With effect from the academic year 2018 - 2019

VASAVI COLLEGE OF ENGINEERING(AUTONOMOUS)
Ibrahimbagh, Hyderabad-31
Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

Sponsored by
VASAVI ACADEMY OF EDUCATION
Hyderabad

SCHEME OF INSTRUCTION AND SYLLABI UNDER CBCS FOR B.E. V and VI Semesters for ECE With effect from 2018-2019 (For the batch admitted in 2016-17)

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

S. NO.	Course Code	Course	Scheme of Instruction				Scheme of Examination			Credits
			Hrs / week				Duration in Hrs	Maximum Marks		
			L	T	D	P		SEE	CIE	
THEORY										
1	PC510EC	Integrated Circuits & Applications	3	1	-	-	3	70	30	3
2	PC520EC	Automatic Control Systems	3	1	-	-	3	70	30	3
3	PC530EC	Digital Signal Processing	3	1	-	-	3	70	30	3
4	PC540EC	Computer Organization and Architecture	3	1	-	-	3	70	30	3
5	PC550EC	Analog Communication	3	-	-	-	3	70	30	3
6	HS510EH	FS - III: Soft skills	1	1	-	-	1.5	35	15	1
7	MC510EC	FS - III: Technical Skills	1	1	-	-	1.5	35	15	1
8	OE5XXX	Open Elective – IV	1	-	-	-	2	50	30	1
9	OE5XXX	Open Elective – V	2	-	-	-	3	70	30	2
PRACTICALS										
10	PC561EC	Integrated Circuits Lab	-	-	-	2	3	50	25	1
11	PC571EC	Sensors & Systems Lab	-	-	-	2	3	50	25	1
12	PC581EC	Digital Signal Processing Lab	-	-	-	2	3	50	25	1
		Total	**20**	**6**	**-**	**6**		**690**	**315**	**23**
		Grand Total	**32**					**1005**		

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- V SEMESTER
INTEGRATED CIRCUITS AND APPLICATIONS

Instruction: 3+1 Hrs /week	SEE Marks :70	Course Code : **PC510EC**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. Students will acquire the knowledge of linear IC applications and design various circuits using IC's for any given specifications. 2. Student shall describe specifications of a digital IC for various logic families and design combinational and sequential circuits with digital ICs.	**At the end of the course, students will be able to:** 1. Illustrate the internal circuit, parameters and features of op-amp. 2. Design of linear and non-linear circuits using op-amp. 3. Design and analyze various applications using ICs, such as 741, 555, 723 etc,. 4. Define specifications of digital IC and select appropriate IC based on specifications. 5. Design and analyze applications using different combinational and Sequential circuits (IC's) 6. Expand the memory size using semiconductors memory.

UNIT – I

Integrated Circuits and Op-Amp Applications : Chip Size and Circuit Complexity, Ideal and Practical Op-Amp, Op-Amp Characteristics - DC, AC-Slew Rate and Frequency Response, 741 Op-Amp, Modes of Operation: Inverting, Non- Inverting, Differential, Op-Amp Applications: Basic Applications of Op-Amp, Instrumentation Amplifier, AC Amplifier, V to I and I to V Converters, Sample & Hold Circuits, Differentiators and Integrators, Comparators, Schmitt Trigger, Multivibrators, 723 Voltage Regulator.

UNIT – II

Active Filters, Oscillators, Timers & Phase Locked Loops First Order and Second Order Low Pass, High Pass and Band Pass Filters, Band Reject and All Pass Filters. Analysis and Design of Function Generators using IC 8038. 555 Timer: Functional Diagram, Monostable, Astable Operations and Applications, Schmitt Trigger, VCO, Functional Diagram of 566, Phase Locked Loop (PLL): Block Schematic, Principles and Description of Individual Blocks of 565.

UNIT – III

D-A and A-D Converters Introduction, Basic DAC Techniques – Weighted Resistor Type, R-2R Ladder Type, Inverted R- 2R Type, Different types of ADCs – Parallel Comparator Type, Counter Type, Successive Approximation Register Type and Dual Slope Type, DAC and ADC Specifications.

UNIT – IV

Digital Integrated Circuits Classification of Digital Integrated Circuits, Standard TTL NAND Gate-Analysis & Characteristics, TTL Open Collectors Outputs, Tristate TTL, MOS & CMOS Open Drain and Tristate Outputs, Concept of negative logic, ECL logic family. Comparison of various Logic Families, IC Interfacing - TTL Driving CMOS & CMOS Driving TTL. TTL-74XX Series & CMOS 40XX Series ICs, Arithmetic Circuit ICs-Parallel Binary Adder/Subtractor using 2's Complement System, Magnitude Comparator Circuits.

UNIT – V

Sequential Circuits 74XX and CMOS 40XX Series ICs, Design of Synchronous and Asynchronous Counters and Mod-N counters, Shift Registers & Applications.

Semiconductors memories: ROM, PROM, EPROM, EEPROM, RAM, Types, Architectures, operation and applications, NVRAM, Flash memory, Introduction to PLD's.

Suggested Reading:

1. Op-amps and Linear Integrated Circuits, Ramakant A. Gayakwad, Prentice Hall, 2003.
2. Linear Integrated Circuits, D. Roy Chowdhury, 3rd Edition, New Age International(P) Ltd., 2008
3. Ronald J. Tocci, Neal S.Widmer & Gregory L.Moss, "*Digital Systems: Principles and Applications,*"PHI,10/e, 2009.
4. Sonde, B. S., "Introduction to system Design using IC's," Wiley, 2/e, 1994.
5. Digital Fundamentals, Floyd and Jain, 8th Edition, Pearson Education, 2005.
6. Modern Digital Electronics, RP. Jain, 4th Edition, Tata McGraw-Hill, 2010.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- V SEMESTER
AUTOMATIC CONTROL SYSTEMS

Instruction: 3+1 Hrs /week	SEE Marks : 70	Course Code : **PC520EC**
Credits : 3	CIE Marks : 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. Apply principles of control theory to model physical system. 2. Analyze the performance of a given system in time and frequency domains and choose appropriate compensator if needed.	**At the end of the course, students will be able to:** 1. Derive dynamic equations for electro mechanical systems and obtain transfer function using block diagram reduction technique, Mason's gain formula from given system model. 2. Analyze the stability of the system in time domain and determine its performance characteristics. 3. Apply Bode plot, Nyquist criteria techniques to determine the performance of the system in frequency domain. 4. Determine the transfer function and stability for digital control system. 5. Analyze the system in the presence of initial conditions and apply Kalman's test for controllability and observability.

UNIT – I

Control System fundamentals and Components: Classification of control systems, Open and Closed loop systems, Error sensing devices – potentiometers and synchro's. AC and DC servo motors. Mathematical modeling of mechanical systems and their conversion into electrical systems. Block diagram reduction and Signal flow graphs.

UNIT – II

Time response: Transfer function and Impulse response, types of input. Transient response of second order system for step input. Time domain specifications. Types of systems, static error coefficients, error series, Routh - Hurwitz criterion for stability.

Root locus techniques: Analysis of typical systems using root locus techniques. Effect of location of roots on system response.

UNIT – III

Frequency response plots: Bode plots, frequency domain specifications. Gain margin and Phase Margin. Principle of argument, Polar plot, Nyquist plot and Nyquist criterion for stability. Compensation: Cascade and feedback compensation using Bode plots. Phase lag, lead, lag-lead compensators. PID controller.

UNIT – IV

Discrete Control Analysis: Digital control, advantages and disadvantages, and digital control system architecture. The discrete transfer function. Sampled data system. Transfer function of sample data systems. Stability of Discrete data systems.

UNIT – V

State Space Representation: Concept of state and state variables. State models of linear time invariant systems, State transition matrix, Solution of state equations. Design of digital control systems using state-space concepts. Controllability and observability.

Suggested Reading:

1. Nagrath, I.J., and Gopal, M., "*Control System Engineering*," New Age Publishers, 5/e, 2009.
2. Ogata, K., "*Modern Control Engineering*," 5/e, PHI, 2010.
3. Benjamin C. Kuo, "*Automatic Control Systems*," 7/e, PHI, 2010.
4. Richard C. Dorf & Robart H. Bishop, "*Modern Control Systems*," 11/e, Pearson, 2008.
5. Gopal, Madan, "*Digital Control Engineering*," 1/e, New Age Publishers, 2008.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- V SEMESTER
DIGITAL SIGNAL PROCESSING

Instruction: 3+1 Hrs /week	SEE Marks :70	Course Code : **PC530EC**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. Students will apply FFT algorithms, discuss various design methods of FIR & IIR filters, describe the concepts of multirate signal processing and identify important features of TMS 320C 54XX DSP processors.	**At the end of the course, students will be able to:** 1. Apply the knowledge FFT Algorithms for computation of DFT. 2. Design FIR & IIR filters using various methods. 3. Analyze the effects of finite word length in digital filters. 4. Apply decimation and interpolation concepts for the design of sampling rate converters. 5. Study TMS320C54XX DSP processors for the design of digital filters.

UNIT – I

Fast Fourier Transform : Overview of Discrete time Fourier Transform (DTFT), Discrete Fourier transform (DFT), – Efficient computation of DFT- Properties of DFT .

FFT algorithms –Radix-2 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms - in place computation- bit reversal- Use of FFT algorithms in Linear Filtering and Correlation.

UNIT – II

Digital filters (FIR) Design: Amplitude and phase responses of FIR filters – Linear phase filters – Windowing techniques for design of Linear phase FIR filters – Rectangular, Bartlet, Hamming, Blackman, Kaiser – realization and finite word length effects.

UNIT – III

Digital filters (IIR) Design: Butterworth and Chebychev approximation- IIR digital filter design techniques- Impulse Invariant transformation - Bilinear transform techniques- Digital Butterworth- Chebychev filters,-comparisons between FIR and IIR filters. Digital filters structures.

UNIT – IV

Multirate Digital Signal Processing : Introduction -Decimation by a Factor D- Interpolation by a Factor I- Sampling Rate Conversion by a Rational Factor I/D- Implementation of Sampling Rate Conversion- Multistage implementation of Sampling Rate Conversion- Sampling Rate Conversion by an Arbitrary factor- Application of Multirate Signal Processing.

UNIT – V

Introduction to DSP Processors: Difference between DSP and other microprocessors architectures- their comparison and need for ASP, RISC and CPU- General purpose DSP processors- TMS 320C 54XX processors, architecture, addressing modes-instruction set.

Suggested Reading:

1. Alan V. Oppenheim & Ronald W. Schafer, "*Digital Signal Processing*," PHI, 2/e, 2010.
2. John G. Proakis & Dimtris G. Manolakis, "*Digital Signal Processing Principles, Algorithms and Application*,"
3. PHI, 3/e, 2000.
4. Ashok Ambardar, "*Digital Signal Processing: A Modern Introduction*," Cengage Learning, 2009.
5. Li Tan, "*Digital Signal Processing: Fundamentals and Applications*," Elsevier, 2012.
6. B.Venkataramani & M. Bhaskar, "*Digital Signal Processor Architecture, Programming and Application*," TMH,2002.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- V SEMESTER
COMPUTER ORGANIZATION AND ARCHITECTURE

Instruction: 3+1 Hrs /week	SEE Marks :70	Course Code : **PC540EC**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. To familiarize the students with the concept of organization of basic CPU and control unit towards microprocessor level. 2. To familiarize students with Architecture, programming and interfacing 8086 microprocessor with external environment.	**At the end of the course, students will be able to:** 1. Apply digital engineering fundamentals to acquire knowledge of arithmetic algorithms for fixed and floating-point CPUs. 2. Implementing the techniques of pipelining and parallelism in stored program structures to analyze the performance of a Processor. 3. Interpret various techniques for efficient memory & I/O utilization to develop a system application. 4. Define a microprocessor and analyze the basic features of 8086µp by applying computer organization fundamentals. 5. Interfacing and programming required peripherals to develop a system around 8086µp.

UNIT – I

Data representation and Computer arithmetic: Introduction to Computer Systems, Organization and architecture, evolution and computer generations; Fixed point representation of numbers, digital arithmetic algorithms for Addition, Subtraction, Multiplication using Booth's algorithm and Division using restoring and non restoring algorithms. Floating point representation with IEEE standards and its arithmetic operations.

UNIT – II

Central Processing Unit: Basic concepts of CU & ALU, General register organization, Instruction formats, Features of CISC and RISC, Instruction Pipeline, Stored program organization, Hardwired control unit, Micro programmed Control organization, address sequencing, micro instruction format and micro program sequencer.

UNIT – III

Memory organization: Memory hierarchy, Primary memory, Secondary memory, Associative memory, Cache memory: mapping functions, Virtual memory, address mapping using pages, Memory management hardware. I/O organization: Program controlled I/O, Interrupt driven I/O, DMA.

UNIT – IV

8086 Architecture: Memory segmentation, Physical address calculation, Deriving of system bus, stack organization, addressing modes, Interrupt vector table, Interrupt handling, Minimum and Maximum mode operation of 8086. Brief overview of features of x86 series microprocessors.(x=1,2,3,4, Pentium).

8086 Assembly Language programming: Instruction set, Assembler directives, Programs using data transfer, Arithmetic, logical, Branching and String processing.

UNIT – V

8086 Interfacing: Memory interfacing using RAM, EPROM IC Chips, 8255 PPI, 8253/8254 programmable interval timers, need for DMA and interfacing with DMA controller (8257 IC), programmable communication interface (8251).

Suggested Reading:

1. Morris Mano, M., "*Computer System Architecture*," 3/e, Pearson Education, 2005.
2. Hamacher, Vranesic, Zaky, "*Computer Organization*," 5/e, McGraw Hill, 2007.
3. Ray A.K & Bhurchandhi K.M, "*Advanced Microprocessor and Peripherals,*" 2/e, TMH, 2007.
4. Douglas V Hall, "*Microprocessors and Interfacing Programming and Hardware*," 2/e, THM, 2007.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- V SEMESTER

ANALOG COMMUNICATION

Instruction: 3 Hrs /week	SEE Marks :70	Course Code : **PC550EC**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. To understand the basic concepts of Analog continuous and Pulse modulation schemes. 2. To design and analyse AM and FM transmitters and receivers. 3. To understand the importance of noise, its effect and also to estimate the figure of merit of various communication systems.	**At the end of the course, students will be able to:** 1. Analyze and apply the knowledge of signals to analog modulation and demodulation schemes. 2. Formulate different analog modulation schemes in terms of modulation index, bandwidth, transmitted power. 3. Analyse the performance characteristics of analog communication receiver 4. Estimate noise figure based on the knowledge of different types of receivers. 5. Acquire knowledge about pulse modulation schemes.

UNIT – I

Linear Modulation schemes: Need for modulation, double side band suppressed carrier (DSB-SC) modulation, conventional Amplitude Modulation (AM). Hilbert transform, properties of Hilbert transform. Pre-envelop. Complex envelop representation of band pass signals, In-phase and Quadrature component representation of band pass signals. Low pass representation of band pass systems. Single side band (SSB) modulation and Vestigial-side band (VSB) modulation. Modulation and demodulation schemes

UNIT – II

Angle modulation schemes: Frequency Modulation (FM) and Phase modulation (PM), Concept of instantaneous phase and frequency. Types of FM modulation: Narrow band FM and wide band FM. FM spectrum in terms of Bessel functions. Direct and indirect (Armstrong's) methods of FM generation. Balanced discriminator, Foster–Seeley discriminator and Ratio detector for FM demodulation. Pre-Emphasis and De-Emphasis. Capture effect.

UNIT – III

Transmitters and Receivers: Classification of transmitters. High level and low level AM transmitters. FM transmitters. Principle of operation of Tuned radio frequency (TRF) and super heterodyne receivers. Selection of RF amplifier. Choice of Intermediate frequency. Image frequency and its rejection ratio, Receiver characteristics: Double spotting, Tracking and alignment, Automatic Gain Control.

UNIT – IV

Noise Sources and types. Atmospheric noise, Shot noise and thermal noise. Noise temperature. Noise in two-port network: noise figure, equivalent noise temperature and noise bandwidth. Noise figure and equivalent noise temperature of cascade stages. Narrow band noise representation. S/N ratio and Figure of merit calculations in AM, DSB-SC, SSB and FM systems.

UNIT – V

Analog pulse modulation schemes: Sampling of continuous time signals. Sampling of low pass and band pass signals. Types of sampling. Pulse Amplitude Modulation (PAM) generation and demodulation. Pulse time modulation schemes: PWM and PPM generation and detection.

Suggested Reading:

1. Simon Haykin, "*Communication Systems*," 4/e, Wiley India, 2011.
2. Herbert Taub, Donald L. Shilling & Goutam Saha, "*Principles of Communication Systems*," 3/e, TMH, 2008.
3. P. Ramakrishna Rao, "*Analog Communication*," 1/e, TMH, 2011.
4. A. Bruce Carlson and Paul B. Crilly, "*Communication Systems*," 5/e, 2011.
5. Singh, R.P. and Sapre, S.D., "*Communication Systems*," TMH, 2007.

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

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- V SEMESTER

FINISHING SCHOOL – III : TECHNICAL SKILLS

BASICS OF JAVA

Instruction: 1+1 Hrs /week	SEE Marks :35	Course Code : **MC510EC**
Credits : 1	CIE Marks: 15	Duration of SEE : 1.5 Hrs

Course Objectives	Course Outcomes
1. students will be able to develop Java programs that leverage the object-oriented features of the Java language, use data types, arrays and other data collections. 2. Implement error-handling techniques using exception handling 3. Develop technical skills necessary for complete understanding of front-end web development.	**At the end of the course, students will be able to:** 1. Analyze the semantics of HTML, Java script. 2. Interpret the different parts of a web page. 3. Interpret the Java SDK environment to create, debug and run simple Java programs. 4. Apply fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. 5. Demonstrate understanding of applets, events and keywords.

UNIT – I

HTML for Java Programmers: Introduction to Internet. HTML, HTML format, HTML tags, the applet tag, HTML Document Creation. Introduction to scripting languages VBScript and Java Script.

UNIT – II

Overview of Java, Features of Java, Java tools, Java applications, The Java language: Java keywords, Primitive types, Literals, Arrays, Operators, and Control Operations: Selection, Iteration, Jumping.

UNIT – III

Java Classes class inheritance

Exception handling, working with Threads: Thread basics, Thread classes, Creating Threads, scheduling and Thread Priorities, Daemons, Grouping threads, Thread states, Synchronization, Packages.

UNIT – IV

Java Applets, Programming the user interface: Introduction and Basic Concepts, Abstract Window Toolkit (AWT), Drawing, Interactive Interface Elements, Organizing Interface with Layouts, Images, Windows, Frames, Dialog Box, and File Dialog Box

UNIT – V

Applet method of interest, Extending the AWT, Extending Components, Event Handling: AWT Event handling, the Event class, java input events:

Suggested Reading:

1. Thomas. A. Powell, *HTML- The Complete Reference*, TMH, 2002.
2. Herbert Schildt, *JAVA – The Complete Reference*, TMH, 2014 9th edition.
3. Comer, *Internet Book – everything you need to know about computer networking & How Internet Works*, 4th PHI, 2015.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- V SEMESTER

INTEGRATED CIRCUITS LAB

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : **PC561EC**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course Objective	Course Outcomes
1. Students will design and verify circuits using ICs for the given specifications.	**At the end of the course, students will be able to:** 1. Design and implement the applications of Op-Amps. 2. Design and verify the characteristics of 555 timer and 723voltage regulator IC's. 3. Design and verify various combinational circuits such as adders, code-converters etc. 4. Design and verify various sequential circuits such as adders, code-converters etc.

Lab Experiments:

PART – A

1. Measurement of parameters of Op-Amp. Voltage Follower, Inverting and Non Inverting Amplifiers, Level Translators using Op-Amp.
2. Arithmetic Circuits: Summer, Integrator Differentiator using Op-Amp.
3. Active filters: LP, HP and BP using Op-Amp.
4. Op-Amp Oscillators: RC phase shift oscillator, Wein bridge oscillator.
5. Triangle and Square wave Generators. Schmitt Trigger using Op-Amp.
6. Voltage Controlled Oscillator Using LM 566.
7. IC Regulators and current boosting.
8. Applications of 555 Timer.
9. PLL characteristics

PART – B

1. Measurement of propagation delay, fan-out, Noise margin and transfer Characteristics of TTL and CMOS IC gates and open collector / drain gates.
2. Designing code converters using logic gates and standard code converters. Parity generator and checker circuit.
3. Flip-Flop conversions and latches using gates and ICs.

4. Designing Synchronous, Asynchronous up/down counters
5. Shift registers and ring counters using IC Flip-Flops & Standards IC counters.
6. Full adders, subtractors using logic gates and multiple bits IC Adder/Subtractor and arithmetic Circuits.
7. Mux-Demux applications.
8. Interfacing counters with 7-segment LED/LCD display units.
9. Mealy and Moore type sequence detector

General Note:

1. At least 5 experiments from each part.
2. A total of not less than 10 experiments must be carried out during the semester.
3. Analysis and design of circuits, wherever possible, should be carried out using SPICE tools.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- V SEMESTER

SENSORS & SYSTEMS LAB

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : **PC571EC**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes:
1. To design and analyze control systems using control system tool/box / simulink / MATLAB 2. To inculcate multi-disciplinary strategies to develop, optimize and capitalize on technologies that enable new and improved processes.	**At the end of the course, students will be able to:** 1. To perform time domain and frequency domain analysis of a given control systems. 2. To design a suitable compensator to meet the required specification. 3. To conduct stability analysis of a given sample data control systems. 4. To analyze and understand various sensors based on the classification and working principle. 5. To identify the problem and use the appropriate sensors for multidisciplinary applications.

List of the Experiments:

1. To study distortion factor meter and determination of the % distortion of the given oscillator.
2. To determine output characteristics of LVDT and Measure displacement using LVDT.
3. To study characteristics of temperature transducer like thermocouple, thermistor and RTD with implementation of a small project using signal conditioning circuits like instrumentation amplifier.
4. Measurement of strain using strain gauge.
5. To study characteristics of load cell.
6. To study differential pressure transducer & signal conditioning of output signal.
7. Measurement of level using capacitive transducer.
8. Study of distance measurement using ultrasonic transducer.
9. To study characteristics of fiber optic transducer for temperature or pressure measurements.
10. (i) Simulation of 2^{nd} and higher order systems for step and impulse signals and evaluate time domain specifications.
    (ii) Evaluation of effect of additional poles and Zeros on time response of 2^{nd} order systems.

11. (i) To determine the range of D.C gain of –Ve feedback amplifier for a loop transfer using root locus technique.
    (ii) to the study effect of O.L poles and zeros on root locus.
12. To determine gain margin and phase margin of a system using bode plot and Nyquist plot. Comment on system stability.
13. (i) To study the effect of P, PI & PID controller on loop transfer function.
    (ii) Design a suitable comparator to meet derived specifications of a system (validate the design)
14. Determine controllability and observability from a given state model.
15. Determine the stability of a sample data system.
16. Introduction to Virtual Instrumentation

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- V SEMESTER
DIGITAL SIGNAL PROCESSING LAB

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : **PC581EC**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course Objective	Course Outcomes
1. Students will design and develop digital systems using MATLAB and Code Composer Studio Environment.	**At the end of the course, students will be able to:** 1. Develop MATLAB files for the verification of system response. 2. Design digital filters using various methods. 3. Implement a Multirate Signal Processing System. 4. Design and implement digital filter Code Composer Studio and Digital Signal Processing Kits.

(A) Experiments on DSK and CCS

1. Solutions of difference equations
2. Impulse Response
3. Linear Convolution.
4. Circular Convolution
5. Study of procedure to work in real- time.
6. Fast Fourier Transform Algorithms: (DIT, DIF)
7. Design of FIR (LP/HP) using windows, (a)Rectangular, (b)Triangular (c) Hamming window
8. Design of IIR (HP/LP) filters.

(B) Experiments on signal processing.

1. DFT and FFT algorithm
2. Linear Convolutions
3. Circular Convolutions
4. FIR filter design using different data windows
5. IIR filter design: Butter worth, chebysheve type 1 and 2 and Bilinear transformation Methods.
6. Interpolation and Decimation.

Note:

1. Minimum of **5** from Part A and **5** from Part B is mandatory.
2. For section 'B', MATLAB with different toolboxes like Signal Processing, Signal Processing block set, and SIMULINK/ MATHEMATICA/ any popular software can be used.

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

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 Reddy M., Remote Sensing and Geographic Information System, 2012
2. John A. Richards, Remote sensing Digital Image Analysis, 2012

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 Mc GrawHill.
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/

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: 2Hrs /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** : 3Hours

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, TMHl, 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. AmithabaGhose, "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. classifythe 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 (Open Elective-V)

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

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

S. No	Course Code	Course	Scheme of Instruction				Scheme of Examination			Credits
			Hrs / week				Duration in Hrs.	Maximum Marks		
			L	T	D	P		SEE	CIE	
THEORY										
1	PC610EC	Digital Communication	3	1	-	-	3	70	30	3
2	PC620EC	Transmission Lines and Antennas	3	1	-	-	3	70	30	3
3	PC630EC	Microcontrollers and Applications	3	1	-	-	3	70	30	3
4	PC640EC	Computer Networks	3	-	-	-	3	70	30	3
5	HS500EH	Economics and Finance for Engineers	2	1	-	-	3	70	30	2
6	MC500EH	Human Values & Professional Ethics - II	1	-	-	-	2	50	30	1
7	HS610EH	FS - IV : Soft Skills	1	1	-	-	1.5	35	15	1
8	MC6XXEC	FS - IV : Technical Skills	1	1	-	-	1.5	35	15	1
9	OE6XXXX	Open Elective – VI	1	-	-	-	2	50	30	1
10	OE6XXXX	Open Elective – VII	2	-	-	-	3	70	30	2
PRACTICALS										
11	PC651EC	Analog & Digital Communication Lab	-	-	-	2	3	50	25	1
12	PC661EC	Microcontrollers Lab	-	-	-	2	3	50	25	1
13	PC671EC	Computer Networks Lab	-	-	-	2	3	50	25	1
		Total	**20**	**6**	**-**	**6**		**740**	**345**	**23**
		Grand Total	**32**					**1085**		

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- VI SEMESTER
DIGITAL COMMUNICATION

Instruction: 3+1 Hrs /week	SEE Marks :70	Course Code : **PC610EC**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. To understand the building blocks of digital communication system. 2. To analyze error performance of a digital communication system in the presence of noise. 3. To study various source coding and channel coding techniques. 4. To understand the concept of spread spectrum communication system	**At the end of the course, students will be able to:** 1. Compare digital modulation techniques and their performance. 2. Understand different analog to digital conversion in different applications 3. Assess entropy and efficiency of source coding techniques. 4. Design block codes, convolution & cyclic codes. 5. Analyze spread spectrum modulation techniques their acquisition and tracking circuits.

UNIT – I

Elements of Digital Communication System, Comparison of Digital and Analog Communication Systems. Analog to Digital Conversion, Quantization and Encoding techniques, PCM. Companding in PCM systems: μ-law and A-law. Applications of PCM: PCM-TDM. Introduction to Linear Prediction Theory. Modulation and demodulation of DPCM and DM. Quantization noise and Slope overload error in DM. Modulation and demodulation of ADM. Comparison of PCM, DPCM, DM and ADM. SNR of PCM and DM. Vocoders.

UNIT – II

Uncertainty, Information and entropy. Source coding, Shannon – Fano algorithm and Huffman coding. Discrete memoryless channels, Probability relations in a channel, priori & posteriori entropies, cascaded channels, mutual information, Channel capacity, information rate and information capacity. Rate distortion.

UNIT – III:

Types of transmission errors, need for error control coding, Linear Block Codes (LBC): description of LBC, generation, Syndrome and error detection, minimum distance of a block code, error correcting and error detecting capabilities, Standard array and syndrome decoding, Hamming

codes. Binary cyclic codes (BCC): description of cyclic codes, encoding, decoding and error correction of cyclic codes using shift registers, BCH codes. Convolution codes: description, encoding and decoding.

UNIT – IV:

Base band digital data transmission, error probability, matched filter, correlation receiver, coherent and non-coherent ASK, FSK, PSK, DPSK and QPSK, and error probability. Need for MSK, Modulation, Comparison of digital carrier modulation schemes. M-ary signaling schemes. Synchronization methods.

UNIT – V

Need for spreading a code, generation and characteristics of PN sequences. Direct Sequence Spread Spectrum and Frequency hopping spread spectrum systems and their applications. Acquisition schemes for spread spectrum receivers, Tracking of FH and DS signals.

Suggested Reading:

1. Simon Haykin, "Communication Systems," 4/e, Wiley India, 2011.
2. Herbert Taub, Donald L. Shilling & Goutam Saha, "Principles of Communication Systems," 3/e, TMH, 2008.
3. P. Ramakrishna Rao, "Digital Communication," 1/e, TMH, 2011.
4. A. Bruce Carlson and Paul B. Crilly, "Communication Systems," 5/e, 2011.
5. Sam Shanmugham.K., "Digital and Analog Communication Systems," Wiley, 1979.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- VI SEMESTER
TRANSMISSION LINES AND ANTENNAS

Instruction: 3+1 Hrs /week	SEE Marks :70	Course Code : **PC620EC**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. Students will understand antenna fundamentals and parameters 2. Study the working of antennas at different frequencies 3. Acquire the knowledge of different modes of wave propagation	**At the end of the course students will be able to:** 1. Apply principles of electromagnetics to explain antenna radiation 2. Identify basic antenna parameters 3. Design and analyze wire antennas, antenna arrays and aperture antennas 4. Demonstrate the ability to measure antenna parameters 5. Identify and describe effects of atmosphere on radio wave propagation

UNIT – I

Constant K filters: low pass, high pass, band pass, band elimination filter design; m-derived filters: low pass, high pass, band pass, band elimination filter design; composite filter design; Notch filter.

Transmission Lines – I: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Distortion – Conditions for Distortionless and Minimum Attenuation, Types of Loading.

UNIT – II

Transmission Lines – II : Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements: λ/4, λ/2, λ/8 Lines – Impedance Transformations. Significance of Z min and Z max, Smith Chart – Configuration and Applications, Single and Double Stub Matching.

UNIT – III

Antenna fundamentals and wire antennas: Principles of radiation, retarded potential and isotropic radiator, Basic antenna parameters: patterns, radiation intensity, far field, near field, Gain and directivity, Friis transmission, Antenna Polarization, effective aperture, antenna temperature, aperture efficiency. Point sources, Current distribution,

infinitesimal dipole. Half-wave dipole, quarter wave monopole, Loop antenna, Far field pattern of circular loop with uniform current.

UNIT – IV

Antenna arrays: Arrays of point sources, two element array with equal and unequal amplitudes, different phases; Linear array with uniform distribution; binomial array; principle of pattern multiplication. Broadside and End fire arrays, effect of inter element phase shift on beam scanning. Effect of earth on vertical patterns and horizontal patterns; Turnstile antenna, Rhombic Antenna, Yagi - Uda Array and Log periodic array Antennas.

UNIT – V

VHF, UHF & MW antennas: Helical Antennas – Geometry, Helix modes, Design considerations for Mono-filar Helical antenna, Horn, Parabolic Reflector, Lens antennas. Microstrip antennas: different types, advantages and disadvantages of Microstrip antennas.

Suggested Reading:

1. Networks, Lines and Fields, John D. Ryder, PHI, 2nd ed.,1999
2. Edward C. Jordan and Kenneth G. Balmain, "*Electromagnetic Waves and Radiating Systems,*" 2/e, PHI, 2001.
3. Constantine A. Balanis, "*Antenna Theory: Analysis and Design,*" 3/e, John Wiley, 2005.
4. John D. Krauss, Ronald J. Marhefka & Ahmad S. Khan, "*Antennas and Wave Propagation,*" 4/e, TMH, 2010.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- VI SEMESTER
MICROCONTROLLERS AND APPLICATIONS

Instruction: 3+1 Hrs /week	SEE Marks :70	Course Code : **PC630EC**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objective	Course Outcomes
1. To introduce 8051μc SoC architecture, programming of internal blocks, and interface with real world devices for designing microcontroller based electronic solution.	**At the end of the course, students will be able to:** 1. Differentiate between a microprocessor and microcontroller and choose a particular target for designing an application as per technology update. 2. Summarize the features of 8051 MCU and configure the internal registers. 3. Design programs using embedded C constructs with C51 MCU target for a given requirement. 4. Develop device drivers in embedded C for interfacing the real world I/O, memories, sensors and transducers. 5. Suggest other microcontroller families available and compare its performance with 8051.

UNIT – I

8051 Microcontroller: Introduction, Controller family, Internal architecture, Pin configuration, I/O port structure Memory organization, Stack organization.

Assembly language Programming with 8051: Instruction set, Data transfer, Arithmetic, logical and Branching instructions, Addressing modes.

UNIT – II

On chip peripheral interface and programming in Assembly language and C: 8051 timer in different modes, counter programming, 8051 Serial data communication; need of MAX232, Interrupt programming.

UNIT – III

Off chip peripheral interface and programming in C: Memory expansion, Off chip EPROM, SRAM, Expansion of I/O ports using 8255 PPI; Sensor interface – ADC; sampling Clock generation, DAC interface.

UNIT – IV

I/O Interfacing and programming in C: 8051µc Interface with Seven-segment display, LCD module, Keyboard, DC Motor and Stepper Motor interfacing, RTC Interfacing.

UNIT – V

Introduction to Advanced microcontrollers: Architectural features of MSP430x, ARM (Quantitative analysis only).

Applications of 8051µc: PWM generation, Speed control in Industrial applications, Automotive and Home automation.

Suggested Reading:

1. *Muhammad Ali Mazidi, Janice G. Mazidi & Rolin D. McKinlay (Author); 8051 Microcontroller and Embedded Systems, The: Pearson New International Edition 2nd edition; 2013. ISBN-13: 978-1292026572*
2. Ayala K.J, "*The 8051 Micro Controller Architecture, programming and Application,*" Penram International, 2007.
3. *Davies J H, "MSP430 Microcontroller Basics" Elsevier India Pvt. Ltd.-New Delhi Edition: 2010*
4. Andrew N.Slos, demonic symes, chris wrigth" ARM system developers guide designing and optimizing system s/w " Elsevier 1st edition.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- VI SEMESTER
COMPUTER NETWORKS

Instruction: 3 Hrs /week	SEE Marks :70	Course Code : **PC640EC**
Credits : 3	CIE Marks: 30	Duration of SEE : 3 Hrs

Course objectives	Course outcomes
1. To understand the different Topologies and configurations in the area of computer networks. 2. To understand the terminology and concepts of the OSI model and the TCP/IP model. 3. To understand the state-of-the-art technology in network protocols, network architecture. 4. To study contemporary issues and develop new protocols in network security	**At the end of the course, students will be able to:** 1. Analyze principles of LAN design such as topology and configuration depending on types of users accessing the network. 2. Explore contemporary issues in networking technologies 3. Identify deficiencies in existing protocols, and then formulate new and better protocols 4. Analyze and Understand the skills of sub netting and routing 5. To Apply and use of cryptography and network security in day to day applications.

UNIT - I

Data communication, Network Topologies: LAN, WAN, MAN, Types-Bus, Star, Ring, Hybrid. Line configurations. Reference Models: OSI, TCP/IP.
Data Link Layer: Design issues, Framing, Error Detection and Correction, Flow control Protocols: Stop and Wait, Sliding Window, ARQ Protocols, HDLC.

UNIT - II

MAC Sub Layer: Multiple Access Protocols: ALOHA, CSMA, Wireless LAN. IEEE 802.2, 802.3, 802.11, 802.16 standards. Bluetooth, Bridges and Routers.
Circuit switching: Circuit Switching Principles and concepts.
Packet switching: Virtual circuit and Datagram subnets.

UNIT - III

Network Layer: Network layer Services, Routing algorithms : Shortest Path Routing, Flooding, Hierarchical routing, Broadcast, Multicast, Distance Vector Routing, and Congestion Control Algorithms.
Internet Working: The Network Layer in Internet and ATM Networks.

UNIT - IV

Transport Layer: Transport Services, Elements of Transport Layer, Connection management, TCP and UDP protocols, ATM AAL Layer Protocol.

UNIT - V

Application Layer: Domain Name System, SNMP, Electronic Mail, World Wide Web.

Network Security: Cryptography Symmetric Key and Public Key algorithms, Digital Signatures, Authentication Protocols.

Suggested Reading:

1. Andrew S Tanenbaum "Computer Networks" 5/ed. Pearson Education, 2011.
2. Behrouz A. Forouzan "Data Communication and Networking" 3/e, TMH, 2008.
3. William Stallings "Data and Computer Communications", 8/e, PHI, 2004.
4. S.Keshav "An Engineering Approach to Computer Networks" 2/e, Pearson Education.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR 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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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 ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- VI SEMESTER
FINISHING SCHOOL – IV : TECHNICAL SKILLS
APPLICATIONS OF JAVA

Instruction: 1+1 Hrs /week	SEE Marks :35	Course Code : **MC610EC**
Credits : 1	CIE Marks: 15	Duration of SEE : 1.5 Hrs

Course Objective	Course Outcomes
1. To familiarize the students with advanced Java programming concepts, simple graphical user interfaces, examine case studies and have practice in developing small-scale programs ,which is done using Object Oriented Programming techniques to develop Java applications in a Windows based environment	**At the end of the course, students will be able to:** 1. Write good java programs in GUI using SWING and handling different kinds of event on it including applying the concepts of multithreading. 2. Update and retrieve the data from the databases using SQL 3. Implements a data tier based on JDBC. 4. Analyze business tier and business logic based on EJB 5. Ability to implements a web tier using Java Servlets and JSP supporting Java Beans and RMI.

UNIT – I

Working with Databases: Introduction to SQL and Relational Databases, Using java with databases: Java and CGI calls, JDBC API, Server side database Access. IO streams, IO exceptions.

UNIT – II

Files - streams - byte streams, character streams, text input/output, binary input/output, random access file operations, File management using File class.

Connecting to Database - JDBC Type 1 to 4 drives, connecting to a database, querying a database and processing the results, updating data with JDBC.

UNIT – III

Package Java. net: Datagram Packet, Datagram socket, Inet Address, Server Socket, Socket, URL, and URL Connection.

UNIT – IV

Introduction to CGI, PERL, SERVELETS, RMI, SWINGS, CORBA, EJB, activeX.

Suggested Reading

1. Thomas. A. Powell, HTML- The Complete Reference, TMH, 2002.
2. Herbert Schildt, JAVA – The Complete Reference, TMH, 2014, 9th Ed
3. Robert Orfali and Donharkey, Client Server Programming with JAVA and CORBA, John Wiley, 2nd ed., 1998.
4. Comer, Internet Book – everything you need to know about computer networking & How Internet Works, 3rd PHI, 2002

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- VI SEMESTER
FINISHING SCHOOL – IV : TECHNICAL SKILLS
CUSTOMER RELATIONSHIP MANAGEMENT (CRM), BUSINESS PROCESS MANAGEMENT (BPM)

Instruction: 1+1 Hrs /week	SEE Marks :35	Course Code : **MC620EC**
Credits : 1	CIE Marks: 15	Duration of SEE : 1.5 Hrs

Course Objective	Course Outcomes
1. This Course is intended for System Architect candidates who want to create Pega 7.2 Case-Management solutions.	**At the end of the course student will be able to:** 1. Use Pega 7.2 tool and technology to rapidly prototype a simple case-management application. 2. Create case stages and steps, implement processes, define properties, create a user interface, and create business rules and processes. 3. Use and create Declare Expression Rules and use Declarative Rules Inspector. 4. Implement business policies with decision rules. 5. Define best practices and design patterns for implementing case-based business applications.

UNIT - I

Pega's Business Application Platform: The Pega Platform, Principles of application development, Best practices and guardrails Prototyping an Application using Pega Express: Designing a case life cycle, Assigning work, Enforcing service levels, Creating user views. Case Design using Designer Studio: Requirements management, Managing case life cycle exceptions, Adding optional business process events, Sending correspondence, Guiding users through a business process, Designing complex process flows.

UNIT - II

Report Planning and Design: Process visibility through business reporting Application Design: The role of the system architect, The building blocks of a Pega application, Accessing applications, Assessing guardrail compliance Case Design: Creating cases and child cases

UNIT - III

Dta Model Design: Data elements in Pega applications, Setting property values automatically, Setting property values declaratively, Passing data to another case, Reviewing application data Process Design: Activities, Configuring a work party, Configuring a service level agreement, Routing assignments, Configuring correspondence, Circumstancing rules.

UNIT - IV

Decision Design: Automated decisions in Pega applications, Configuring when rules, Configuring decision tables and decision trees UI Design: Designing a UI form, Reusing text with paragraph rules, Configuring responsive UI behavior, Designing a dynamic UI, Validating user data

UNIT - V

Report Design: Creating reports, Optimizing report data, Data Management: Caching data with data pages, Managing reference data, Integration in Pega applications, Creating a connector.
Application Debugging: Debugging Pega applications

Reference:

https://pdn.pega.com/

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- VI SEMESTER

ANALOG AND DIGITAL COMMUNICATION LAB

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : **PC651EC**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course Objectives	Course Outcomes
1. To apply the knowledge of Analog communication to perform different Analog modulation schemes and calculate modulation index. 2. To analyse the various digital modulation techniques. 3. To study different Analog and digital multiplexing techniques.	**At the end of the course student will be able to:** 1. Apply the knowledge of modulation & demodulation to different modulation techniques 2. Analyze modulation & demodulation of PCM 3. Analyze modulation & demodulation of Delta modulation 4. Estimate the modulation & demodulated output of ASK, FSK, PSK. 5. Study the working of modem. Measure attenuation, NA, losses of optical fiber cable.

(A) Experiments on Analog Communication

1. AM, FM generation and detection
2. Balanced Modulator
3. Pre emphasis and De-emphasis circuits
4. Radio Receiver Measurements: Sensitivity, Selectivity and Fidelity
5. Sampling and reconstruction
6. PAM, PWM, and PPM generation and detection
7. Time Division, Frequency Division Multiplexing and De-multiplexing
8. PLL Characteristics
9. Spectral Analysis of Video signals generated by TV demonstrator Kit and Pattern Generator using Spectrum analyzer
10. Mixer Characteristics

(B) Experiments on Digital Communication

1. PCM generation and detection
2. Error control coding
3. Data formats / channel encoding and decoding.
4. Linear Delta, Adaptive Delta Modulation and Demodulation.
5. ASK, FSK, BPSK & QPSK generation and Detection.
6. Minimum Shift Keying generation & detection
7. Optical Fibre measurements:
   Numerical aperture, Attenuation, E-O and O-E characteristics
8. Digital Fibre Optic Multiplexed Link
9. Modem characteristics.
10. Wavelength Division Multiplexing

Note:

1. Minimum of **5** from Part A and **5** from Part B is mandatory.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- VI SEMESTER

MICROCONTROLLER LAB

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : **PC661EC**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course Objective	Course Outcomes
1. To familiarize students with the programming aspects of assembly language and C programming with 8086μp and 8051μc in interfacing with real world using X86 kits and perform virtual design simulation on proteus 7.2 for 8051 microcontroller in embedded 'C' with (μ vision-4) IDE.	**At the end of the course student will be able to:** 1. Apply knowledge in writing the programs using keilμVision4 software for microcontroller and Masm assembler tool for Microprocessor. 2. Generate a suitable Interface with onchip peripherals of 8051μc. 3. Interface off chip peripherals by programming the interrupts to meet the design solution 4. Design and execute a mini project based on given specifications using modern software tools.

PART – A

[Experiments on assembly language programming for 8086 μP using Assembler]

1. Execution of basic programs on 8086 microprocessor (8 bit and 16 bit arithmetic operations).
2. Programs using different addressing modes.
3. Single byte, multi byte binary and BCD addition and Subtraction.
4. Code conversions.
5. String Searching and Sorting
6. Generation of waveforms and gating applications using 8253/8254 timers.
7. Generation of waveforms using DAC interface.
8. Monitor utilities of 8086 kit for Keypad/displaying results.

PART – B

[Experiments on Embedded C programming for 8051 μC using Keil IDE]

1. LED toggle, Switch control logics in polling mode.
2. Timer and counter programming.

3. Square wave generation with variable duty cycle (PWM).
4. Interrupt programming
5. Serial communication using RS 232 UART protocols.
6. Interfacing for A/D applications.
7. Program to control stepper motor and DC motor.
8. LCD display interfacing (4-bit and 8-bit mode).
9. Keypad interfacing.

General Note:

1. At least 7 experiments from each part.
2. A total of not less than 14 experiments must be carried out during the semester.
3. Analysis and design of circuits, wherever possible should be carried out using SPICE tools.

Special Note:

- Sessional marks are to be awarded as per the following breakup.
- 20 marks for the regular lab exercises and internal exam.
- 5 marks for the mini project-cum-design exercise(s).

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS FOR B.E.- VI SEMESTER

COMPUTER NETWORKS LAB

Instruction: 2 Hrs /week	SEE Marks :50	Course Code : **PC671EC**
Credits : 1	CIE Marks: 25	Duration of SEE : 3 Hrs

Course Objective	Course Outcomes
1. To provide comprehensive knowledge of networking devices, tools and skills required to implement, test and trouble computer networks.	**At the end of the course student will be able to:** 1. Implement IP addressing schemes and different subnetting scenarios. 2. Perform basic configurations of networking devices like switches and routers 3. Build and implement simple networking topologies and troubleshooting the networks. 4. Implement and troubleshoot virtual LANs and inter-VLAN routing. 5. Implement and test routing protocols like RIPv1, RIPv2, single-area and multi-area OSPF.

Experiments

1. Getting started with Packet Tracer tool and Internetworking Operating System.
2. Implementation of different subnetting scenarios and IP addressing schemes
3. Basic configuration of networking devices
4. Building and troubleshooting different networking topologies
5. Building and testing Wired Local Area Networks
6. Building and testing Wireless Local Area Networks
7. Implementation and understanding of different servers like HTTP,TFP,TFTP,DNS
8. Creating and testing Wide Area Networks
9. Implementation of routing protocols
10. Implementation of Virtual Local Area Networks(VLAN) and inter VLAN routing
11. Testing and troubleshooting networks with Protocol Data Units
12. Implementation of access lists for traffic control in networking
13. Implementation of Gateway protocols (Boarder Gateway Protocols)
14. Experiments on DATA LINK LAYER

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

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 1:

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 2:

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.

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/

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/

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.

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.

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

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.

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

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