAVE studies.

INFORMATION PHASE: information needed for VAVE, Method to collect and analyze information, ABC Analysis, Pareto Analysis, Breakeven analysis.

UNIT-II

FUNCTION ANALYSIS PHASE: Breakdown item into elements and sub-elements, questions to be asked, introduction to functions, practice session, types of functions (use and sell function), levels of function (basic and secondary), identify various functions, elements of cost, procedure for cost allocation, cost allocation to function, concept of worth, process flow for determining worth, discussions on worth,

meaning of FAST, use of FAST, different types of FAST. Ground rules of FAST, FAST diagram.

CREATIVE PHASE: Definition of creativity, misconceptions about creativity, introduction to creative techniques like TRIZ, 3P, lateral adoption and others

EVALUATION PHASE: selection of criteria, feasibility analysis, weighted evaluation methods, decision matrix.

RECOMMENDATION PHASE: Need for recommendation, method to make presentation, impact analysis and justification report, implementation plan, presentation skills.

IMPLEMENTATION PHASE: Detailed design, verification and validation, certification, change implementation.

AUDIT PHASE: Need for audit, types of audit, how to do audit.

Learning Resources:

1. S.S.Iyer: Value Engineering: A How to Manual, New age International Publisher- 2nd edition 2009
2. Anil Kumar Mukhopadhaya: Value Engineering Mastermind: From Concept to Value Engineering Certification. SAGE, New Delhi
3. Del. L.Yonker: Value engineering analysis and methodology, CRC press, New York
4. M.A.Bulsara, Dr.H.R. Thakkar, "Product Design And Value Engineering", charotar publishers, 1st edition 2015.
5. Lawrence D.Miles: Techniques of Value Analysis and Engineering: 3rd Edition New York
6. K.R.Chari : Value engineering

DEPARTMENT OF PHYSICS
SYLLABUS FOR B.E. IV SEMESTER
DISPLAY DEVICES (Open Elective-I)

Instruction :1 Hours / week	SEE Marks :40	Course Code : OE400PH
Credits : 1	CIE Marks :30	Duration of SEE : 2 Hours

Course objectives	Course outcomes
Students will be able to learn • Basics of luminescence and display devices	**At the end of the course students will be able to** 1. List out different types of luminescence mechanisms 2. Classify types of display devices 3. Explain working of some display devices 4. Compare the output intensities emitted by LED, OLED et

UNIT-I:

Introduction to Luminescence, fluorescence, phosphorescence, principle and classification, luminescence mechanisms for various types and its applications.

UNIT-II:

Classification of display devices, working of Liquid crystal displays, comparison of LED and LCD, dynamic scattering display, OLEDS and their applications.

SUGGESTED BOOKS:

1. S. W. S. McKeever, Thermoluminescence of Solids, Cambridge University Press, 1988
2. Adrian Kita, Luminescent Materials and Applications, John Willey & Sons

DEPARTMENT OF PHYSICS
SYLLABUS FOR B.E. IV SEMESTER
FUNDAMENTALS OF VACCUM TECHNOLOGY *(Open Elective-I)*

Instruction :1 Hours / week	SEE Marks :40	Course Code : OE410PH
Credits : 1	CIE Marks :30	Duration of SEE : 2 Hours

Course objectives	Course outcomes
Students will be able to learn • Fundamentals of vacuum technology	**At the end of the course students will be able to** 1. Define basic vacuum technology related notations. 2. Enumerate methods production of vacuum. 3. List out different vacuum gauges and their limitations. 4. Identify types of vacuum leaks.

UNIT-I:

Definition of vacuum, units of vacuum Vacuum ranges, evaporation theory- rate of evaporation, Hertz- Knudsen equation, types of evaporation, adsorption, desorption, Production of Vacuum, vacuum measurement, Vacuum pumps: pumping speed, throughput, Rotary oil pump, multi stage rotary pumps, diffusion pump, cryo-pump. Vacuum applications in various areas of engineering.

UNIT-II:

Measurement of vacuum, Vacuum gauges: thermocouple gauge, Pirani gauge, ionization gauge, Penning gauge, leak detection, Leak detection methods

SUGGESTED BOOKS:

1. M. N. Avadhanulu and P.G. Kshirsagar, Textbook of Engineering Physics, Revised Edition, S.Chand, 2015
2. Dr. V.V. Rao, Dr. T.B. Gosh, Dr. K.L. Chopra, Vacuum Science and Technology, Allied Publishers, New Delhi, 2008
3. John F. O'HanlonA User's Guide to Vacuum Technology, Jhon Willey and sons, 2006

DEPARTMENT OF PHYSICS

SYLLABUS FOR B.E. IV SEMESTER

INTRODUCTION TO NON- DESTRUCTIVE TESTING (Open Elective-I)

Instruction :1 Hours / week	SEE Marks :40	Course Code : OE420PH
Credits : 1	CIE Marks :30	Duration of SEE : 2 Hours

Course objectives	Course outcomes
Students will be able to learn • Basics of acoustics and non-destructive testing	**At the end of the course students will be able to** 1. Illustrate non-destructive testing 2. Explain production mechanisms of ultrasonics 3. Differentiate various methods of non-destructive testing 4. Compare the non-destructive testing methods and identify suitable one for given application.

UNIT-I:

Ultrasonic waves and their properties, Production of ultrasonics by Piezo-electric and magnetostriction methods, Detection of ultrasonics, Acoustic grating: ultrasonic velocity measurement, cavitation, Applications: ultrasonic cleaning, Echo cardiogram (ECG), ultrasonic imaging.

UNIT-II:

Introduction to non- destructive testing (NDT)- objectives of NDT-advantages- types of defects-methods of NDT: Visual inspection, liquid penetration testing, acoustic detection: pulse echo method, ultrasonic inspection methods, Radiography: x-ray and gamma ray, Electromagnetic: eddy current testing, Acoustic Emission, Ultrasonic Testing (UT)

SUGGESTED BOOKS:

1. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage learning, 2014
2. M. N. Avadhanulu and P.G. KshirSagar, Textbook of Engineering Physics: Revised Edition, S.Chand, 2015
3. R K Gaur and S L Gupta, Engineering Physics, Dhanpat Rai, 2012

DEPARTMENT OF PHYSICS

SYLLABUS FOR B.E. IV SEMESTER

FUNDAMENTALS OF CRYOGENICS (Open Elective-II)

Instruction :2 Hours / week	SEE Marks :60	Course Code : OE430PH
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

Course objectives	Course outcomes
Students will be able to learn • Liquefaction of gases • Fundamentals of cryogenics	**At the end of the course students will be able to** 1. Define ranges of liquid temperatures 2. Narrate regenerative and cascade cooling processes. 3. Enumerate properties and use of cryogenic fluids. 4. Explore applications and use of cryostats and cryocoolers.

UNIT-I:

Introduction to low temperature Physics- Porous plug experiment: Joule Thomson effect, Theory of porous plug experiment- J-K effect for a Van der Waal's gas. Relation between inversion temperature, Boyle temperature and critical temperature.

UNIT-II:

Gas-Liquefaction-Regenerative cooling and cascade process- Liquefaction of air: Linde Process, Liquefaction of hydrogen, nitrogen, helium and oxygen.

UNIT-III:

Properties of cryogenic helium and Properties of Materials at Cryogenic Temperatures.

UNIT-IV:

Adiabatic demagnetization, practical applications of low temperatures, super fluidity Liquid He-II and He-III cryostat- Cryocoolers, Cryogenic Insulations-applications.

SUGGESTED BOOKS:

1. D.S. Mathur, Heat and thermodynamics, S. Chand & Co, 2008
2. Mamata Mukhopadhyay, Fundamentals of Cryogenic Engineering, PHI, 2010

DEPARTMENT OF PHYSICS

SYLLABUS FOR B.E. IV SEMESTER

SMART MATERIALS AND APPLICATIONS (Open Elective-II)

Instruction :2 Hours / week	SEE Marks :60	Course Code : OE440PH
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

Course objectives	Course outcomes
Students will be able to learn • Essentials of smart materials • Different types of smart materials	**At the end of the course students will be able to** 1. List out various properties of functional materials 2. Identify smart materials based on properties and their appropriate usage. 3. Write different types of smart materials 4. Categorize suitable alloys for specific application.

UNIT I:

Introduction to functional materials, ferroelectricity, piezo electricity, pyroelectricity, Magnetostriction. Properties of smart materials such as piezo electric, magneto-strictive, electro-strictive, thermos-responsive

UNIT-II:

Electrochromic materials, photochromic materials, thermo-chromic materials, thermoelectric materials, smart gels, electro-rheological (ER) and Magnetorheological MR fluids

UNIT III:

Introduction to metal alloys, classification of metal alloys as ferrous and non-ferrous alloys. Properties and applications of ferrous and non-ferrous alloys.

Introduction to shape memory alloys (SMA)- advantages and disadvantages of SMAs- Austenite, martensite, shape memory effect and types of shape memory effects- temperature transformation

UNIT IV:

Properties and characteristics of engineering SMAs - Ni-Ti shape memory alloy, Cu-based shape memory alloys: Cu-Zn-Al, Cu-Al-Ni, ferromagnetic shape memory alloys Applications of SMAs.

SUGGESTED BOOKS:

1. K. Otsuka and C. M. Wayman, Shape memory Alloys, Cambridge University Press, 1999
2. Dimitris C. Lagoudas Shape Memory Alloys: Modeling and Engineering Applications, Springer, 2013
3. Vijay K. Varadan, K. J. Vinoy, S. Gopalakrishnan, Smart Material Systems and MEMS, John Wiley & Sons, 2006

DEPARTMENT OF PHYSICS
SYLLABUS FOR B.E. IV SEMESTER
FUNDAMENTALS OF THIN FILM TECHNOLOGY (Open Elective-II)

Instruction :2 Hours / week	SEE Marks :60	Course Code : OE450PH
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

Course objectives	Course outcomes
Students will be able to learn • Fundamentals of thin film technology • Properties and preparation mechanisms	**At the end of the course students will be able to** 1. Differentiate bulk materials and thin films 2. Explore growth process of thin films. 3. List out various thin film preparation techniques. 4. Narrate properties of thin films

UNIT-I:

Classification of films- nucleation and growth- nucleation theories: capillarity and atomistic models, substrate effect, film thickness effect.

UNIT-II:

Thin film deposition techniques- simple thermal evaporation-electron beam evaporation-sputtering (d.c and a.c), flash evaporation, Laser ablation- spin coating- molecular beam epitaxy- Film thickness measurement-ellipsometry, Fizeu (Tolonsky) technique, quartz crystal oscillator techniques.

UNIT-III:

Electrical conduction in metallic films- Continuous and discontinuous films, electrical, optical and dielectric properties of thin films

UNIT-IV:

fabrication of thin film resistor, capacitor, diode, anti-reflection coatings, gas sensors and temperature sensors.

SUGGESTED BOOKS:

1. Kasturi Chopra Thin Film Device Applications, Mac Graw Hill, New York, 2012
2. A. Goswami, thin film fundamentals, New age international, 2006
3. K.L. Chopra, thin film phenomenon, Mac Graw Hill, New York, 1990

DEPARTMENT OF CHEMISTRY
SYLLABUS FOR B.E. IV SEMESTER
ELECTRONIC ENGINEERING MATERIALS *(Open Elective-I)*

Instruction :1 Hours / week	SEE Marks :40	Course Code : OE400CH
Credits : 1	CIE Marks :30	Duration of SEE :2 Hours

OBJECTIVES	OUTCOMES
The course will enable the students:	**At the end of the course students should be able to:**
1. To familiarize with various types of liquid crystals, their chemical constitution and behavior 2. To acquaint with different types of sensors and chemistry involved in them 3. To discuss the conductance in polymers and mechanism of conductance in undoped and doped polymers	1. Explain the classification, types and applications of liquid crystals 2. Discuss the principles, mechanism and applications of potentiometric and amperometric sensors 3. Explain the principle, mechanism and applications of fluorophore based, chromophore based and enzyme based fibre optic biosensors 4. Discuss the mechanism of conduction in undoped and doped polymers and applications of conducting polymers

UNIT-I: Liquid Crystals

Introduction, Classification: Thermotropic and Lyotropic liquid crystals. Chemical constitution & liquid crystalline behavior. Molecular ordering in liquid crystals: Nematic, Smectic and Cholesteric. Applications.

UNIT-II: Conducting Polymers and Sensors

a) Conducting Polymers: Introduction, Classification: Extrinsic and Intrinsic Conducting Polymers**.** Mechanism of conduction of doped and undoped polyacetylene& Polyaniline. Applications.
b) Sensors: Introduction, Potentiometric sensors, Amperometric sensors, Fluoride-ion-selective electrode. Fluorophore and Chromophore based Fiber-optic Biosensors. Enzyme Based Nonmediated Fiber Optic Biosensors.

Suggested Reading:

1. P.C.Jain and Monica Jain, “Engineering Chemistry”, DhanpatRai Pub, Co., New Delhi (2002)
2. S.S. Dara “A text book of engineering chemistry” S.Chand&Co.Ltd., New Delhi (2006).
5. Chemistry of Engineering Meterials by R.P Mani and K.N.Mishra, CENGAGE learning

6. A textbook of Polymer Science: Fred, Billmeyer Jr., Wiley India Third edition.
7. Chemistry of Advanced Materials: CNR Rao, RSC Publication
8. Billmeyar F. W., "Text book of Polymer Science", Wiley-Inter Science, New York, 2002.
9. Arora M. G., Singh M and Yadav M.S, "Polymer Chemistry", Anmol Publications, New Delhi, 2003.

Online resources:

1. www.nptel.ac.in
2. http://ndl.iitkgp.ac.in
3. http://ocw.mit.edu

DEPARTMENT OF CHEMISTRY
SYLLABUS FOR B.E. IV SEMESTER
POLYMER TECHNOLOGY *(Open Elective-I)*

Instruction :1 Hours / week	SEE Marks :40	Course Code : OE410CH
Credits : 1	CIE Marks :30	Duration of SEE :2 Hours

OBJECTIVES	OUTCOMES
The course will enable the students:	**At the end of the course students should be able to:**
1. To familiarize with various types of polymers and polymerization methods and effect of their structure on properties. 2. To acquaint with different types of moulding techniques. 3. To discuss the reinforced plastics and biomedical applications of polymers	1. Explain the classification and types of polymerization methods 2. Discuss the moulding constituents and moulding techniques. 3. Discuss the different polymer blends and engineering plastics. 4. Choose the polymers for different applications.

UNIT-I: Introduction, classification of polymers, methods of polymerization-Condensation polymerization (High temperature and low temperature methods), addition polymerization-bulk polymerization, solution polymerization, emulsion polymerization and suspension polymerization. Effect of polymer structure on properties.

UNIT-II: Moulding constituents of plastic, moulding techniques-Compression moulding, injection moulding, and extrusion moulding. Reinforced plastics, polymer blends and alloys, engineering plastics-polyamides, polycarbonates, polyurethanes. Polymers in medicine, biomedical applications of polymers.

Suggested Reading:

1. P.C.Jain and Monica Jain, “Engineering Chemistry”, DhanpatRai Pub, Co., New Delhi (2002)
2. Shasi Chawla, “Text Book of Engineering Chemistry”, Dhanpat Rai Publishing Company, NewDelhi (2008).
3. S.S. Dara “A text book of engineering chemistry” S.Chand&Co.Ltd., New Delhi (2006).
4. Chemistry of Engineering Meterials by R.P Mani and K.N.Mishra, CENGAGE learning

DEPARTMENT OF CHEMISTRY
SYLLABUS FOR B.E. IV SEMESTER
INDUSTRIAL POLLUTION PREVENTION AND CONTROL *(Open Elective-I)*

Instruction :1 Hours / week	SEE Marks :40	Course Code : OE420CH
Credits : 1	CIE Marks :30	Duration of SEE : 2 Hours

OBJECTIVES	OUTCOMES
The course will enable the students :	**At the end of the course students should be able to:**
1. An overview of pollution in industries 2. Principles of various processes the treatment of air and water pollution	1. Explain the causes of pollution. 2. Describe the various sources of pollution. 3. Understand the effects of uncontrolled emissions. 4. Apply various methods to dispose the waste and minimize the pollution.

UNIT-I : Introduction, types of industrial waste, definition of pollutant, air pollutants- gases, hydro carbon pollutants, particulates - inorganic and organic particulates- effects of particulate pollutants, chlorofloro carbons(CFC)- cause of ozone depletion- harmful effects of cfc,photo chemical smog, air pollutant control methods: particulate emission control-gravititional setting chambers-cyclone separators, fabric filters, electrostatic precipitators.

UNIT-II: Water pollution: Definition of water pollution, types of water pollutants- Inorganic pollutants, toxic metals, organic pollutants, determental effects of Inorganic pollutants, toxic metals and organic pollutants, water pollution control methods-primary and secondary treatment.

Treatment and disposal of industrial wastes, treatment of wastes or effluents with organic impurities, treatment of wastes or effluents with inorganic impurities, the nature, effect and treatment of some important chemical wastes.Case study.

Suggested Reading:

1. B K Sharma, "Industrial Chemistry", GOEL publishing house, Meerut.
2. Pandey.G.N and Carney.G.C, "*Environmental Engineering"*, Tata McGrawHill, New Delhi,1989
3. Rose.G.R.D, "*Air pollution and Industry"*, Van Nostrand Reinhold Co., NewYork 1972
4. Freeman HM, "Industrial pollution prevention hand book", McGraw Hill.
5. James G Mann and Liu Y A, "Industrial water reuse and waste water minimization, McGraw Hill.

DEPARTMENT OF CHEMISTRY
SYLLABUS FOR B.E. IV SEMESTER
ELECTROCHEMICAL ENERGY SYSTEMS ***(Open Elective-II)***

Instruction :2 Hours / week	SEE Marks :60	Course Code : OE430CH
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

OBJECTIVES	OUTCOMES
The course will enable the students :	**At the end of the course students should be able to:**
1. To introduce the various terms to understand the efficiency of batteries. 2. To know the relevant materials required for the construction of primary and secondary batteries. 3. To familiarize with the reactions involved during charging and discharging processes. 4. To focus on the need of fuel cells and the concept of their construction and functioning 5. To emphasize on the merits and demerits of each type of battery.	1. Discuss the construction, electrochemistry, technology and applications of selected primary batteries 2. Discuss the construction, electrochemistry, technology and applications of few secondary batteries 3. Explain the working principle, electrochemistry, technology and applications of prominent fuel cells 4. Choose a suitable battery or a fuel cell for a given application 5. Evaluate different batteries or fuel cells in order to select a suitable battery or fuel cell for a given application

Unit-I: Batteries- Fundamentals

Types of cells: Reversible and Irreversible cells, Primary, Secondary and Reserve batteries.

Battery characteristics: Free energy change, Electromotive force of battery, Ampere-Hour, Capacity, Power, Power density, Energy density, Efficiency, Cycle life, Tolerance to service conditions, Performance characteristics.

Unit-II: Primary Batteries

Construction, electrochemistry and technology of Zinc-Air Battery, Nickel metal hydride battery,

Primary lithium batteries: **Soluble Cathode Cells**, **Solid Cathode Cells**- Lithium Manganese dioxide, Lithium-Vanadium Pentoxide battery, **Solid electrolyte cells**- Lithium polymer electrolyte Battery-Applications.

Unit-III: Secondary Batteries

Construction, electrochemistry and technology of Maintenance Free Lead Acid battery (MFLA), Valve Regulated Lead Acid battery (VRLA), Absorbed Glass Mat Lead Acid battery (AGMLA). Nickel-Cadmium battery, Reserve battery.

Secondary Lithium batteries: Liquid organic electrolyte cells, polymer electrolyte cells, lithium ion cells, applications.

Unit –IV: Fuel Cells

Introduction, classification based on temperature and nature of electrolyte. Working principle, components, applications and environmental aspects of Alkaline fuel cell (AFC)- Hydrogen-Oxygen alkaline fuel cell, Methyl alcohol - Oxygen alkaline fuel cell, Phosphoric acid fuel cell (PAFC), Molten carbonate fuel cell (MCFC), Polymer Electrolyte membrane Fuel cell (PEMFC), Solid oxide fuel cell (SOFC).

Suggested Reading

1. P.C.Jain and Monica Jain, “Engineering Chemistry”, Dhanpat Rai Pub, Co., New Delhi (2002)
2. S.S. Dara “A text book of engineering chemistry” S.Chand&Co.Ltd., New Delhi (2006).
3. Dell R. M. and Rand D. A. J., “Understanding Batteries”, Royal Society of Chemistry, UK, 2001.
4. Chemistry of Engineering Meterials by R.P Mani and K.N.Mishra, CENGAGE learning
5. Shasi Chawla, “Text Book of Engineering Chemistry”, Dhanpat Rai Publishing Company, NewDelhi (2008).
6. Dell R. M. and Rand D. A. J., “Understanding Batteries”, Royal Society of Chemistry, UK, 2001.
7. Derek Pletcher and Frank C. Walsh, “Industrial Electrochemistry”, Chapman and Hall, New York, 1993

DEPARTMENT OF CHEMISTRY
SYLLABUS FOR B.E. IV SEMESTER
CORROSION SCIENCE AND TECHNOLOGY (Open Elective-II)

Instruction :2 Hours / week	SEE Marks :60	Course Code : OE440CH
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

OBJECTIVES	OUTCOMES
The course will enable the students :	**At the end of the course students should be able to:**
1. To acquaint with the causes and factors influencing the rate of corrosion 2. To understand the different types of corrosion like dry, wet and galvanic corrosion and their relative impact 3. To familiarize with various preventive methods of corrosion such as cathodic protection, use of inhibitors, coatings, etc. 4. To know various industrial methods like electroplating, electroless plating.	1. Explain different types of corrosion with suitable examples 2. Analyze the given case study and diagnose the type of corrosion in a given corrosion problem 3. Discuss different factors that affect corrosion and passivation of metals 4. Select a suitable metallic coating for corrosion control of the equipment in a given application 5. Explain the mechanism by which organic coatings and inhibitors control corrosion of metals 6. Discuss the principles and application of cathodic protection and surface conversion coatings for corrosion control

UNIT-I: Chemical and Electrochemical Corrosion

Introduction - gravity, **cause, C**hemical and Electrochemical corrosion, **Pilling – Bed worth** rule, effect of nature of oxide layer on rate of chemical corrosion, **Galvanic corrosion**, electrochemical series and galvanic series. **F**ormation of anodic and cathodic areas, Differential aeration corrosion -pitting, water line **corrosion** & crevice corrosion, stress corrosion, corrosion fatigue. Passivation of metals, polarization curve of passivating metals, effect of pH and potential-pH diagram for iron (Pourbaix Diagram) and polarization curve of iron, application of Pourbaix diagram for corrosion mitigation.

Factors influencing corrosion

a. Nature of metal: Relative position of metal in galvanic series, Over voltage, Relative areas of anode & cathode and Nature of corrosion product.

b. Nature of environment: Temperature, pH and Humidity.

UNIT-II: Corrosion Control by Metallic Coatings

Metallic coatings: Types - anodic & cathodic. Pre treatment **of** surface of base metal. Methods of application of metallic coatings: Hot dipping-galvanization - applications of galvanized RCC steel bars. Cladding, Electro plating & Electroless plating- Principle and their differences.
Electroplating of Cu coating on Fe, Electroless plating of Ni coating on Insulators, Preparation of PCB using Electroless plating.

UNIT-III: Corrosion Control by Inhibitors and Organic Coatings

Corrosion Inhibitors: Anodic, Cathodic and Vapour phase inhibitors.
Organic Coatings: Paints – constituents and their functions. Vitreous enamel coatings. Varnishes. Super hydrophobic and self healing coatings. Epoxy coatings on RCC steel bars- Impervious coatings.

UNIT-IV: Corrosion Control by Cathodic Protection and Surface Conversion

Cathodic protection: Principle, Sacrificial Anodic Protection (SAP), Impressed Current Cathodic Protection (ICCP). Application of Cathodic protection for bridges, ship hulls and underground pipelines.
Surface conversion coatings: Carburizing, Nitriding, Cyaniding.

Suggested Reading:

1. 1.P.C.Jain and Monica Jain, “Engineering Chemistry”, Dhanpat Rai Pub, Co., New Delhi (2002)
2. S.S. Dara “A text book of engineering chemistry” S.Chand&Co.Ltd., New Delhi (2006).
3. Chemistry of Engineering Meterials by R.P Mani and K.N.Mishra, CENGAGE learning
4. Shasi Chawla, “Text Book of Engineering Chemistry”, Dhanpat Rai Publishing Company, NewDelhi (2008).
5. Principles and prevention of corrosion: Denny A Jones, Prentice Hall, 1996.
6. Derek Pletcher and Frank C. Walsh, “Industrial Electrochemistry”, Chapman and Hall, New York, 1993
7. Fundamentals of Corrosion: Michael Henthorne, Chemical Engineering
8. Corrosion Engineering: Mars G Fontana, Mc Graw Hill, 1987

Online resources:

1. www.nptel.ac.in
2. http://ndl.iitkgp.ac.in
3. http://ocw.mit.edu