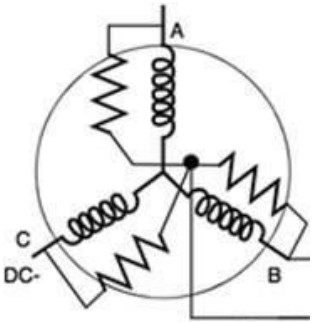
VASAVI COLLEGE OF ENGINEERING(AUTONOMOUS)
Ibrahimbagh, Hyderabad-31

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

Sponsored by
VASAVI ACADEMY OF EDUCATION
Hyderabad

SYLLABI UNDER CBCS FOR
B.E V and VI SEMESTERS (EEE)
WITH EFFECT FROM 2018-19
(For the students admitted in 2016-17)



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINERING
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VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION FOR BE V-SEMESTER w.e.f. 2018-19 under CBCS
(Students admitted in 2016-17)

Course Code	Course Name	Instruction Hours/ week				Examination			Credits
		L	T	D	P	Duration	Max. Marks		
	Theory					Hours	SEE	CIE	
PC510EE	Power Systems-II	3	1	0	0	3	70	30	3
PC520EE	Electrical Measurements & Instrumentation	3	1	0	0	3	70	30	3
PC530EE	Power Electronics	3	1	0	0	3	70	30	3
PC540EE	Linear Control Systems	3	1	0	0	3	70	30	3
PC550EE	Digital Electronics & Logic Design	3	0	0	0	3	70	30	3
HS510EH	FS– III : Soft Skills	1	1	0	0	1.5	35	15	1
MC510EE	FS– III : Technical Skills	1	1	0	0	1.5	35	15	1
OEXXXXX	Open Elective-IV	1	0	0	0	2	50	30	1
OEXXXXX	Open Elective-V	2	0	0	0	3	70	30	2
LABS									
PC511EE	Electrical Machines Lab-II	0	0	0	2	3	50	25	1
PC521EE	Controls Systems & Simulation Lab	0	0	0	2	3	50	25	1
PC531EE	Electrical Measurements Lab	0	0	0	2	3	50	25	1
	Total	**20**	**6**	**0**	**6**		**690**	**315**	**23**
	Grand Total	**32**					**1005**		

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER
POWER SYSTEM- II

Instruction: 4 Hrs /week	SEE Marks :70	Course Code : **PC510EE**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
Enable the student to 1. Acquire knowledge of Transmission Lines Performance, Power circle diagrams & Corona. 2. Understand the Per Unit system of Representation, load flow studies and different load flow methods. 3. Learn about the Symmetrical Fault analysis and S.C capacity of a Bus. 4. Acquire the knowledge of the fundamentals of Sequence components, Sequence networks of Generator, T/F, T.M.L & Load and Unsymmetrical Fault analysis of power system. 5. Understand the concept of Travelling Wave theory and Bewley Lattice diagram.	1. Able to **calculate** and **compare** the performance (Constants A, B, C & D, voltage regulation & efficiency) of different types of Transmission lines. 2. Able to **differentiate** and **choose** the proper load flow method for solution of load flow problems. 3. Student can **calculate** the P.U quantities in power system and **analyze** symmetrical fault (LLL-Fault) and **calculate** S.C capacity of a Bus. 4. Able to draw the **diagram** of Sequence networks of different components and **calculate** the Unsymmetrical Fault (LG, LL, LLG & LLLG) current value & MVA values. 5. Student can **evaluate** the value of coefficient of reflection and refraction of voltage or current wave and **construct** Bewley Lattice diagram.

UNIT-I

Transmission Line Theory: Short, medium, long lines – Line calculations, Tuned lines – Power circular diagrams and their applications. Corona : Causes – Disruptive and Visual Critical Voltages, Power loss – minimization of Corona Effects.

UNIT-II

Per Unit system of Representation : Use of per Unit Quantities in power systems, Advantages of per unit system.

Load flow studies: Formation of Y bus for a system, modeling of tap changing and phase shifting transformer, formulation of load flow problem, Solution of load flow by Gauss-Seidel, Newton-Raphson, Decoupled and fast Decoupled methods, comparison of different load flow methods.

UNIT-III

Z-bus formation - Symmetrical Three phase Transients in R-L series circuits – short circuit currents – Reactances of Synchronous Machines – Symmetrical Fault calculations. Short circuit capacity of a bus.

UNIT-IV

Unsymmetrical faults : Symmetrical components of unsymmetrical phasors – Power in terms of symmetrical components - sequence impedance and sequence networks. Sequence networks of unloaded generators – Sequence impedances of circuit elements – Single line to ground, line-to-line and double line to ground faults on unloaded generator – Unsymmetrical faults of power systems.

UNIT-V

Transients in power systems : Causes of over voltages : Traveling Wave Theory – Wave equation – Open Circuited Line – The short circuited line – Junction of lines of different natural impedances – Reflection and refraction – Coefficients – Junction of Cable and overhead lines – Junction of three lines of different natural impedances – Bewley Lattice diagram.

Suggested Reading:

1. C.L. Wadhwa , Electrical Power Systems, Wiley Eastern Ltd., 4th Ed. 2006.
2. John J.Grainger William D. Stevenson Jr. Power System Analysis, Tata MCGraw Hill Edn.2003
3. I.J.Nagrath & D.P.Kothari "Modern Power Systems Analysis" TMH Edition, 2003.
4. A. Chakrabarti, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A Text book on Power System, Dhanpat Rai & Co(P) Ltd.

w.e.f the academic year 2018-19

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER
ELECTRICAL MEASUREMENTS AND INSTRUMENTS

Instruction: 4 Hrs /week	SEE Marks :70	Course Code : **PC520EE**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
Enable the student to Have a fair knowledge about the fundamentals of construction & working principles of Analogue Ammeters, Voltmeters, Watt meters, Energy meters, power factor meters and frequency meters. Learn the measurements of circuit elements R, L & C using bridges, construction & working principle and applications of DC & AC potentiometers, CTs & PTs. Learn the fundamentals of Transducers & Strain Gauges.	After completion of the course student will be able to 1. Identify and choose the proper type and range of meter to measure current / voltage / Power. 2. Measure and calculate the Energy in a 1-ph/3-ph system of balanced/unbalanced. 3. Calculate the R, L & C values using the appropriate bridges. 4. Calibrate ammeter/ voltmeter/ wattmeter using the Potentiometer 5. Identify and choose the proper type of Transducer or strain gauge for measurement of Non electrical quantities.

UNIT -I

Principles of Measurement and Instrumentation: Basic characteristics of measuring instruments - accuracy, precision and uncertainty, sources of measurement error.

Instruments: Ammeter and Voltmeter, Expression for torque of moving coil, moving iron, dynamometer and electrostatic instruments. Extension of range of instruments, wattmeter, torque expression for dynamometer instruments. Active & Reactive power measurement.

UNIT -II

Energy meters – single phase and poly phase, driving torque and braking torque equations, Errors and testing compensation, maximum demand indicator, Single phase & 3 – phase electro dynamo meter power factor meter, frequency meter – electrical resonance, Use of Oscilloscope in

frequency (Lissajous Patterns), phase and amplitude measurements and Weston type of synchoroscope.

UNIT -III

Measurement of inductance, capacitance and resistance using Bridges: Wheat stone bridge, Kelvin Double Bridge, Loss of charge method, Megger, wagner's Earthing device, Maxwell's Inductance bridge, Hay's bridge, Anderson's bridge, Desauty's bridge, schering bridge and Heaviside mutual Inductance bridge.

UNIT -IV

Potentiometers and Instrument Transformers: Standard cell and standard resistance, Crompton's DC and AC polar and coordinate type Potentiometer & Applications – Measurement of impedance, Calibration of ammeter, voltmeter and wattmeter. Instrument transformers – C.T. & P.TS Ratio and phase angle errors.

UNIT -V

Measurement of Non – Electrical quantities: Measurement of Linear displacement – Linear Potentiometers, Linear-motion variable inductors. Transducers: Proximity Inductive Transducers, LVDT, Optical Encoders and Capacitive Transducers, Measurement of angular velocity – Inductive Tachometer, DC & AC Tacho-generators. Strain Gauge: Basic construction of Bonded strain Gauge and Unbonded Strain Gauge.

Suggested Reading:

1. A.K. Sawhney, A course in Electrical and Electronics Measurements and Instruments- Dhanpat RAi and Sons, Delhi, 2005
2. Umesh Sinha, Electrical and Electronics Measurements and Instruments, Satya Prakashan
3. F.W.Golding and Widdis, Electrical and Electronics Measurements and Instruments 5th Edition-2010

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER
POWER ELECTRONICS

Instruction: 3+1 Hrs /week	SEE Marks :70	Course Code : **PC530EE**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
1. To provide fundamentals of power semi – conductor devices and its applications in power electronics. 2. To impart the knowledge of turn – on and turn – off of various power semi – conductor switches. 3. To understand the operation and application of various power converters in power electronics. 4. To impart the knowledge of control techniques employed for switches in different types of converters.	A successful graduate will be able to 1. Categorize and compare various devices used in power electronics. 2. Analyze and select the appropriate converter for a given application. 3. Suggest suitable commutation, protection and control circuits for a given application. 4. Design power and control circuits for the required application with given specifications.

UNIT-I

Power Semiconductor Devices: Power diode, types of power diodes - general purpose diodes, fast recovery diodes and Schottky diodes, their Characteristics, Basic structure, working, steady state and switching characteristics of BJT, Power MOSFETs, IGBTs, SCRs and GTOs, two transistor analogy of SCR, comparison of BJT, MOSFET and IGBT, applications of power semi – conductor devices.

UNIT-II

Firing, Driver and Protection circuits: R, RC and UJT triggering circuits for SCR, triggering circuits for single phase bridge rectifier and choppers, driver circuits for MOSFET, IGBT and BJT, commutation methods of SCRs, protection of SCRs.

UNIT-III

AC – DC Converters: Principles of controlled rectification - study of 1 – φ and 3 – φ half and full controlled bridge rectifiers with R, R – L, R – L – E loads, effect of source inductances, dual converters - circulating current mode and circulating current free mode – control strategies.

UNIT-IV

DC – DC, DC to AC and Cyclo Converters: Classification of choppers – A, B, C, D and E, switching mode regulators – study of Buck, Boost and Buck-Boost regulators, Cuk regulators, single phase AC voltage controllers with R & RL loads, principle of operation of 1 – φ bridge type cyclo converters & their applications.

UNIT-V

Inverters: Principle of operation of 1 – φ inverter, 3 – φ bridge inverters (180° and 120° modes), voltage control of inverters - single pulse width modulation, multiple pulse width modulation and sinusoidal pulse width modulation, comparison of voltage source inverters and current source inverters, elementary multilevel inverters.

Suggested Reading:

1.Singh, M.D and Khanchandani, K.B, – *Power Electronics*, Tata McGraw Hill, 2nd Edition, 2006.

2.Rashid, M.H – *Power Electronics: Devices, Circuits and Applications*. Pearson, 2003

3.Mohan, Undeland, Robbins, *Power Electronics – Converters, Applications and Design*, Wiley India Pvt Ltd, 2010.

4.Bimbra.P.S, *Power Electronics*, Third Edition, Khanna Publishers, 2012.

w.e.f the academic year 2018-19

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER
LINEAR CONTROL SYSTEMS

Instruction: 3+1 Hrs /week	SEE Marks :70	Course Code : **PC540EE**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
Study the principles of system modeling, system analysis and feedback control, and use them to design and evaluate feedback control systems with desired performance; specifically, to acquire the related knowledge and techniques to meet the following course objectives: 1. *Control system modeling*: modeling of electric, mechanical and electromechanical systems, using differential equations, transfer functions, block diagrams, and state variables; 2. *Control system analysis*: analysis of properties of control systems, such as sensitivity, stability, controllability, tracking, in time and frequency domains; and 3. *Control system design*: design of feedback controllers, such as PID, lead and lag compen- sators, pole placement designs, to meet desired system performance specifications.	1. To model the electrical, mechanical and electromechanical systems using differential equations, transfer functions, block diagrams and state variables 2. To obtain the time and frequency response of systems and analyse them with respect to performance specifications 3. To analyze the stability, controllability and observability in time and frequency domains 4. To design the feedback controllers, such as PID, lead and lag compensators to meet the desired performance specifications 5. To analyze the stability, controllability and observability of digital control systems

UNIT – I

Open and closed loop systems: Continuous time and discrete time control systems, control system components – Error sensing devices – Potentiometers. Synchros, AC – DC servo motors – Block diagram representation, Transfer function and impulse response – signal flow graphs.

UNIT – II

Time Response: Types of input, Transient response of second order systems for step input. Time domain specifications – Types of system – static error coefficients, Error series – Routh-Hurwitz criterion of stability. Root locus technique – Typical systems analyzed by root locus technique – Effect of location of roots on system response, PID controller

UNIT – III

Frequency Response – I: Introduction, Frequency domain specifications. MP, wP for a second order system,Frequency response analysis using Bode plots and Nyquist plots, Relative stability analysis, gain margin and phase margin.

UNIT - IV

Frequency Response – II: Nyquist stability criterion, Principle of argument, Analysis of Typical systems using Nyquist stability criterion.
Compensation: Lead, Lag, Lead – Lag Compensation using bode plot.

UNIT – V

State Space Representation: Concept of state, State Variable, State Models of linear time invariant systems. Derivation of state models from transfer functions and differential equations. State transition matrix – solution of state equations by time domain method. Observability and Controllability.

Suggested Readings:

1. I.J. Nagrath, M. Gopal, Control System Engineering< new Age International (P) Limited publishers, 2007.
2. J. F. Franklin and J.D. Powell – Digital Control of Dynamic Systems, Addison Wesley.
3. M. Gopal, Control System Principles and Design – Tata Mc Graw Hill, 2nd edition, 2003.
4. K. Ogata, Modern Control Systems, 3rd Edition, PHI.

w.e.f the academic year 2018-19

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER
DIGITAL ELECTRONICS AND LOGIC DESIGN

Instruction: 3 Hrs /week	SEE Marks :70	Course Code : **EE550EE**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
To impart the knowledge of combinational and sequential digital circuits.	1. Comprehend the number system and apply programmable logic devices to implement the logic functions. 2. Explain and apply logic gates, Boolean algebra, k-map and tabulation method for implementation of logic functions. 3. Classify different logic families. 4. Design different combinational circuits. 5. Design Sequential Circuits.

UNIT-I

Boolean Algebra and Combinational Logic : AND, OR and NOT operations – Laws of Boolean Algebra – minimization of Boolean expressions – truth tables and maps – sum – of products and product of sums – map method of reduction – incompletely specified functions – multiple output minimization – tabular minimization.

UNIT-II

Digital logic Families and IC's : Digital logic families and IC's-Characteristics of Digital IC's –introduction to RTL,DTL, TTL , CMOS, ECL families, Details of TTL logic family- totem pole, open collector ouputs. Wired AND operation, Comparision of performance, TTL subfamilies, – multiplexer and demultiplexer – encoder and decoder – code converters, implementation of combinational logic using standard logic gates and multiplexers.

UNIT-III

Binary arithmetic and circuits : Half adder and Full adder – Subtractor and Magnitude comparator – number complements – two's complement arithmetic – carry look ahead adder – decimal numbers and their codes – BCD and Excess – 3 arithmetic.

UNIT-IV

Synchronous sequential Circuits : Basic latch circuit – debouncing switch – SR, JK, D and T flip-flops truth-table and excitation table – ripple and synchronous counters – design of counters - up/down counter – general BCD counter – shift registers – ring counters.

UNIT-V

Design of Digital Systems : Concept of state. State diagram – sequence detectors – sequence generators –Design procedure, synthesis using D,JK,T flip-flops-applications of resgisters-concepts of programmable logic devices– PROM, PLA, PAL

Suggested Reading:

1. Morris Mano M., Digital Design, Prentice Hall of India, Second Edition, 1994.
2. Zvi Kohavi, Switching and Finite Automata Theory, Tata McGraw Hill, Second Edition,
3. 1991
4. Tocci & Widmer_Digital Systems-Pearson Education-Eight Editiion, 2003.
5. Donald Pleach/Albert Paul Malvino/ Goutam Saha :Digital Principles and Applications" MCGraw-Hill, 2006.

B. Somnath Nair, Digital Elctronics and Logic Design, Prentice Hall, India, 2002

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS FOR B.E.- V SEMESTER
FINISHING SCHOOL – III : SOFT SKILLS - III

Instruction: 1+1 Hrs /week	SEE Marks :35	Course Code : **HS510EH**
Credits : 1	CIE Marks: 15	Duration of SEE : 1.5 Hrs

Course Objectives	Course Outcomes
1. This is a foundation course and aims at enhancing employability skills in students. Students will be introduced to higher order thinking skills and problem solving on the following areas - Arithmetic ability, Numerical ability and General reasoning. Students will be trained to work systematically with speed and accuracy while problem solving. 2. The three major areas covered in this course include 1. Numerical Ability 2. Arithmetic Ability 3. General reasoning	**At the end of the course, students will be able to:** 1. Solve questions on the above mentioned areas using short cuts and smart methods 2. Understand the fundamentals concepts of Aptitude skills 3. Perform calculations with speed and accuracy

UNIT – I : QUANTITATIVE APTITUDE - NUMERICAL ABILITY

- Numerical Ability
- Introduction to higher order thinking skills
- Speed Maths
- Number systems
- LCM & HCF

UNIT – II : QUANTITATIVE APTITUDE- ARITHMETIC ABILITY FOUNDATION

- Arithmetic Ability
- Percentage
- Profit loss and discounts
- Ratio proportions Allegations and mixtures
- Averages

UNIT – III : QUANTITATIVE APTITUDE- ARITHMETIC ABILITY ADVANCED

- Arithmetic Ability

- Time speed and distance
- Time and work
- Interest calculations

UNIT – IV : REASONING ABILITY – GENERAL REASONING PART 1

- General Reasoning
- Coding decoding
- Directions
- Series completions

UNIT – V : REASONING ABILITY- GENERAL REASONING PART 2

- General Reasoning
- Analogies
- Classification
- Alphabet test
- Mathematical operations

w.e.f the academic year 2018-19

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SYLLABUS FOR B.E.- V SEMESTER

FINISHING SCHOOL – III : TECHNICAL SKILLS - III

Instruction: 1+1 Hrs /week	SEE Marks :35	Course Code : **MC510EE**
Credits : 1	CIE Marks: 15	Duration of SEE : 1.5 Hrs

Course Objectives	Course Outcomes
The course will enable the students to: The objective of the course is to provide an overview on LabVIEW so as to enable the learners to use it as a virtual lab software.	**At the end of the course student will be able to:** 1. Recognize the components of LabVIEW and use them to develop new VI. 2. Develop graphical coding using Structures. 3. Use DAQ to acquire / send signal between hardware and software. 4. Design basic VIs.

UNIT-I

LabVIEW Basics - Front panel, block diagram, controls, indicators and palettes; Data types – Floating, integer, boolean, string and cluster. Opening, creating, saving and execution and highlight execution of VI.

UNIT-II

Case structure: Numerical, Boolean and Enum, case structure with string and ring, flat Sequential Structure, sequence structure with stacking, structure tunnels, Arrays, while and for loops, graphs and charts, Hardware interfacing using DAQ.

Suggested Reading:

1. R. Bishop, LabVIEW 8 Student Edition, Prentice Hall, 2006

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER
ELECTRICAL MACHINES LAB – II

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : **PC511EE**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
The main objective of the course is to give the students an insight into the constructional details of the induction and synchronous machines with a view of better understanding of their working principles. The course also equips the students to test and evaluate the performance of induction and synchronous machines by conducting appropriate experiments.	1. Estimate or test the performance of induction and synchronous machines by conducting suitable experiments and report the results. 2. Predetermine the voltage regulation of Non salient and Salient Alternators by conducting suitable tests. 3. Evaluate the various characteristics of ac machines by conducting suitable experiments. 4. Communicate effectively and support constructively towards team work. 5. Pursue lifelong learning for career and professional growth with ethical concern for society and environment.

List of Experiments:

1. Three phase to Two phase conversion (Scott Connection)
2. Heat run test on Three phase transformer.
3. No-load test, blocked rotor test and load test on 3-phase Induction motor.
4. Speed control of three phase induction motor
5. Performance characteristics of single phase induction motor.
6. Voltage regulation of Alternator by
   a. Synchronous impedance method
   b. Ampere – turn method
   c. Z.P.F. method.
7. Regulation of Alternator by slip test.
8. Determination of V curves and inverted V curves of Synchronous motor.
9. Power angle characteristics of a Synchronous motor.
10. Load characteristics of Induction Generator.
11. P.F. improvement of Induction motor using capacitors.
12. Synchronization of Alternator using three dark lamp method.

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER
CONTROL SYSTEMS & SIMULATION LABORATORY

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : **PC521EE**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
The objective of the lab is to provide an experience in working with various control system components and control systems for understanding analyzing them and also enhance the analyzing capability by introducing simulation tools for control systems.	A successful graduate will be able to 1. Obtain the characteristics of AC, DC servo motors and synchro pair 2. Obtain the characteristics of second order system and analyze the time domain specifications. 3. Understand AC and DC position control systems and analyze them. 4. Obtain the frequency response characteristics and design lead and lag compensators.

LIST OF EXPERIMENTS:

1. Characteristics of DC and AC Servo motors.
2. Characteristics of Synchro Pair .
3. Frequency response of compensating networks.
4. Step response of second order system.
5. DC position control system.
6. AC position control system.
7. Closed loop PPI and PDI controller.
8. Step response and frequency response of a given plant.
9. Design of lag and lead compensation for the given plant.
10. ON/ OFF Temperature control system.
11. Temperature control system.
12. Level Control System.
13. Simulation of Root locus, Nyquist plot, Bode plot using Matlab/Simulink
14. Design of lead and lag compensators using MATLAB
15. Conversion of state to transfer function and transfer function state space using MATLAB
16. Time response of Second order system using MATLAB(Simulink)
17. Design of PID controller
18. Frequency response characteristics and relative stability analysis using MATLAB

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER
ELECTRICAL MEASUREMENTS LAB

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : **PC531EE**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
Enable the student 1. To have fair knowledge about Transient, Frequency response of RLC-circuits and Parameters of network. 2. To learn the theorems concepts and their application. 3. To learn the construction, working principles, calibration and applications of different types of Analog instruments – Ammeter, Voltmeters, Watt meter, Energy meter and Potentio meters. 4. To have the knowledge of measurement of circuit elements R, L & C using bridges.	1. Able to **identify** and **choose** the proper type of theorem to solve the circuits. 2. Able to **identify** and **choose** the proper type and range of meter to measure current, voltage, Power and Energy. 3. Student can **calibrate** ammeter, voltmeter and wattmeter using the Potentio meter. 4. Student can **calculate** the R, L & C values using the proper bridges.

List of Experiments

1. Measurement of low resistance by Kelvin's Double Bridge
2. Calibration of Single phase energy meter by Phantom Loading
3. Measurement of Inductance by Anderson's Bridge
4. Measurement of capacitance by DeSautry's bridge
5. Use of D.C Potentiometer for measurement of unknown voltage and impedance
6. Calibration of 3-phase Energy meter (Electromagnetic/static) by direct loading.
7. Calibration of Power Factor meter.
8. Measurements of 3 phase reactive power using single phase wattmeter.
9. Calibration of LPF meter by phantom loading.
10. Measurement of R,L,C at KHz and 100 KHz frequency of supply by using LCR meter.

OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS IN
B.E- V SEMESTER (2018-19) Engineering Branches

Open Elective IV (Semester - V)			
Dept.	**Title**	**Code**	**credits**
Civil	Environmental Impact Assessment	OE510CE	1
	Remote Sensing	OE520CE	1
CSE	Introduction to Software engineering	OE510CS	1
ECE	Introduction to Telemetry	OE510EC	1
EEE	Basics of power systems	OE510EE	1
IT	Introduction to Linux	OE510IT	1
Mech.	Basics Of 3-D Printing	OE500ME	1
Open Elective V (Semester - V)			
Civil	Global Positioning Systems	OE530CE	2
	Project Management	OE540CE	2
CSE	Introduction to Java Programming	OE520CS	2
ECE	Introduction to Signal Processing	OE520EC	2
EEE	Fundamentals of Power Electronics	OE520EE	2
IT	Introduction to Java Programming Language	OE520IT	2
Mech.	Introduction to Robotics	OE510ME	2
	Basics of Entrepreneurship	OE520ME	2

B.E- V and VI SEMESTER (2018-19) Basic Sciences and H&SS

Open Elective IV (Semester - V)			
Dept	**Title**	**Code**	**credits**
CHEM	Electronic Engineering Materials	OE400CH	1
	Polymer Technology	OE410CH	1
	Industrial Pollution Prevention and Control	OE420CH	1
	Electrochemical Energy Systems	OE430CH	2
	Corrosion Science and Technology	OE440CH	2
PHY	Display Devices	OE400PH	1
	Fundamentals of Vacuum Technology	OE410PH	1
	Introduction to Non-destructive Testing	OE420PH	1
	Fundamentals of Cryogenics	OE430PH	2
	Smart Materials and Applications	OE440PH	2
	Fundamentals of Thin Film Technology	OE450PH	2
ENG	Technical Writing and Professional Presentations	OE510EH	2

w.e.f the academic year 2018-19

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR BE V-SEMESTER
ENVIRONMENTAL IMPACT ASSESSMENT (Open Elective – IV)

Instruction: 1 Hr /week	SEE Marks :50	Course Code : OE510CE
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objectives of the course are to introduce	*Upon the completion of the course, students are expected to*
1. The issues, impact and management plan due to Environmental of the project	1. Apprise the need, legal provisions and 2 Enumerate the methods of Environmental Impact Assessment. 3.Predict the impact and prepare the management plan for Environmental issues of the project 4. Issues related to rehabilitation of affected people, Preparation of Environmental impact statement

UNIT-I

Environmental Impact Assessment: Need for environmental impact assessment (EIA), objectives of EIA. EIA capabilities and limitations. Legal provisions of EIA. Methods of EIA, base line data collection required for EIA

UNIT-II

Evaluation of impacts: Prediction of impacts. Preparation of Environmental Management Plan, preparation of EIAs of road project, Industry, and dam. Issues related to rehabilitation of affected people, Preparation of Environmental impact statement and Environment management plan.

Learning Resources:

1.Peavy and Rowe, Environmental Engineering, McGraw Hill Publications.
2.Keiley, Environmental Engineering, McGraw Hill Publishers, 2003.
3.Sincero and Sincere, Environmental Engineering, Prentice Hall of India.

Online Resources

1.http://nptel.ac.in/courses/

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR B.E. V-SEMESTER
REMOTE SENSING (Open Elective – IV)
(to other branches)

Instruction: 1 Hr /week	SEE Marks :35	Course Code : OE520CE
Credits : 1	CIE Marks: 15	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
Objectives of this course are to	*Upon the completion of the course, students are expected to*
1. Provide fundamental knowledge on geo spatial technology such as remote sensing	1. Explain the basic principles of remote sensing to analyse the surface featureson the Earth. 2. Describe the characteristics of satellites, platforms & sensors used in acquisition of remote sensing data required for further processing. 3. Identify and correct the remotely sensed data for atmospheric, radiometric and geometric errors to produce a high quality image. 4. Apply the principles and techniques of remote sensing to solve various problems in engineering field.

UNIT-I

Introduction: Definition, Elements of remote sensing, Physics of remote sensing, Sources of Energy, Active and Passive Radiation, Types of remote sensing, Electromagnetic spectrum and radiation, Interaction with Atmosphere, Atmospheric windows, Spectral reflectance of Earth's surface features

Data Acquisition: Satellite orbits and characteristics, various types of platforms, Sensor types & characteristics, Types of resolution-spatial, spectral, radiometric &temporal

UNIT-II

Data Pre-processing: Atmospheric errors and removal, Radiometric corrections, Geometric corrections, Geo-referencing, re-sampling methods - Basic Principles of Visual Interpretation

Applications: Applications of optical remote sensing techniques in various fields of Engineering

Learning Resources:

1. Anji ReddyM., Remote Sensing and Geographic Information System, 2012
2. John A. Richards, Remote sensing Digital Image Analysis, 2012

w.e.f the academic year 2018-19

DEPARTMENT OF CIVIL ENGINEERING

GLOBAL POSITIONING SYSTEM (Open Elective–V)

(to other branches)

Instruction: 2 Hr /week	SEE Marks :70	Course Code : OE530CE
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
Objectives of this course are to	*Upon the completion of the course, students are expected to*
1. To provide fundamental knowledge on geo spatial technology such as GPS	1. Describe the fundamental theory and concepts of the Global Positioning System to provide 3D positioning with great accuracy. 2. Compute errors and biases in GPS measurements and apply necessary corrections to obtain accuracy as per the user specifications. 3. Describe the differences between point and relative GPS positioning, 4. Analyse DGPS and RTK surveys used to obtain GPS measurements in the field.

UNIT-I

Overview of GNSS and Introduction to GPS, GLONASS, GALILEO, COMPASS, IRNSS systems

GPS: Basic concepts, Functional system of GPS – Space segment, control segment and user segment, Working principle of GPS, Signal structure and code modulation, Pseudo-range measurements and navigation position

UNIT-II

Errors and biases in GPS measurements, Accuracy of navigation position: UERE and DOP, Intentional degradation of GPS signals: Selective availability (SA) and Anti-spoofing (AS)

Differential GPS: Space based augmentation systems (e.g., SBAS, GAGAN) and Ground based augmentation systems (e.g., WASS, EGNOS)

UNIT-III

GPS Carrier Phase measurements: Signal Differencing, Double Differencing and Triple Differencing in GPS measurements.

UNIT-IV

Surveying with GNSS: Point positioning, Relative positioning, Static and Kinematic positioning.

GNSS applications: GIS and GPS integration

Learning Resources:

1. Leick, A., GPS Satellite Survey, John Wiley: NJ, 2015
2. Hofmann, B., Lichtenegger H. and Collins J., Global Positioning System: Theory and Practice, Springer: Berlin, 2011.
3. Hofmann-Wellenhof, Bernhard, Lichtenegger, Herbert, Wasle, Elmar, GNSS – GPS, GLONASS, Galileo and more, 2013.

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR BE V-SEMESTER
PROJECT MANAGEMENT (Open Elective – V)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code : OE540CE
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objectives of the course are to	*Upon the completion of the course, students are expected to*
1. Learn the concept of project management along with functions and objectives. 2. Understand the various techniques used for project planning such as bar charts, CPM, PERT and crashing of networks. 3. Acquire knowledge on various types of contracts, tenders.	1. Understand the objectives, functions and principles of management in projects. 2. Practice the network techniques like CPM and PERT for better planning and scheduling of engineering works. 3. Analyse the importance of cost and time in network analysis and planning the work accordingly. 4. Knowledge on Contracts, Tenders, and Work orders related to the projects.

UNIT-I

Significance of Project Management: Objectives and functions of project management, management team, principles of organization and types of organisation.

UNIT-II

Project Planning: Planning, bar charts, network techniques in project management - CPM and PERT. Expected likely, pessimistic and optimistic time, normal distribution curve and network problems.

UNIT-III

Contracts: Introduction, types of contracts and their advantages and disadvantages, conditions of contracts, Introduction to Indian contract act.

UNIT-IV

Time Cost Analysis: Cost time analysis in network planning, updating
Tender: Tender form, Tender Documents, Tender Notice, Work Order.

Learning Resources:

1. Srinath L.S., PERT and CPM: Principles and Application, East-West Press, 1975.
2. Peret, F, Construction Project Management an Integrated approach, Taylor and Francis, Taylor and Francis Group, London & New York, 2009
3. Punmia B.C., and Khandelwal, PERT and CPM, Laxmi Publications, 1990.
4. http://nptel.ac.in/courses/

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E V SEMESTER
INTRODUCTION TO SOFTWARE ENGINEERING (Open Elective-IV)

Instruction: 1 Hr /week	SEE Marks :50	Course Code : OE510CS
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course Objectives	Course Outcomes
Students should be able to	At the end of the course, students will be able to
• Understand the concepts involved in the lifecycle of software development • Learn the best practices to be employed for the design and testing.	1. Explain the various software development lifecycle models for a software system development. 2. Build the prototype for software business case and analyze the requirements of software project. 3. Analyze the different behavioral and structural models for the designed object oriented system. 4. Identify verification and validation methods in a software engineering project and implement testing methods at various phases of SDLC

UNIT-I

Introduction to Software Engineering:

A generic view of Process: Software Engineering, Process Framework CMM Process Patterns, Process Assessment.

Process Models: Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process.

An Agile view of Process: What is Agility, What is an Agile Process, Agile Process Models.

Requirements Engineering: A bridge to Design and Construction, Requirements Engineering Tasks, Initiating Requirements Engineering Process, Eliciting Requirements, Negotiating Requirements, Validating Requirements.

UNIT-II

Object oriented Modeling & design using UML: Introduction to UML.

Structural Modeling: Classes and Advanced Classes, Relationships and Advanced Relationships, Common Mechanisms, Class Diagrams.

Behavioural Modelling: Interactions, Interaction diagrams, Use Cases, Use Case Diagrams, Activity diagrams, State Machines, State chart Diagrams.

Testing Tactics: Software testing fundamentals, Black box and White box testing.

Suggested Books:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, 6th Edition (2005), Tata McGrawHill.
2. Grady Booch, James Rumbagu, Ivor Jacobson, The Unified Modeling Language-User guide, (Covering UML 2.0) ,2nd Edition (2007), Pearson Education, India.

Reference Books:

1. Shari Lawrence Pfleeger, Software engineering Theory and Practices, 4th Edition (2011), Pearson Education, India.
2. Pankaj Jalote, An Integrated Approach to Software Engineering, 3rd Edition (2005), Narosa Publishing House.

Online Resources:

1. http://nptel.ac.in/courses/106101061/
2. https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-355j-software-engineering concepts-fall-2005/lecture-notes/

w.e.f the academic year 2018-19

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E V SEMESTER
INTRODUCTION TO JAVA PROGRAMMING (Open elective-V)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code : OE520CS
Credits : 2	CIE Marks: 30	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
• Apply object oriented principles for developing an application using Java constructs • Design GUI using existing Java classes and interfaces	1. Apply the object oriented programming (OOP) concepts to design an application. 2. Employ runtime error handling, concurrent programming practices to develop a parallel processing application 3. Read and write the IO operations using console and files streams 4. Design dynamic GUI for a java application using AWT classes

UNIT – I

Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables and Arrays, Operators, Control Statements, Classes and Methods, Garbage Collection, this keyword, final, Inheritance, Method Overriding.

UNIT – II

Abstract class, Nested class, Interface, Package, Exception Handling, Multithreaded Programming, String Handling.

UNIT - III

Util: StringTokenizer, Date, Calendar, Random, Timer, Observable

IO: Java I/O Classes and Interfaces, Files and Directories, Byte and Character Streams

UNIT – IV

GUI and event Programming: Applet Class, Applet architecture, The Delegation Event Model, Event Classes, Source of Events, Events Listener Interfaces, AWT: Classes, Working with Graphics, Frames, Menu, Layout Managers**.**

Suggested Books:

1. Herbert Schildt, *The Complete Reference Java*, 7th Edition, Tata McGraw Hill 2005.

Reference Books:

1. P. Radha Krishna, *Object Oriented Programming through Java,* Universities Press, 2007.
2. Sachin Malhotra, Saurabh Choudhary, *Programming in Java*, 2nd Edition, Oxford Press, 2014.

Online Resources:

https://docs.oracle.com/javase/tutorial/java

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SYLLABUS FOR B.E. V-SEMESTER

INTRODUCTION TO TELEMETRY (Open Elective -IV)

(for other Departments)

Instruction: 1 Hrs /week	SEE Marks :50	Course Code : **OE510EC**
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course Objective	**Course Outcomes**
1. To understand the concept of telemetry systems.	**At the end of the course, students will be able to:** 1. Analyze different components of telemetry systems. 2. Acquire knowledge on wired and wireless data acquisition techniques in telemetry systems. 3. Demonstrate the knowledge on satellite telemetry systems. 4. Apply techniques of different telemetry systems in real time applications.

UNIT - I

Introduction to Telemetry Principles: Introduction, the Basic System, Classification, Non-electrical Telemetry Systems, Voltage and Current Telemetry Systems, Local Transmitters and Converters, Frequency Telemetry, Power Line Carrier Communication (PLCC).

Wave Propagation: Space Propagation of Waves, Surface Wave, the Ionosphere, Some Considerations on Space Wave Propagation.

UNIT - II

Basics of Satellite Telemetry, Introduction, General Considerations, TT & C Services, Digital Transmission System in Satellite Telemetry, TDM, Some Aspects of TT&C – Subsystems, Satellite Telemetry and Communications: MA Techniques.

Fiber Optic Telemetry: Introduction, Optic Fiber Cable, Dispersion, Losses, Connectors and Splices, Sources and Detectors, Transmitter and Receiver Circuits, Coherent Optical Fiber Communication System, Wavelength Division Multiplexing.

Suggested Reading:

1. D. Patranabis, Telemetry Principles, Tata McGraw-Hill, 1999
2. Swoboda G., Telecontrol Methods and Applications of Telemetry and Remote Control, Reinhold Publishing Corp., London, 1991
3. Young R.E., Telemetry Engineering, Little Books Ltd., London, 1988
4. Gruenberg L., Handbook of Telemetry and Remote Control, McGraw Hill, New York, 1987.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SYLLABUS FOR B.E. V-SEMESTER

INTRODUCTION TO SIGNAL PROCESSING (Open Elective -V)

(for other Departments)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code : **OE520EC**
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	**Course Outcomes**
1. To Introduce the basics of Signals and Systems, and the principles of Digital Signal Processing (DSP). To design digital filter using frequency domain concepts.	**At the end of the course, students will be able:** 1. To classify discrete time signals as energy and power and to classify discrete time systems as causal-non causal, linear-nonlinear and stable-unstable. 2. To study the properties of discrete time Fourier transform, discrete Fourier transform and z-transform. 3. To implement the DFT using FFT for the given sequence. 4. To realize digital filter structures from their z-transform. 5. To apply DSP techniques to audio, image processing and telecommunication areas.

UNIT – I

Introduction to signals: Definition, Representation, Elementary Signals: Unit Impulse, Unit Step, Unit Ramp, Rectangular and Triangular, Classification of signals: periodic and non-periodic, Energy and Power, even and odd, Basic operations on signals such as shifting, scaling and reversal.

UNIT – II

Introduction to Discrete Time Systems: Definition, Classification of systems: Linear and Non-linear, Time Invariant and Time Variant, Causal and Non-causal, Stable and Unstable, Introduction to LTI systems, Properties of an LTI system and linear convolution.

UNIT – III

Discrete Transform Techniques: Discrete Time Fourier Transform and its properties, Discrete Fourier Transform and its properties, Circular convolution, Twiddled factor and its properties, Introduction to FFT algorithms, Z-transform and its properties, transfer function.

UNIT – IV

A Frame work for digital filter design: Types of digital filters, Ideal filter characteristics, Specification of practical filters, Design of FIR filters using windowing techniques, Design of Digital IIR Low Pass Filter using butterworth approximation, realization of filter structures. Some Application Areas of DSP.

Suggested Readings:

1. Rao, K. Deergha, Swamy M.N.S., "Digital Signal Processing – Theory and Practice", 1st edition, Springer, 2018.
2. Ifeachor, E.C. and Jerris, B.W., "Digital Signal Processing: A practical Approach," 2nd edition, Pearson Education.
3. Tan, Li, "Digital Signal Processing – Fundamentals and Applications", Academic Press.
4. Mitra, S.K., "Digital Signal Processing – A Computer Based Approach", 3rd Ed., Tata McGraw-Hill.

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER

BASICS OF POWER SYSTEMS (Open Elective –IV)

Instruction: 1 Hrs /week	SEE Marks :50	Course Code : OE510EE
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course objective:	**Course Outcomes:**
Electrical Power plays significant role in day to day life of entire mankind. This course gives an over view of electrical power generation and economic aspects of power to all engineers of all disciplines.	**At the end of the course, students will be able to:** 1. **Identify** the various and major ways of generation of Power in India. 2. **Estimate** the Energy generated by Hydel Generating station. 3. **Calculate** the Capacitance value for P.f. improvement. 4. **Assess** the Tariffs of domestic and commercial.

UNIT – I

Thermal Power Station: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses. Brief description of TPS components-Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers.

Hydro Power Stations: Power Generation Principles, Choice of site, layout and various parts of generating stations, Estimation of power in Hydel, flow duration curve, hydrograph, mass curve etc. Types of Hydel stations.

UNIT – II

Nuclear Power Stations: Nuclear Fission and Chain reaction, Nuclear fuels, Principle of operation of Nuclear reactor, Reactor Components-Moderators, Control rods, Reflectors and Coolants, Radiation hazards-Shielding and Safety precautions.

Economics of Power Generation: Load Curve, load demand and diversity factors, base load and peak load operation, types of costs and depreciation fund calculations, Tariffs.

Power Factor: Causes of low P.F, Improving power factor , Methods of power factor improvement, Numerical problems.

Suggested Reading

1. C.L. Wadhwa, Electrical Power Systems, Wiley Eastern Ltd. 5th Edition, 2005
2. C.L. Wadhwa, Generation, Distribution and Utilisation of Electrical Energy, Wiley Eastern Ltd., 5th Edition, 2005
3. S.N.Singh- Electrical Power Generation, Transmission and Distribution-Prentice Hall pvt.ltd. New-2003.

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SYLLABUS OF B.E V- SEMESTER

FUNDAMENTALS OF POWER ELECTRONICS (Open Elective –V)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code : OE520EE
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
To provide fundamentals of power semi-conductor devices and power electronics converters in power electronics.	**At the end of the course, students will be able to:** 1. Categorize and compare power electronic devices. 2. Explain the operation of AC-DC, DC-DC and DC-AC converters. 3. Explain the control strategies of Choppers and PWM techniques in inverters. 4. Analyze and select the appropriate converter for a given application.

Unit – I Power Semi – conductor Switches:
Operation and static characteristics of power diode, SCR, MOSFET and IGBT, applications.

Unit – II AC – DC Converters:
Operation of 1 – ϕ half wave rectifiers with R, R – L and R – L – E loads, operation of 1 – ϕ bride type full and semi – converters with R – L – E load, applications.

Unit – III Choppers:
Operation of step down and step up choppers, control strategies, applications.

Unit – IV DC – AC Converters:
Operation of 1 - ϕ inverters, operation of 3 - ϕ inverters – 180° and 120° mode, pulse width modulation techniques, applications.

Learning Resources:

1. Bimbra.P.S, *Power Electronics*, Third Edition, Khanna Publishers, 2012.
2. Singh, M.D and Khanchandani, K.B, – *Power Electronics*, Tata McGraw Hill, 2nd Edition, 2006.
3. Rashid, M.H – *Power Electronics: Devices, Circuits and Applications,* Pearson, 2003
4. Mohan, Undeland, Robbins, *Power Electronics – Converters, Applications and Design*, Wiley India Pvt Ltd, 2010.

DEPARTMENT OF INFORMATION TECHNOLOGY

Syllabus for B.E V- SEMESTER

INTRODUCTION TO LINUX (Open Elective - IV)

Instruction:1Hrs/ week	**SEE Marks** : 50	**Course Code** : OE510IT
Credits : 1	**CIE Marks** :30	**Duration of SEE** : 2 Hours

Course Objectives	**Course Outcomes**
The course will enable the students to:	**At the end of the course student will be able to:**
Acquire basic skills for using Linux operating system.	1. Install Linux operating system and use desktop environment. 2. Identify and use Linux utilities to create and manage simple file processing operations. 3. Organize directory structures with appropriate security. 4. Configure and use Linux shell.

Unit I

Introduction to Linux, Installing Linux, Running Linux from USB Drive, Understanding X Windows System and Desktop, Navigating through Linux Desktop and Managing files. Understanding Linux file system, listing files and directory attributes , Making files and directories , Listing and changing permissions and ownership.

Unit II

Understanding the Linux Shell, Understanding aliases, Using the shell from console or terminals, Using command history and tab completion, Connecting and expanding commands, Creating aliases, Making shell settings permanent, Using man pages and other documentation.

Learning resources

Introduction to Linux – A Hands On Guide, Machtelt Garrels.
https://linuxjourney.com/

DEPARTMENT OF INFORMATION TECHNOLOGY

Syllabus for B.E V- SEMESTER

INTRODUCTION TO JAVA PROGRAMMING LANGUAGE (Open Elective - V)

Instruction:2Hrs/ week	**SEE Marks** : 70	**Course Code** : OE520IT
Credits : 2	**CIE Marks** :30	**Duration of SEE** : 3 Hours

Course Objectives	Course Outcomes
The course will enable the students to:	**At the end of the course student will be able to:**
Acquire skills to write basic Java programs.	1. Use arrays to store multiple data elements. 2. Organize programs logically with the usage of packages. 3. Create, throw and handle exceptions. 4. Perform basic Input Output file operations.

Unit I

Java Programming Fundamentals: Introduction, Overview of Java, structure of a Java program, data types, variables-scope and lifetime, operators, control statements, classes, methods, command line arguments.

Unit II

Arrays: one-dimensional arrays, creating an array, declaration of arrays, initialization of arrays, two dimensional arrays. Inheritance, Interfaces: defining interfaces, extending interfaces, implementing interfaces.

Unit III

Packages: creation, importing a package and user defined packages.

Exception Handling: Introduction, types of exceptions, syntax of exception handling code, multiple catch statements, using finaaly statement, user-defined exceptions.

Unit IV

Basic I/O Streams: Java I/O classes and interfaces, Files, Stream and Byte classes. Character Streams, Serialization.

Exploring java.lang: Object, Wrapper classes, String, StringBuffer.

Suggested Reading:

1. Herbert Schildt, The Complete Reference Java, 7th Edition, Tata McGraw Hill, 2006.
2. James M Slack, Programming and Problem solving with JAVA, Thomson Learning, 2002.
3. C Thomas Wu, An Introduction to Object Oriented Programming with Java 5th edition, McGraw Hill Publishing, 2010.
4. Y. Daniel Liang , An Introduction to JAVA Programming, Tata McGraw Hill, 2009.
5. Kathy Sierra, Head First Java, 2/e, Shroff Publishers, 2012.

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS FOR B.E. V-SEMESTER

BASICS OF 3-D PRINTING (Open Elective-IV)

Instruction : 1 Hour/week	SEE Marks : 50	Course Code : OE500ME
Credits : 1	CIE Marks :30	Duration of SEE : 2Hours

Course Objectives	**Course Outcomes**
The objective of the course is to • understand the fundamentals of various rapid prototyping technologies with emphasis on FDM technology for application to various industrial needs.	After completion of the course, the student will be able to 1. understand the fundamentals of Additive manufacturing Technologies for engineering applications. 2. understand the methodology to manufacture the products using FDM technology 3. study the applications, advantages and case studies of FDM technology. 4. identify different industrial sectors for application of AMT to reduce manufacturing cost and time.

UNIT-I

Introduction, Reverse engineering and its Methodology, Historical development, Advantages of 3-D printing, 3-D printing process chain, Classification of various 3-D printing processes.

Fused Deposition Modeling (FDM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies, Practical demonstration

UNIT-II

Applications of 3-D printing in various fields like aerospace, jewellery, medicine, forensic science and anthropology, visualization of bio-molecules, etc.

Learning Resources:

1. C K Chua, K F Leong, C S Lim, "Rapid Prototyping – Principles and applications", 3rd Ed., World Scientific Publishing Co. Pvt. Ltd, 2010
2. Pham, D.T. and Dimov S.S., "Rapid Manufacturing", Springer, 2001
3. Amithaba Ghose, "Rapid prototyping", Eastern Law house, 1997
4. Paul F. Jacobs, "Rapid Prototyping & Manufacturing" ASME Press, 1996

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. V-SEMESTER

INTRODUCTION TO ROBOTICS (Open Elective-V)

Instruction:2Hours /week	SEE Marks : 70	Course Code : OE510ME
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.	On completion of the course, the student will be able to 1. list and explain the basic elements of industrial robots 2. analyse robot kinematics and its control methods. 3. classify the various sensors used in robots for better performance. 4. summarize various industrial and non-industrial applications of robots.

UNIT I - ROBOT BASICS

Robot-Basic concepts, Need, Law, History, Anatomy, specifications.
Robot configurations-cartesian, cylinder, polar and articulate.
Robot wrist mechanism, Precision and accuracy of robot.

ROBOT ELEMENTS

End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot drive system
Types, Position and velocity feedback devices-Robot joints and links-Types, Motion interpolation.

UNIT II - ROBOT KINEMATICS AND CONTROL

Robot kinematics – Basics of direct and inverse kinematics, Robot trajectories, 2D and 3D Transformation-Scaling, Rotation, Translation Homogeneous transformation.
Control of robot manipulators – Point to point, Continuous Path Control, Robot programming

UNIT III - ROBOT SENSORS

Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors. Force sensor-Light sensors, Pressure sensors,
Introduction to Machine Vision and Artificial Intelligence.

UNIT IV - ROBOT APPLICATIONS

Industrial applications of robots, Medical, Household, Entertainment, Space, Underwater, Defense, Disaster management.
Applications, Micro and Nanorobots, Future Applications.

Learning Resources:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel, Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", Tata – McGraw Hill Pub. Co., 2008.
2. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010.
3. Klafter.R.D, Chmielewski.T.A, and Noggin's., "Robot Engineering: An Integrated Approach'", Prentice Hall of India Pvt. Ltd., 1994.
4. Fu.K.S, Gonzalez.R.C&Lee.C.S.G, "Robotics control, sensing, vision and intelligence", Tata- McGraw Hill Pub. Co., 2008
5. , Yu. "Industrial Robotics", MIR Publishers Moscow, 1985.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. V-SEMESTER
BASICS OF ENTREPRENEURSHIP

Instruction : 2 Hours / week	SEE Marks : 70	Course Code : OE520ME
Credits : 2	CIE Marks : 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to : • understand and discover entrepreneurship • build a strong foundation for the students to start, build and grow a viable and sustainable venture • develop an entrepreneurial outlook and mind set, critical skills and knowledge	On completion of the course the student will be able to: 1. understand entrepreneurship as a career option and develop customers, channels and traction 2. understand the method of creating business model and make a minimum viable product. 3. develop costing and pricing strategies 4. understand team building and its importance 5. create marketing and sales strategies for business and understand business regulations and government schemes.

UNIT-I

Introduction to Entrepreneurship: Define Entrepreneurship, Entrepreneurship as a career option, Benefits and Myths of Entrepreneurship, Characteristics, Qualities and Skills of Entrepreneurship on Economy and Society

Opportunity and Customer Analysis: Identify your Entrepreneurial Style, Identify Business Opportunities, Methods of finding and understanding Customer Problems, Process of Design Thinking, Identify Potential Problems, Customer Segmentation and Targeting, Customer Adoption Process, Craft your Value Proportions, Customer-Driven Innovation.

UNIT-II

Business Model and Validation: Types of Business Models, Lean Approach, the Problem-Solution Test, Solution Interview Method, Difference between Start-up Venture and small Business, Industry Analysis, Identify Minimum Viable Product (MVP), Build-Measure-Lean Feedback Loop, Product-market fit test.

UNIT-III

Economics and Financial Analysis: Revenue sources of Companies, Income analysis and Cost Analysis-Product Cost and Operation Cost, Basics of Unit Costing, Profit Analysis, Customer Value Analysis, Different Pricing Strategies, Investors Expectations, Practice Pitching to Investors and Corporate.

UNIT-IV

Team Building and Project Management: Leadership Styles, Team Building in Venture, Role of good team in Venture, Roles and Respondents, Explore Collaboration Tools and Techniques-brainstorming, Mind Mapping. Importance of Project Management, Time Management, Work Flow, Network Analysis Techniques.

Marketing &Business Regulations: Positioning, Positioning Strategies, Building Digital Presence and Leveraging Social Media, Measuring effectiveness of Channels, Customer Decision-making Process, Sales plans and Targets, Unique Sales Proposition (USP), Follow-up and Close Sales. Business Regulations of starting and operating a Business, Start-up Ecosystem, Government schemes.

Learning Resources:

1. Robert D Hisrich, Michael P Peters, Dean A Shepherd, "Entrepreneurship", Sixth edition, New Delhi, 2006.
2. Thomas W. Zimmerer, Norman M. Scarborough, "Essentials of Entrepreneurship and small business Management", Fourth edition, Pearson, New Delhi,2006.
3. Alfred E. Osborne, "Entrepreneurs Toolkit", Harvard Business Essentials, HBS Press, USA,2005
4. Madhurima Lall and Shikha Sahai, "Entrepreneurship", Excel Books, First Edition, New Delhi,2006

w.e.f the academic year 2018-19

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

Instruction :1 Hours / week	SEE Marks :50	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

w.e.f the academic year 2018-19

DEPARTMENT OF PHYSICS

SYLLABUS FOR B.E. V SEMESTER

FUNDAMENTALS OF VACCUM TECHNOLOGY *(Open Elective-IV)*

Instruction :1 Hours / week	SEE Marks :50	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

w.e.f the academic year 2018-19

DEPARTMENT OF PHYSICS

SYLLABUS FOR B.E. V SEMESTER

INTRODUCTION TO NON- DESTRUCTIVE TESTING *(Open Elective-IV)*

Instruction :1 Hours / week	SEE Marks :50	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. V SEMESTER
FUNDAMENTALS OF CRYOGENICS (Open Elective-IV)

Instruction :2 Hours / week	SEE Marks :70	Course Code : OE430PH
Credits : 2	CIE Marks :30	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. V SEMESTER
SMART MATERIALS AND APPLICATIONS (Open Elective-IV)

Instruction :2 Hours / week	SEE Marks :70	Course Code : OE440PH
Credits : 2	CIE Marks :30	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 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. V SEMESTER

FUNDAMENTALS OF THIN FILM TECHNOLOGY *(Open Elective-IV)*

Instruction :2 Hours / week	SEE Marks :70	Course Code : OE450PH
Credits : 2	CIE Marks :30	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. V SEMESTER
ELECTRONIC ENGINEERING MATERIALS *(Open Elective-IV)*

Instruction :1 Hours / Week	SEE Marks : 50	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:

4. P.C.Jain and Monica Jain, "Engineering Chemistry", DhanpatRai Pub, Co., New Delhi (2002)
5. S.S. Dara "A text book of engineering chemistry" S.Chand&Co.Ltd., New Delhi (2006).

2. Chemistry of Engineering Meterials by R.P Mani and K.N.Mishra, CENGAGE learning
3. A textbook of Polymer Science: Fred, Billmeyer Jr., Wiley India Third edition.
4. Chemistry of Advanced Materials: CNR Rao, RSC Publication
5. Billmeyar F. W., "Text book of Polymer Science", Wiley-Inter Science, New York, 2002.
6. 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

w.e.f the academic year 2018-19

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

Instruction :1 Hours / Week	SEE Marks :50	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

w.e.f the academic year 2018-19

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

Instruction :1 Hours / Week	SEE Marks :50	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.

w.e.f the academic year 2018-19

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

Instruction :2 Hours / Week	SEE Marks :70	Course Code : OE430CH
Credits : 2	CIE Marks :30	Duration of SEE : 3 Hours

OBJECTIVES	**OUTCOMES**
The course will enable the students :	**At the end of the course students should be able to:**
• To introduce the various terms to understand the efficiency of batteries. • To know the relevant materials required for the construction of primary and secondary batteries. • To familiarize with the reactions involved during charging and discharging processes. • To focus on the need of fuel cells and the concept of their construction and functioning • 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
2. Shasi Chawla, "Text Book of Engineering Chemistry", Dhanpat Rai Publishing Company, NewDelhi (2008).
3. Dell R. M. and Rand D. A. J., "Understanding Batteries", Royal Society of Chemistry, UK, 2001.
4. Derek Pletcher and Frank C. Walsh, "Industrial Electrochemistry", Chapman and Hall, New York, 1993

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

Instruction :2 Hours / Week	SEE Marks :70	Course Code : OE440CH
Credits : 2	CIE Marks :30	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. 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

w.e.f the academic year 2018-19

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
SYLLABUS FOR B.E. V SEMESTER
TECHNICAL WRITING AND PROFESSIONAL PRESENTATIONS
(Open Elective-IV)

Instruction :2 Hours / week	SEE Marks :70	Course Code : OE510EH
Credits : 2	CIE Marks :30	Duration of SEE : 3 Hours

OBJECTIVES	**OUTCOMES**
The course will enable the student:	**At the end of the course students should be able to:**
• This course introduces the principles and mechanics of technical writing for students of engineering. • specific communications skills associated with reporting technical information and will write a series of papers ranging from process description and feasibility reports to research projects, project proposals, and statement of purpose, which are pre-requisites for start-up companies and getting into foreign universities as well. • how to make effective presentations as part of today's workplace demands.	1. write effective reports 2. research and write project proposals and SOPs 3. make persuasive presentations

UNIT I

A. TECHNICAL REPORTS- INFORMAL

Informal report formats, project and research reports

B. TECHNICAL REPORTS-FORMAL

Formal report components, feasibility reports, evaluation reports, Analytical and informational reports, executive summaries.

UNIT II

TECHNICAL WRITING IN BUSINESS CORRESPONDENCE

Components of a letter, forms of electronic communication, effective emails, instant and text messaging guidelines.

UNIT III

TECHNICAL RESUMES

Parts of a resume, letters of employment, resume format and distribution, cover letter writing, the curriculum vitae.

UNIT IV

a) PROFESSIONAL PRESENTATIONS

Personal presentations, Paper presentations, Poster presentations, Power point presentations

b) HOW TO WRITE PROPOSALS AND STATEMENT OF PURPOSE

Types of proposals, persuasive elements, requests for proposals, stating your objective

Learning Resources:-

1. Effective Technical Communication, M Ashraf Rizvi, Tata McGraw-Hill Education, 2005
2. Raman, Meenakshi & Sangeeta Sharma. Technical Communication: Principles and Practice. Second Edition. New Delhi: Oxford University. Press, 2011.
3. Hacking Your Statement of Purpose: A Concise Guide to Writing Your SOP, Milena Young, 2014.
4. How to prepare a *feasibility study*: a step-by-step guide including 3 model *studies*. Front Cover. Robert E. Stevens, Philip K. Sherwood. Prentice-Hall, 1982.
5. Successful Presentations (with DVD): John Hughes & Andrew Mallett. Oxford university Press.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION FOR BE VI-SEMESTER w.e.f. 2018-19 under CBCS
(Students admitted in 2016-17)

Subject Code	Subject Name	Instruction Hours per week				Examination			Credits
		L	T	D	P	Duration	Max. Marks		
						Hours	SEE	CIE	
PC610EE	Linear Integrated Circuits	3	0	0	0	3	70	30	3
PC620EE	Switchgear & Protection	3	1	0	0	3	70	30	3
PC630EE	Signals & Systems	3	1	0	0	3	70	30	3
PC640EE	Microprocessor and Microcontrollers	3	1	0	0	3	70	30	3
HS500EH	Economics and Finance for Engineers (ECE, EEE, IT)	2	1	0	0	3	70	30	2
MC500EH	HVPE– II (ECE, EEE, Mech.)	1	0	0	0	2	50	30	1
HS610EH	FS– IV : Soft Skills	1	1	0	0	1.5	35	15	1
MC610XX	FS– IV : Technical Skills	1	1	0	0	1.5	35	15	1
OE6XXXX	Open elective-VI	1	0	0	0	2	50	30	1
OE6XXXX	Open elective-VII	2	0	0	0	3	70	30	2
LABS									
PC611EE	Power Systems Lab	0	0	0	2	3	50	25	1
PC621EE	Power Electronics & Simulation Lab	0	0	0	2	3	50	25	1
PC639EE	Mini Project	0	0	0	2	-	-	25	1
	Total	**20**	**6**	**0**	**6**		**690**	**345**	**23**
	Grand Total	**32**					**1035**		

w.e.f the academic year 2018-19

SYLLABUS OF B.E VI- SEMESTER
LINEAR INTEGRATED CIRCUITS

Instruction: 3 Hrs /week	SEE Marks :70	Course Code : **PC610EE**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
To impart fundamental concepts of linear and non linear devices and circuits namely Operational Amplifier, Multivibrator, 555 timer, ADC, DAC conversion methods, voltage regulators and provide an overview on design of second order filters for Linear IC applications.	1. Demonstrate an understanding of fundamentals of linear integrated circuits. 2. Analyze the various applications and circuits based on particular linear integrated circuit. 3. Select and use an appropriate linear integrated circuit to build a given application. 4. Analyze the non-linear circuit applications and design voltage regulators.

UNIT-I

Operation amaplifiers-Characteristics, open loop voltage gain, output impedance, input impedance, common mode rejection ratio – Offset balancing techniques – Slew rate, Frequency response - Stability, frequency compensation of Op-amp ,basic applications – Inverter summer, analog integrator, differentiator, current to voltage converter, voltage to current converter, voltage follower.

UNIT-II

Voltage limiter, clipper and clamper, precision rectifier- full wave and half wave , peak detector, comparator, zero crossing detector, Schmitt trigger, monostable, astable , multiplier, analog divider, Instrumentation amplifier circuits using Op-amps.

UNIT-III

Waveform generation using op-amps-sine, Square, Triangular, Quadrature oscillators ,voltage controlled oscillator/multi vibrator, voltage to frequency converter , 555 timer functional diagram, operation as monostable and astable. phase locked loop, A/D and D/A converters.

UNIT-IV

Series voltage regulator, shunt regulators, and switching regulators using OP-amp, dual voltage regulator, fixed voltage regulators, dual tracking regulators, current sensing and current feed back protection.

UNIT-V

RC active filters-low pass,high pass and band pass, band reject, notch, first order, second order transformation , state variable filter , switched capacitor filter , universal filter, Balanced modulator and demodulator

Suggested Reading:

1. D.Roy Choudhury, Linear Integrated Circuits, Shail B.Jain, 4th Edition, New Age International(P) Ltd., 2010.
2. R.A. Gayakwad, Op-Amps and Linear Integrated Circuits, 4th Edition, Prentice Hall of India, 2009.
3. Coughlin and Driscoll, Operational Amplifiers and Linear Integrated Circuits, 6th Edition, Prentice hall of India, 2003.
4. Malvino Albert Paul, Electronic Principles, 7th Edition, Tata McGraw Hill, 2006.
5. S. Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", McGraw Hill Inc., 2002

SYLLABUS OF B.E VI- SEMESTER
SWITCHGEAR AND PROTECTION

Instruction: 4 Hrs /week	SEE Marks :70	Course Code : **PC620EE**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	Course Outcomes:
1. To analyze principles of operation of the different types of electromagnetic relays. 2. To comprehend principles and operation of static, microprocessor and distance relays. 3. To comprehend the different principles of protective schemes in power system and power apparatus. 4. To comprehend the principles of operation of the different types of circuit breakers. 5. To be acquainted with different lightning arrestors for the protection of the various equipments of power system.	At the end of the course the student will be able to: 1. Calculate parameters of relay operations, analyze the principles of operation of various electromagnetic relays, derive the characteristics and apply for protection of transmission lines. 2. analyze the characteristics of dual input comparators, static relays and microprocessor based relays and distance relays. 3. apply the knowledge of different principles of relays for equipment protection like alternators, transformers, bus bars etc. 4. comprehend, analyze the concepts of circuit interruption and perform calculations on restriking voltage, recovery voltage, RRRV etc. 5. comprehend Analyze and apply the knowledge of different types of lightning arrestors, surge absorbers and design of ground wire, insulation coordination for various over voltage applications.

UNIT – I

Introduction to protective relays: Need for protection – primary protection – backup protection – zones of protection – Definitions of relays pickup, Dropout and reset values, Classification of relays, operating principles and construction of Electromagnetic and induction relays, Over current, Over voltage and Power relays. Directional features – Universal relay torque equation. Over current protection for radial feeders and ring mains, Protection of parallel lines, Relay settings for over current relays, Earth fault and phase fault protection.

UNIT – II

Static phase and Amplitude comparators: Characteristics of dual input comparators. Distance protection – 3 steps distance relays, Characteristics of distance relays on RX Diagram – Static over current relay, Microprocessor based over current relaying (block diagram), need for numerical relays, advantages and functional block diagram of numerical relay.

UNIT – III

Transformer and generator protection: Differential relays – percentage differential relays – protection of generator and transformer using percentage differential relays – split phase, interturn protection, overheating, loss of excitation, protection of generators – Protection of transformers against magnetizing in rush – Bucholz relays – Protection of earthing transformers – Generator transformer unit protection.

UNIT – IV

Circuit breakers: Need for circuit breakers – arc properties – principles of are quenching, Theorics, Recovery and restriking voltages, Definitions in Circuit breakers, rated symmetrical and asymmetrical breaking current – rated making current – rated capacity, voltage and frequency of circuit breakers , Auto reclosure, Duty cycle, Current chopping – resistance switching – derivations of RRRV – Maximum RRRV etc., Circuit breaker calculations – types of circuit breakers – Bulk oil, Minimum oil, air, air blast, SF6 and vacuum circuit breakers, testing of circuit breakers.

UNIT – V

Over voltage protection: Protection of transmission lines against direct lightening strokes – ground wires – protection angle – protection zones – height of ground wire – conductor clearances – conductor heights – tower footing resistance and its effects – Equipment protection assuming rod gaps, arcing horns, different types of lightening arrestors – their construction – surge absorbers – Peterson coil – insulation co-ordination.

Suggested Reading:

1. Badriram, Viswakarma, Power System Protection and Switchgear, Tata McGraw Hill, 2011.
2. C.L. Wadhwa, Electrical Power system, Wiley Eastern Ltd. 2nd Edition, 2010.
3. Sunil S.Rao, Switchgear and Protection, Khanna Publications.
4. B. Ravindranath & M.Chander, Power Systems Protection & Switchgear, New Age International, Special Indian Edition.

w.e.f the academic year 2018-19

SYLLABUS OF B.E VI- SEMESTER
SIGNALS AND SYSTEMS

Instruction: 4 Hrs /week	SEE Marks :70	Course Code : **PC630EE**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	Course Outcomes:
➢ To define and classify continuous and discrete time signals & systems ➢ To determine the frequency domain characteristics of continuous and discrete time signals using transform techniques. ➢ To verify the causuality and stability of LTI system and find its response using convolution.	After completing the course the student will be able to: 1. Analyse continuous time signals and systems and transform them to frequency domain. 2. Convert continuous time signals to discrete time signals using sampling. 3. Analyse discrete time signals and systems and transform them to frequency domain using ZT. 4. Determine the response of an LTI system using convolution.

UNIT - I

Continuous Time Signals & Systems: Introduction, elementary signals, classification of signals and basic operations on signals. Introduction to systems and its classification.

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).

Introduction to Linear Time Invariant (LTI) system, Unit impulse and step response, Transfer function of an LTI system.

UNIT - III

Sampling: Introduction to sampling, sampling theorem, aliasing, sampling Techniques, reconstruction, quantizing and encoding.

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, classification of signals and basic operations on signals. 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.

w.e.f the academic year 2018-19

SYLLABUS OF B.E VI- SEMESTER
MICROPROCESSORS AND MICROCONTROLLERS

Instruction: 4 Hrs /week	SEE Marks :70	Course Code : **PC640EE**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	Course Outcomes:
The objective of this course is become familiar with the architecture and instruction sets of 8086 and 8051 processors and as well as interfacing an external devices to these processors.	students will be able to 1. Applying the basic concepts of digital fundamentals to Intel 8086 architecture. 2. Apply the knowledge of 8086 instruction set and identify a detail software and hardware structure of the microprocessor. 3. Illustrate the different peripherals (8255, 8257, 8259 etc) interfacing with the microprocessor. 4. Design, Develop and interface microcontroller base systems to peripheral devices and systems at the chip level.

UNIT - I

Over view of micro computer structure and operation - Microprocessor Architecture of 8086- Segmented memory, Addressing modes, Instruction set, Minimum and Maximum mode operations.

UNIT-II

Construction of machine codes for MOVE 8086 instruction - Assembly language Programming, Assembler directives, simple programs using Assembler, strings, procedures, Macros, timing.

UNIT- III

Memory and I/O interfacing, A/D and D/A interfacing, 8255 (PPI), programmable Interval Timer (8253), Keyboard and display interface, interrupts of 8086, Seven segment display, 8257 DMA controller, 8251 USART

UNIT - IV

Microcontrollers - 8051 microcontroller, Architecture, I/O ports, connecting external memory, Instruction set, Assembly language programming.

UNIT - V

Interrupts programming concepts with examples, Serial communication programming concepts with examples, Timers, Counters, Applications of micro controllers interfacing LEDs, Seven Segment display, Keyboard Interfacing, LCD interfacing, Stepper motor interfacing.

Suggested Reading:

1. Douglas.V.Hall-Microprocessors and Interfacing-Rara Mcgraw Hill-Revised 2nd edition, 2006.
2. Krishna Kant – Microprocessors and Microcontrollers – Architecture, Programming and System Design 8085, 8086 8051, 80996, Prentice-Hall India-2007.
3. Kenneth.J.Ayala _ "the 8051 , Microprocessors Architecture , Programming and Application, Thomson publishers, 2nd edition.
4. Walter A. TRiebel & Avatar Singh- The 8088 and 8086 Microprocessor – Fourth Edition, pearson

SYLLABUS OF B.E VI- SEMESTER
ECONOMICS AND FINANCE FOR ENGINEERS

Instruction: 2+1 Hrs /week	SEE Marks :70	Course Code : **HS500EH**
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. The objective of the Course is to equip the prospective engineers with the concepts and tools of economics, finance, cost and taxes for business decisions.	**At the end of the course, students will be able to:** 1. Decide appropriate price for goods and services with the company's given cost structure for an estimated profit of the companies. 2. Analyze the given financial statements of a firm to understand its past financial performance in the market. 3. Compare the long term financial investment proposals to decide whether a proposal is financially viable or not through capital budgeting techniques. 4. Identify the suitable sources of finance for the company by considering the functions of major banks such as SBI and RBI 5. Calculate the impact of the new tax policies on the company's financial structure/ individual incomes.

Unit I: Basics of Economics:
Scarcity Definition of Economics - Macro and Micro Economics - Managerial Economics - Meaning of a Firm - Objectives of a Firm - Profit Maximization - Demand Concept - Price Elasticity of Demand - Meaning of Supply - Equilibrium Price and Quantity - Production - Cobb Doughlas Production Function - Economies of Scale.

Unit II: Cost and Price:
Cost - Meaning - Classification of Costs - Short run and Long run costs - Cost Sheet - Break even Analysis - Methods of Pricing (Problems on Cost Sheet, Breakeven Analysis and Methods of Pricing can be asked).

Unit III: Banking & Finance:
RBI and its role - Commercial Banks - Functions - Capital Budgeting - Discounting and Non discounting Techniques - Working Capital

Management - Concepts and Components of Working Capital - Operating Cycle.

UNIT IV: Understanding Financial Statements:
Financial Statements - Meaning - Types - Purpose - Ratios (Liquidity, Solvency & Profitability Ratios) (Problems can be asked on Ratios)

Unit V: Direct & Indirect Taxes:
Heads of Income - Income from Salaries - Income from House Property - Income from Business - Income from Capital Gains - Income from Other Sources - Latest Tax Rates - GST - CGST - SGST - IGST - GST network.

Learning Resources :

1. S.P.Jain and K.L Narang., "Cost Accounting", Kalyani Publishers, Twentieth Edition Revised – 2008.
2. S.P.Jain and K.L Narang., "Financial Accounting", Kalyani Publishers – 2002.
3. Mehta P.L., "Managerial Economics: Analysis, Problems and Cases", Thirteenth Edition, Sultan Chand and Sons, Nineteenth Edition - 2013.
4. M.Y.Khan and P.K. Jain., "Financial Management – Text, Problems and Cases", Mc Graw Hill Education Private Limited, New Delhi.
5. Vinod K Singhania and Kapil Singhania., "Direct Taxes Law and Practice", Taxmann Publications, Sixtieth Edition - 2018.
6. Dr,Vinod K Singhania., "Students' Guide to GST and Customs Law", Taxmann Publications, Edition - 2018.
7. Muralidharan., "Modern Banking", Prentice Hall of India.

Reference Books:

1. *M. L. Seth., "Micro Economics",* Lakshmi Narain Agarwal.
2. Dr. R.P. Rustagi., "Fundamentals of Financial Management" Taxmann Publications.
3. Dr. D.M. Mithani, "Money Banking International Trade & Public Finance", Himalaya Publishing House - 2014.
4. Rajesh., "Banking Theory and Practice", Tata Mc Graw Hill Publishing

SYLLABUS FOR B.E.- VI SEMESTER
HUMAN VALUES AND PROFESSIONAL ETHICS – II

Instruction: 1 Hrs /week	SEE Marks :50	Course Code : **MC500EH**
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course Objectives	Course Outcomes
1. Get a holistic perspective of value- based education. 2. Grasp the meaning of basic human aspirations vis-a-vis the professional aspirations. 3. Understand professionalism in harmony with self and society. 4. Develop ethical human conduct and professional competence. 5. 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. 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. 7. Obtain a holistic vision about value-based education and professional ethics.

UNIT-I

A. **DISTINCTION BETWEEN NEED AND GREED**
Exercising the wisdom to distinguish need from greed.

B. **IDEAL SELF-REAL SELF**-
How to define the ideal-idealism at various levels- is it possible to reach idealism –Man as a pilgrim on a journey to idealism.

UNIT - II

A. **RIGHTS AND RESPONSIBILITIES**-Educating an individual about rights and responsibilities –Safeguards-Stimulants-Social Justice-The three catalysts for deciding rights and responsibilities.

B. **IMBIBING AND INCULCATING CIVIC SENSE AND CIVIC-VIRTUES**, The true meaning of Integrity -Honesty, Humility, Openness, Transparency, Dedication, Reliability, Confidentiality, accountability, Collegiality, Sympathy, Trustworthiness, Co-operation, Courage.

a. The moral dilemma of the Modern world, Respect for Self, Others and Work.
b. Respect for women at the workplace.

UNIT - III

MANAGING FAILURE-Identifying causes for failure and learning lessons-Using failure to score success-Role of self-confidence and personal ethics in coping with failure.

• Anger/ Depression • Fear • Agitation • Failure • Lethargy • Dishonesty	• Cruelty • Jealousy • Desire • Cheating • Pride • Greed • Lying

UNIT - IV

STRESS MANAGEMENT- Identifying sources and levels of stress – Tackling stress and its associated negativity-Positive aspect of coping with stress- Some techniques to manage stress.

UNIT - V

DEVELOPING EMOTIONAL INTELLIGENCE

Self-Awareness
Handling Emotions
Motivation
Empathy
Social skills

Suggested Readings:

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, Cambridge 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)

Online Resources

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

SYLLABUS FOR B.E.- VI SEMESTER
FINISHING SCHOOL – IV : SOFT SKILLS

Instruction: 1+1 Hrs /week	SEE Marks :35	Course Code : **HS610EH**
Credits : 1	CIE Marks: 15	Duration of SEE : 1.5 Hrs

Course Objectives	Course Outcomes
1. This course aims at enhancing the employability skills. Students will be trained in higher order thinking skills including analytical skills, problem solving skills and critical & logical reasoning skills. Students will be trained to work systematically and develop logical and analytical thinking. 2. Students will be trained in the following areas 1. Critical and Non-verbal reasoning 2. Pure Maths 3. Verbal ability 4. Logical reasoning 5. Data Interpretation and Analysis	**At the end of the course, students will be able to:** 1. Understand the fundamentals concepts of Aptitude and verbal skills 2. Solve questions using short cuts and smart methods 3. Perform calculations with speed and accuracy 4. Develop Analytical thinking and problem solving skills

UNIT I: VERBAL ABILITY
- Finding errors
- Vocabulary
- Synonyms
- Antonyms
- Idioms and Phrases
- Fill in the blanks and sentence Jumbles
- Reading comprehension

UNIT II : LOGICAL REASONING
- Logical Reasoning
- Assignments
- Puzzles
- Blood relations
- Syllogisms

UNIT III : CRITICAL AND NON VERBAL REASONING
- Critical Reasoning
- Nonverbal reasoning

- Figure series and completions

UNIT IV : QUANTITATIVE APTITUDE - PURE MATHS

- Pure maths
- Algebra
- Probability
- Permutations and combinations

UNIT V: DATA INTERPRETATION AND ANALYSIS

- Data Interpretation
- Line graph
- Pie chart
- Bar Graph
- Tabulations

DEPARTMENT OF INFORMATION TECHNOLOGY
FINISHING SCHOOL – IV : TECHNICAL SKILLS
FUNDAMENTAL PROGRAMMING SKILLS
(For all branches of Engineering)

Instruction: 2 Hrs /week	SEE Marks :35	Course Code :**MC610IT**
Credits : 1	CIE Marks: 15	Duration of SEE : 3 Hrs

UNIT – I

Fundamentals of Programming

Fundamentals of programming through C–structure of a C program–compilation and linking processes –Constants, Variables–Tokens–Data Types–Format Specifiers, Input and Output statements– operators-Expression evaluation in C – Type qualifiers – Type Modifiers– Typedef
Branching–if, if-else, else-if ladder, nest edif, switch and go to statements -Loops–while, do- while, for statements
Practice: problems on data formats, operator's precedence and associativity, basic Conditional programs and Pattern display programs.

Arrays, Strings, Pointers,

Arrays –Initialization–Declaration–One dimensional, Two dimensional and Multi-dimensional arrays. Strings–Operations on strings, string functions
Pointers–Introduction to Program Memory, storage of data, Run time memory allocation– Pointer Arithmetic-Pointer to an Array–pointer to linear data, run time array, pointer to 2D- array.
Practice: problems on RMO and CMO representations of an array, spiral display of a 2D array and matrix operations

Functions, Recursions and Storage Classes

Functions–Introduction to modular programming–Function Communication -Pass by value, Pass by reference–Function pointers– Recursions–Typecasting–Storage classes
Practice: programs on passing an array and catching by a pointer, function returning data, comparison between recursive and Iterative solutions

UNIT – II

Structures, Unions, Enumerations Pre-processor Directives

Need for user-defined datatype–structure definition–Structure declaration–Array within a Structure–ArrayofStructures–NestedStructures-Unions–DeclarationofUniondatatype, Struct Vs Union- Enum–Pre-processor directives
Practice: Structure padding, user-defined data storage and retrieval programs

File Storage and OOP

Pre-Processor Directives, Introduction to Standard Storage, Types of Files, opening and closing a file, I/O operations on a File, File handling functions.

Procedure vs. object oriented programming –Datatypes–control structures–Operator Overloading–Inheritance–Polymorphism and Virtual Functions, Function templates and class templates –Namespaces–Casting–Exception Handling, Stream classes–Formatted IO–File classes and File operations–Dynamic memory allocation–Standard Template Library

Practice: I/O through files, class and object, Implementation of OOP concepts

SYLLABUS OF B.E VI- SEMESTER
POWER SYSTEMS LABORATORY

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : **PC611EE**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

COURSE OBJECTIVE	COURSE OUTCOME
1. To allow students to practically verify several concepts and procedures learned in power systems and switchgear and protection 2. To promote teamwork among students and effective communication skills.	Student will be 1. able to calculate parameters related to electric transmission line, alternators and transformers 2. able to plot relay and insulator characteristics. 3.able to understand insulators and their properties

List of Experiments:

1. Determination of regulation and efficiency of an artificial transmission lines.
2. IDMT characteristics of Over-current relay & Study of Bucholz relay.
3. Determination of A, B, C, D constants of short, Medium and Long lines.
4. Differential protection of single phase transformer.
5. Sequence impedance of 3-phase Alternators.
6. Determination of positive, negative and zero-sequence reactance of three phase Transformers using sequence current excitation
7. Characteristics of Static relays.
8. Determination of dielectric strength of insulating oils and study of Megger.
9. Parallel operation of two 3- phase alternators.
10. Determination of voltage distribution and String efficiency of string of insulators.
11. Fault analysis of Alternator
12. Simulation of transmission line using software tool (ABCD constants, Efficiency and regulation of transmission line)
13. Simulation for determination of voltage distribution and String efficiency of string of insulators using software tool.

At least ten experiments should be completed in the semester.

SYLLABUS OF B.E VI- SEMESTER
POWER ELECTRONICS & SIMULATION LAB

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : **PC621EE**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
The objective of the lab is to provide an experience in working with power converters and enhance the analyzing capability by introducing simulation tools for power converters.	A successful graduate will be able to 1. Obtain the characteristics of power electronic devices. 2. Operate power electronic converters for any given application. 3. Apply the knowledge of power converters to operate electrical machines as drives. 4. Develop power electronic converter models using software.

List of experiments:

1. Characteristics of SCR, power BJT, MOSFET and IGBT
2. Gate trigging circuit for devices (SCR, BJT, MOSFET and IGBT) using R, R – C and UJT's and IC's
3. 1 – Ø AC voltage controller with R & R – L loads
4. 1 – Ø step down cyclo – converter with R & R – L loads
5. Study of forced commutation techniques
6. Two quadrant D.C drive
7. Buck – boost choppers
8. 1 – Ø bridge rectifiers: half and full control with R & R – L loads
9. Study of UPS & SMPS
10. V/f control of A.C drive
11. Simulation of 1-Ø full & semi converter
12. Simulation of 1-Ø & 3-Ø inverter
13. 1 – Ø inverter with R and R – L loads

SYLLABUS OF B.E VI- SEMESTER
MINI PROJECT

Instruction: 2 Hrs /week	SEE Marks :	Course Code : **PC639EE**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course objective:	**Course Outcomes:**
The mini project is by far the most important part in the degree program. It provides an opportunity for students to demonstrate independence and originality, to plan and organise a large project over a long period, and to put into practice some of the techniques students have been taught throughout the course. It enables the students to acquire confidence at having conceptualized, designed, and implemented a working, medium sized project with their team .	1. Apply the knowledge acquired in the electrical engineering. 2. Demonstrate the ability to locate and use technical information from multiple sources. 3. Demonstrate the ability to communicate effectively through a technical report. 4. Demonstrate independent learning and professional ethics. 5. Demonstrate the project management capabilities. .

List of Experiments:

1. Design and winding of a two winding transformer.
2. Design and winding of a 3-phase Induction Motor.
3. Design and winding of a single phase capacitor start induction motor.
4. Design of a voltage stabilizer.
5. Design of choke.
6. Disassembly, repairing, assembly and testing of electrical devices.
7. Design of a inverter
8. Design and winding of a 3 winding transformer
9. Design and winding of a stepper motor
10. Designing of relay coils for different PSM and TSM

Note:

- Students should choose any two from the above, execute and demonstrate.
- Students can also come out with innovative projects and after approval by the faculty; they should execute and demonstrate the project

OPEN ELECTIVES OFFERED BY VARIOUS DEPARTMENTS IN
B.E- VI SEMESTER (2018-19) Engineering Branches

Dept.	Title	Code	credits
Open Elective VI (Semester - VI)			
Civil	Intelligent Transportation System	OE610CE	1
CSE	Introduction to Operating Systems	OE610CS	1
ECE	Consumer Electronics	OE610EC	1
EEE	Solar Power and Applications	OE610EE	1
IT	Introduction to Web Technologies	OE610IT	1
Mech.	Basics of Mechatronics	OE600ME	1
Open Elective VII (Semester - VI)			
Civil	Integrated Solid Waste Management	OE620CE	2
CSE	Introduction to Databases	OE620CS	2
ECE	Electronics for Automotive Applications	OE620EC	2
EEE	Programming For Engineers	OE620EE	2
IT	Statistical Programming using R	OE620IT	2
Mech.	Optimization Methods for Engineers	OE610ME	2
	Advances in Entrepreneurship	OE620ME	2

With effect from the A.Y 2018-19

DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR B.E. VI SEMESTER
INTELLIGENT TRANSPORTATION SYSTEMS (OPEN ELECTIVE – VI)

Instruction:	1 hr/ Week	SEE marks:50	Course Code	:	OE610CE
Credits:	1	CIE marks:30	Duration of SEE	:	2 hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	*Upon the completion of this course the students will be expected to:*
1. Impart knowledge on advanced transportation concepts in the field of ITS. 2. Introduce the technologies of ITS in solving transportation problems	1. Explain the concepts of ITS data collection techniques and its architectural framework. 2. Characterize ITS functional areas for transportation planning. 3. Describe the range of technologies involved in the delivery of ITS systems 4. Investigate and analyse the current applications and trends in the context of ITS 5. Present practical examples of ITS

UNIT I:

Introduction to Intelligent Transportation Systems (ITS): Definition of ITS and Identification of ITS Objectives, Historical Background, Benefits of ITS - ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Geographic Information Systems (GIS), video data collection, ITS architecture framework.

UNIT II:

ITS functional areas – Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control Systems (AVCS), Advanced Public Transportation Systems (APTS), Advanced Rural Transportation Systems (ARTS)

Suggested Books:

1. ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul Chen, John Miles.
2. Sussman, J. M., Perspective on ITS, Artech House Publishers, 2005.

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DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS FOR BE VI-SEMESTER
INTEGRATED SOLID WASTE MANAGEMENT (Open Elective – VII)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code : OE620CE
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
The objectives of the course are to	*Upon the completion of the course, students are expected to*
1. Integrate technical solid waste management options and imposed environmental legislation for the guidance to the safe solutions.	1. Assess the implications of production, characteristic and environmental impact of Solid Waste Management based on its sources. 2. Assess the components of Biomedical and Radioactive wastes. 3. Narrate the management methods based on standards. 4. Outline the phases of generation to disposal of E-waste with the global strategic terms of Recycling

UNIT-I

Solid Waste and their Handling: Definition of solid wastes — types of solid wastes — Sources – Industrial, mining, agricultural and domestic — Characteristics. Solid waste Problems – impact on environmental health

UNIT-II

Biomedical Waste Management: Classification, collection, segregation Treatment and disposal.

UNIT-III

Radioactive waste: Definition, Low level and high level radioactive wastes and their management, Radiation standards.

UNIT-IV

E-Waste Management: Waste characteristics, generation, collection, transport and disposal, regulatory aspects of e waste, global strategy, recycling.

Learning Resources:

1. Hazardous waste management by Prof. Anjaneyulu.
2. Standard handbook of Hazardous waste treatment and disposal by Harry M. Freeman, McGraw Hill 1997.
3. Management of Solid waste in developing countries by Frank Flintoff, WHO regional publications 1976.
4. http://nptel.ac.in/courses/

With effect from the A.Y 2018-19

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR B.E VI SEMESTER
INTRODUCTION TO OPERATING SYSTEMS (Open Elective-VI)

Instruction: 1 Hr /week	SEE Marks :50	Course Code :OE610CS
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course objective	Course outcomes
At the end of the Course students should be able to:	At the end of the Course students will be able to:
• Understand different Operating system Structures, Services and threading models	1. Differentiate Operating system structures to show the evaluation of an operating system 2. Analyze the role of an Operating system in executing tasks on a system 3. Distinguish single threaded and multi threaded models of execution 4. Compare CPU scheduling algorithms to find effective algorithm for a given instance of process

UNIT-I

Introduction to operating systems: Definition, Mainframe, Multiprocessor, Clustered and Real time systems, Distributed, OS System structure, Unikernel, OS Services, Virtual machines, Containers, System calls.

UNIT-II

Process: Process concept, Process Scheduling, Inter-process communication, Threads, Multithreading Models.

CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiprocessor scheduling.

Suggested Books:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 9th Edition (2016), Wiley India.

Reference Books:

1. Andrew S. Tanenbaum, Modern Operating Systems, 2nd Edition (2001), Pearson Education, Asia.
2. Dhananjay, Dhamdhere.M, Operating System-concept based approach, 3rd edition (2009), Tata McGraw Hill, Asia
3. Robet Love, Linux Kernel Development, (2004)Pearson Education
4. Richard Stevens, Stephen Rago, Advanced Programming in the UNIX Environment, 3rd Edition (2013), Pearson Education

Online Resources:

https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating-system-engineering-fall-2012/

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SYLLABUS FOR BE VI SEMESTER
INTRODUCTION TO DATABASES (Open Elective-VII)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code : OE620CS
Credits : 2	CIE Marks: 30	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 different issues involved in the design and implementation of a database system. • Understand transaction processing.	1. Identify the functional components of database management system. Create conceptual data model using Entity Relationship Diagram 2. Transform a conceptual data model into a relational model 3. Design database using normalization techniques 4. Apply indexing and hashing techniques for effective data retrieval

UNIT-I

Introduction: Database System Application, Purpose of Database Systems, View of Data, Database Languages, Relational Database, Database Architecture, Database Users and Administrators.

Database Design and E-R Model: Overview of the Design Process, the E-R Model, Constraints, E-R Diagrams.

UNIT-II

Relational Model: Structure of Relation Database, Relational Algebra Operations, Modification of the Database.

Structured Query Language: Introduction, Basic Structure of SQL Queries, Set Operations, Aggregate Functions, Null Values, Nested Sub queries, Views, Join Expressions.

UNIT-III

Relational Database Design: Features of Good Relational Designs, Atomic Domains and first Normal form, Decomposition Using Functional Dependencies, Functional Dependency Theory.

UNIT-IV

Indexing and Hashing: Basic Concepts, Ordered Indices, B+ Tree Index Files, B-Tree Files, Multiple – Key Access, Static Hashing, Dynamic Hashing.

Transaction Management: Transaction concept, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation and Atomicity, Serializability, Recoverability.

Suggested books:

1. Abraham Silberschatz, Henry F Korth, Sudharshan S, Database System Concepts, 6th Edition(2011), McGraw-Hill International Edition.

Reference Books:

1. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System , 8th Edition(2006) Pearson Education.
2. Raghu Ramakrishna, and Johannes Gehrke, Database Management Systems, 3rd Edition(2003), McGraw Hill.
3. RamezElmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, 4th Edition(2006), Pearson Education.
4. Peter rob, Carlos coronel, Database Systems, (2007), Thomoson.

Online resources:

1. http://nptel.ac.in/courses/106106093/

With effect from the A.Y 2018-19

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
CONSUMER ELECTRONICS (Open Elective -VI)
(for other Departments)

Instruction: 1 Hrs /week	SEE Marks : 50	Course Code :**OE610EC**
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course Objective	Course Outcomes
1. Upon completion of the subject, the student shall know the basics of Electronics, operations of various Audio & Video Systems, Office & Home appliances and advance consumer electronic gadgets used in our day-to-day actives.	**At the end of the course, students will be able to:** 1. List technical specification of electronics Audio / Video systems. 2. Understand the working of microphones and speakers and their application in Audio systems. 3. Understand the basic functions of consumer electronic goods like cell phones, ATMs. 4. Troubleshoot consumer electronic products like TV, Washing machine and AC.

UNIT - I

Brief history and development of Electronics – Basic Electronic Components - DC & AC –Sources, Kirchoff's Laws, ADCs, Frequency spectra - Ranges (Audio, Video, RF UHF, VHF, Microwave), Audio System - working principles, components - Microphones and Speakers, Principles of Video Processing and Displays (LCD, LED displays), Analog and Digital Video standards.

UNIT - II

Telecommunication Systems: Basics of Telephone system, Caller ID Telephone, Intercoms, Cordless Telephones, Cellular mobile systems, Basics of satellite communication.

Office Electronics: Automatic Teller Machines, Facsimile machines, Digital Diaries, Safety and security systems.

Home Electronics: Digital Camera system, Microwave ovens, Washing Machines, Air Conditioners and Refrigerators, Troubleshooting.

Suggested Reading:

1. Mitchel Schultz 'Grob's Basic Electronics', Mc Graw Hill Publishers, 12/e, 2016.
2. A.M. Dhake 'Television and Video Engineering', McGraw Hill Education, 2/e, 2014.
3. B.R. Gupta and V. Singhal, "Consumer Electronics", S.K. Kataria& Sons, 2013.
4. R.R.Gulati. 'Monochrome and Color Television' New Age International Publisher, 2/e, 2010.
5. S.P. Bali, 'Consumer Electronics', Pearson Education, 2008.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
ELECTRONICS FOR AUTOMOTIVE APPLICATIONS
(Open Elective-VII)
(for other Departments)

Instruction: 2 Hrs /week	SEE Marks : 70	Course Code :**OE620EC**
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. The student shall know the basics of Electronics for Automotive Applications, operation of various electronics modules 2. The student shall know the various transducers and sensors used in automotive environment 3. The student shall acquire good knowledge about various electronic modules	**At the end of the course, students will be able to:** 1. Appreciate the operation of various electronic modules, their functionality 2. Understand various functions of modules like EBD, ABS, cruise control etc 3. Understand the Advanced Driver Monitoring Systems (ADMS) and safety sensors in automotive environment 4. Appreciate the advances in automotive electronic systems like driverless cars, collision avoidance systems etc.

UNIT – I

Introduction to sensors and transducers: displacement, position, proximity, acceleration, velocity, motion, rotation, force, fluid pressure, liquid flow, liquid level, temperature, light, smoke, and gas sensors. Selection of sensor.

UNIT – II

Data acquisition and Signal conditioning: various signal conditioning modules. Use of data acquisition. Fundamentals of Analog to digital conversion, sampling, amplifying, filtering, noise reduction. Criteria to choose suitable data acquisition equipment.

UNIT – III

Introduction to systems: Measurement and control. Basic system models. Mathematical models. Mechanical system building blocks, Electrical system building blocks, Fluid system building blocks and Thermal system building blocks. Engineering systems: Rotational – translational, Electromechanical, hydraulic-mechanical.

UNIT – IV

Engine management systems – Various sensors used in system – Electronic transmission control vehicle safety system – Electronic control of braking and traction.

Body electronics – Infotainment systems – Navigation systems – Application of Control elements and control methodology in automotive System.

Suggested Reading:

1. Tom Denton "Automobile Electrical and Electronic Systems" 5/e, Routledge, 2017.
2. De Silva, " Mechatronics", First Indian Reprint, (Taylor & Francis), Yesdee Publications, 2013.
3. William B. Ribbens, "Understanding Automotive Electronics: An Engineering Perspective" 7/e, Butterworth–Heinemann, 2012.
4. W. Bolton, "Mechatronics: Electronic control systems in mechanical and electrical Engineering", 3/e, Pearson Education, 2008.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SYLLABUS OF B.E VI- SEMESTER
SOLAR POWER AND APPLICATIONS (Open Elective – VI)

Instruction: 1 Hr /week	SEE Marks :50	Course Code :OE610EE
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course objective:	Course Outcomes:
To impart the basics of solar energy harnessing and solar panel and array.	A student will be able to 1. Identify and choose proper type of meter for solar radiation measurement. 2. Use proper solar PV system according to the load requirements. 3. Categorize and compare photovoltaic cells. 4. Apply the knowledge of solar energy.

Unit – I

Solar Energy Basics: Sun as a source of energy, the Earth, Radiation Spectrums, Extraterrestrial and Terrestrial Radiations, Depletion of solar Radiation, Pyranometer, Pyrheliometer, Sunshine Recorder, Solar Collectors, Solar Water Heater, Solar Cookers and Solar Thermo-Mechanical Systems.

Unit – II

Solar Photovoltaic Systems: Solar Cell fundamentals, Cell characteristics, Cell classification, Module, Panel and Array, Maximizing the Solar PV output and load matching, MPPT, Stand-Alone Solar PV system, Grid-Interactive Solar PV system, Water Pumping and lighting.

Suggested Reading:

1. B H Khan, Non-Conventional Energy Resources, 2nd Edition, Tata McGraw Hill.
2. G. D. Rai, Non-Conventional Energy Sources, 13th Reprint 2014, Khanna Publications.

Online Resource:

1. https://drive.google.com/file/d/
2. www.pdfdrive.net
3. www.edx.org

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SYLLABUS OF B.E VI- SEMESTER
PROGRAMMING FOR ENGINEERS (Open Elective – VII)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code : **OE620EE**
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objective:	Course Outcomes:
To provide fundamental knowledge of programming language for solving problems.	A student will be able to 1. Use arrays and matrices for numerical problems solving. 2. Represent data and solution in graphical display. 3. Create easily programmable graphical user interface. 4. Write scripts and functions to easily execute series of tasks in problem solving.

Unit – I

Working with matrices and arrays:

Generating matrices, load functions, M-files, Concatenation, deleting rows and columns, linear algebra, arrays, multivariate data, scalar expansion and logic scripting.

Unit – II

MATLAB Plotting:

Plotting process, graph components, figure tools, arranging graphs, select plot types, editing plots and basic plotting functions.

Unit – III

Graphics:

Printing Graphics, Handle Graphics and animations.

Creating GUI:

Layout of GUI and programming a GUI.

Unit – IV

Programming:

Flow control, other data structures, scripts and functions.

Suggested Reading :

1. Getting started with MATLAB (Version 7) The Math works.
2. Getting started with MATLAB "A quick introduction for scientist and engineers by RudraPratap, Oxford publications.

DEPARTMENT OF INFORMATION TECHNOLOGY
SYLLABUS OF B.E VI- SEMESTER
INTRODUCTION TO WEB TECHNOLOGIES(Open Elective-VI)

Instruction: 1 Hrs /week	SEE Marks :50	Course Code :OE610IT
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:**
Acquire basic skills for designing static and dynamic Web Applications using HTML, CSS and Javascript.	1. Develop and publish Web pages using Hypertext Markup Language . 2. Optimize page styles and layout with Cascading Style Sheets. 3. Make use of concepts in Java script for creating a dynamic web applications. 4. Implement event handlers to respond to various events.

UNIT-I:

Introduction: World Wide Web, Web Browsers, Web Servers, URL, HTTP. HTML: Standard HTML document structure, Basic Tags, Images, Hypertext Links, Lists, Tables, Frames. CSS: In-line style sheets, Internal Style sheets and External Style sheets.

UNIT-II

JavaScript: Introduction, Basics of java script-variables, data types and operators, Control Structures, Arrays, Functions, HTML Forms, Events and event handling.

Learning Resources:

1. "Web Technologies", 7th Edition, Uttam K.Roy,2012.
2. "Internet & World Wide Web How to Program", 5/e, Paul J. Deitel, Harvey M. Deitel, Abbey Deitel,2012.

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DEPARTMENT OF INFORMATION TECHNOLOGY
SYLLABUS OF B.E VI- SEMESTER
STATISTICAL PROGRAMMING USING R (Open Elective-VI)

Instruction: 2 Hrs /week	SEE Marks :70	Course Code :OE620IT
Credits : 2	CIE Marks: 30	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 course will enable the students to apply the R programming language in the analysis of Statistical data.	1. Write simple programs in R language to manipulate and visualize the data. 2. Write complex program using different constructs of R language to solve simple problems. 3. Use R programming language in the simulation of different types of random variables. 4. Write programs using R language in the analysis and computation of different matrix operations.

Unit I: Introduction to R Language

Basic features of R, Built-in functions, logical vectors and relational operators, Data input and output, programming statistical graphs- High-level plots, low level graphic functions.

Unit II: Programming with R

Flow control, Managing complexity through functions, Miscellaneous programming tips, Debugging and maintenance, Efficient programming.

Unit III: Simulation

Montecarlo simulation, Generation of pseudo random numbers, Simulation of other random variables-Bernouli, Binomial, Poisson, Exponential and Normal random variables.

Unit IV: Computational Linear Algebra

Vectors and matrices in R, Matrix multiplication and inversion, Eigen values and Eigen vectors

Suggested Reading:

1. A first Course in Statistical Programming with R, W. John Braun, Duncan J. Murdoch, Cambridge University Press, 2007.
2. https://cran.r-project.org/manuals.htm

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DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
BASICS OF MECHATRONICS (OPEN ELECTIVE -VI)

Instruction:1Hrs /week	SEE Marks : 50	Course Code : OE600ME
Credits : 1	CIE Marks: : 30	Duration of SEE : 2Hrs

Course objectives	Course Outcomes
The objectives of this course are to: 1. identify the need for mechatronics and its applications 2. study various fluid power systems 3. access various electronic components and devices and design mechatronic systems	On completion of the course, the student will be able to: 1. interpret the importance of mechatronics and elements involved 2. design various fluid power systems for mechatronics applications. 3. Study various industrial electronic devices and integrated circuits. 4. analyze various measurement systems and and to study micro controller based CNC machines.

UNIT – I

Introduction to mechanization & automation.

Concept of Mechatronics: Flow chart of mechatronics systems, Actuators and control system, Application in industries.

Introduction to drive mechanisms and electrical actuators: servo motors and stepper motors.

Introduction to fluid power systems: Industrial pneumatics and hydraulics, Merits of fluid power systems, Pneumatic and hydraulic elements and their symbols, Study of hydraulic control values, pumps & accessories, Hydraulic circuits and electro – hydraulic circuits.

UNIT – II

Introduction to industrial electronic devices: Diodes, Transistors, Silicon controlled Rectifiers (SCR), Integrated Circuits (IC)

Measurement systems: sensors, digital-to-analog and analog–to–digital conversion.

Introduction to microprocessor & micro controller: Applications of mechatronics in the design of modern CNC machines.

Learning Resources:

1. W. Bolton, "Mechatronics", 3rd Ed., Pearson Education, India, 2007
2. HMT Limited, "Mechatronics, Tata Mc.Graw– Hill Publishing Company Limited; New Delhi, 1998.
3. Michael B Histand& David G. Alciatore, "Introduction to Mechatronics and Measurement systems", 4th Ed., Tata McGraw-Hill International edition, 2012

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
OPTIMIZATION METHODS FOR ENGINEERS (OPEN ELECTIVE -VII)

Instruction : 2 Hours /week	SEE Marks : 70	Course Code : OE610ME
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objective of this course is to: understand Linear & non-linear programming, transportation modeling , CPM & PERT for project scheduling and control.	On completion of the course, the student will be able to: 1. explain simplex, dual simplex, revised simplex and sensitivity analysis for shop floor problems. 2. Solve transportation model problems and their optimization using Modi method. 3. apply unconstrained and constrained methods like Univariate, steepest descent, Newton etc. for Non linear programming. 4. apply the techniques like CPM and PERT for project management.

Unit-I
Optimization-An overview
Meaning of Optimization-Origin of Optimization-Introduction to Linear programming problems (LPP) -Formulation of LPP- Graphical method, simplex method

Unit-II
Advanced topics in Linear programming
Duality in LPP, Differences between primal and dual, Dual simplex method, Revised simplex method, sensitivity analysis

Unit-III
Transportation Model
Definition of the transportation model-matrix of Transportation model-Formulation and solution of transportation models- Methods for calculating Initial basic feasible solution-Optimization of transportation model using MODI method.

Unit-IV

Non linear programming problems

Optimization methods for single variable, multivariable functions, Maxima-Minima; Non linear programming unconstrained optimization: Random search, Univariate model;Non linear programming constrained optimization: Steepest descent, Conjugate Gradient, Newton.

Project Scheduling

Introduction to network analysis, Rules to draw network diagram, Fulkerson rule for numbering events, Critical path method, PERT.

Learning Resources:

1. ErPrem Kumar Gupta and Dr. DS Hira, "Operations Research ", S.Chand& Company Pvt. Ltd., 2014.
2. NVS Raju, "Optimization methods for Engineers ", PHI Learning Pvt. Ltd. ., 2014
3. SingiresuS.Rao, "Engineering optimization- Theory and Practice", 4th Edition, John Wiley and Sons, 2009.
4. R. Paneerselvam, "Operations Research", PHI Learning Pvt Ltd., 2009.

DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E. VI-SEMESTER
ADVANCES IN ENTREPRENEURSHIP (OPEN ELECTIVE -VII)

Instruction : 2 Hrs/week	SEE Marks : 70	Course Code : OE620ME
Credits : 2	CIE Marks: 30	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of the course is to 1. understand how to expand business and increase revenues. 2. understand various aspects of finance. 3. understand legalities of running a business.	After completion of the course, the student will be able to 1. understand growth strategies of a start-up & to identify ways and means of expanding customer base. 2. understand customer retention strategies. 3. develop ways and means of growing revenues and develop financial modelling. 4. understand legal formalities and IPR.

UNIT-I

Orientation to Growth: Stages of a Start-up Company, Infant Mortality of Start-up's, Sustaining the Phase of Launching, Growth Opportunities, Diversification and Expansion of Business, Growth Assessment, SWOT Analysis, Growth strategies adopted by Ideal Start-up, Ansoff Growth Matrix, Six ways of Adjacencies for Growth. Case Study of Nike.

Expanding Customer Base: Customer Segmentation: Division of market into segments, Evaluating the Profitability of Segments. Developing Business Model in relation to the current customers. Changing customer segments and revisit of Business Models. Evaluation of Business Models for new customer segments. Critical evaluation of Business Models Old Vs New. Risk of changing the Business Models. Analyzing the scalability of business model using Break Even Analysis.

UNIT-II

Traction and Business: Meaning of Business Traction Process, and Metrics to Measure Business Traction, Customer Retention, Customer Churning, Relationship Business, Customer Life Time Value. Identifying the unnecessary moves in business traction. Traction of business model using Bull's-eye

framework. Measuring the effectiveness of selected channels. Budgeting and Planning.

UNIT-III

Growing Revenues: Identifying Growing Revenues, Stabilising growing revenues, Developing additional revenues (licensing and franchising). Exploring New channels and Partnerships for growth revenues. Evaluating the Growth streams based on longevity. Lean Start-up Canvas.

Sales Planning & Financial Modelling: Understanding the customer buying decision behaviour, setting sales plans, sales targets, Art of Pitching the sales, Selling Process, Building a professional sales team, Sales management. Price Sensitivity of Market. Optimisation of cost and operational expenses. Financial modelling of the Venture, Assessment of competitors and Peer's financial models.

UNIT-IV

Support System: Legal Management in Start-ups: Issues and Legal constraints effecting the business. Need for professional services: Legal consultancy and Accounting. Need for proper documentation for fool-proof administration of business. Intellectual Property rights and their importance. Business Mentoring, role of experts in managing business.

Learning Resources:

1. Entrepreneurship Rajeev Roy "oxford,2012
2. Fundamentals of Entrepreneurship Nandan H,PHI,2013
3. Robert D Hisrich, Michael P Peters , Dean A Shepherd, Entrepreneurship , Sixth Edition, New Delhi, 2006.
4. S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi,2001