

B.TECH ELECTRICAL ENGG.
FIELDS & WAVES
5th Sem. EE-301-E

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4 1

Theory : 100 Marks
Sessional : 50 Marks
Duration : 3Hrs

UNIT I

Review of vector analysis, Orthogonal co-ordinate systems, Review of vector calculus in all the three coordinate systems : line, surface & volume integrals, gradient, divergence & curl of a vector & their physical significance, Divergence theorem, Stokes theorem, solenoidal and irrotational fields.

Gauss law in electrostatics & its applications, uniform line, surface & volume charge distributions, concepts of electric field & electric potentials, electric field & potential due to a linear dipole, Spherical & cylindrical capacitor, energy density in electric field, method of images.

UNIT II

Magnetostatics: Magnetic flux density and magnetizing field intensity, Biot Savart's law, Amperes circuital law & its applications. Magnetic vector potentials, Magnetic field energy, boundary conditions for both the electric & magnetic fields at the interface of various types of media. Laplace, Poisson's equation & continuity equation, displacement current density, conduction current density, Maxwell's equations in differential & integral forms, time harmonic cases & their physical significance, retarded potentials.

UNIT III

UPW: Plane waves & uniform plane waves and their properties, wave equations in various media. Polarization & its types. Intrinsic impedance, propagation constant. Reflection & refraction of uniform plane waves at the interface of conductor- dielectric & dielectric - dielectric (both normal and oblique incidence). Relaxation time, skin effect, skin depth & surface impedance, Poynting vector theorem & its physical significance.

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UNIT IV

Transmission Lines: Distributed parameters, circuit parameters, concepts of voltage & current flow on a transmission line, line equations, characteristic impedance. Reflection of transmission line, maxima & minima, standing wave ratio of a transmission line. Impedance matching, , Smith's chart & its applications, co-axial type transmission line.

Introduction to Waveguides: (Qualitative study only) Concept of Wave Guide and TE, TM and TEM modes in rectangular and circular wave guides. Cut off and guide wave length, characteristic impedance, dielectric wave guide.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

References:

1. Electromagnetic Fields & Waves by Sadiku (Oxford Univ. Press)
2. Fields & Waves Electromagnetics by D.K. Cheng. (Pearson Education)
3. Electromagnetics by J.D. Kraus.

B.TECH ELECTRICAL ENGG.
CONTROL SYSTEM
5th Semester (EE-303E)

L T
4 1

Theory : 100
Sessional : 50
Time : 3Hrs

UNIT-I

INTRODUCTION: Control system-open loop & closed loop, servomechanism.
MATHEMATICAL MODELS OF PHYSICAL SYSTEMS: Differential equation of physical systems, transfer function, block diagram algebra, signal flow-graphs, Mason's formula & its application.

FEEDBACK CHARACTERISTICS OF CONTROL SYSTEMS: Feedback and non-feedback systems, Effects of feedback on sensitivity (to parameter variations), stability, overall gain etc.

UNIT-II

TIME RESPONSE ANALYSIS: Standard test signals, time response of first order and second order systems, steady-state errors and error constants, design specification of second-order-systems.

STABILITY:The concept of stability, necessary conditions for stability, Hurwitz stability criterion, Routh stability criterion, Relative stability analysis.

THE ROOT LOCUS TECHNIQUE:The Root locus concept, construction /development of root loci for various systems, stability considerations.

UNIT-III

FREQUENCY RESPONSE & STABILITY ANALYSIS: Correlation between time and frequency response, Polar Plots, Nyquist plots, Bode Plots, Nyquist stability criterion, Gain margin & Phase margin, relative stability using Nyquist Criterion, frequency response specifications.

UNIT-IV

COMPENSATION OF CONTROL SYSTEMS: Necessity of compensation, Phase lag compensation, phase lead compensation, phase lag lead compensation, feedback compensation.

STATE VARIABLE ANALYSIS : Concept of state, state variable and state model, state models for linear continuous time systems, diagonalization solution of state equations, concept of controllability and observability.

CONTROL COMPONENTS: Working principle of synchros, ac & dc tacho-generators, servomotors, magnetic amplifier, Stepper motor.

NOTE :The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

TEXT BOOK:

1. Control System Engg : I.J.Nagrath & M.Gopal; New Age India.

Reference Books:

1. Control Systems:R.S. Chauhan,(Umesh Pub.)
2. Automatic Control Systems : B.C.Kuo; PHI.
3. Modern Control Engg : K.Ogata; PHI.

B.TECH ELECTRICAL ENGG.
ELECTRONIC MEASUREMENT & INSTRUMENTS
5th Sem. EE-309-E

L T
3 1

Theory : 100 Marks
Sessional: 50 Marks
Duration : 3Hrs

UNIT I

C.R.O.: Introduction, Cathode Ray Tube (CRT), Electron Gun, Electrostatic Focussing, Electrostatic Deflection, limitation, Applications, sampling and storage C.R.O. Digital CRO.

Amplifier Measurement: Amplifier Measurements, Measurements of Noise figure of Amplifier, Measurement of op-amp parameters.

Electronic Instruments: Instruments for measurement of voltage, current & other circuit parameters, R.F. power measurements, introduction to digital meters.

UNIT II

Digital Instruments: Digital Indicating instruments, comparison with analog type digital display methods, theory and applications of digital voltmeters, Electronic Galvanometers, Q-meter.

Frequency Measurements: -Study of decade counting assembly (DCA), Measurements of frequency using cavity wave-meter. Heterodyne frequency meter, Digital frequency meter.

UNIT III

Transducers : Classification types : Photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, strain, pressure, temperature, liquid level.

Signal Conditioning & Acquisition System: - Signal conditioning, DC & AC signal conditioning, A/D converter, D/A Converter, Use of op-amp in signal conditioning, Basic Components of analog and digital data acquisition System.

UNIT IV

Instruments For Signals Generation: - Square wave and pulse generators, Function generators, Random noise generators, Frequency Synthesizer.

Display Devices : Nixie Tube, LED, LCD, Discharge device.

NOTE:

The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. A course in Electrical & Electronics Measurement & Instrumentation: By A.K. Sawhney.
2. Electronics Instruments & Measurements techniques: By Helffrick & Cooper (PHI)
3. Instrumentation devices & Systems: By C.S. Rangan, G.R. Sharma & V.S. Mani.

B.TECH ELECTRICAL ENGG.
MICROPROCESSORS & INTERFACING
5th Semester * (ECE-311E)

L T
3 2

Theory : 100
Sessional : 50
Time : 3Hrs

UNIT-I

INTRODUCTION : Evolution of microprocessors, technological trends in microprocessor development. The Intel family tree. CISC Versus RISC. Applications of Microprocessors.

8086 CPU ARCHITECTURE : 8086 Block diagram; description of data registers, address registers; pointer and index registers, PSW, Queue, BIU and EU. 8086 Pin diagram descriptions. Generating 8086 CLK and reset signals using 8284. WAIT state generation. Microprocessor BUS types and buffering techniques, 8086 minimum mode and maximum mode CPU module.

UNIT-II

8086 INSTRUCTION SET : Instruction formats, addressing modes, Data transfer instructions, string instructions, logical instructions, arithmetic instructions, transfer of control instructions; process control instructions; Assembler directives.

8086 PROGRAMMING TECHNIQUES : Writing assembly Language programs for logical processing, arithmetic processing, timing delays; loops, data conversions. Writing procedures; Data tables, modular programming. Macros.

UNIT-III

MAIN MEMORY SYSTEM DESIGN : Memory devices, 8086 CPU Read/Write timing diagrams in minimum mode and maximum mode. Address decoding techniques. Interfacing SRAMS; ROMS/PROMS. Interfacing and refreshing DRAMS. DRAM Controller – TMS4500.

UNIT-IV

BASIC I/O INTERFACE : Parallel and Serial I/O Port design and address decoding. Memory mapped I/O Vs Isolated I/O Intel's 8255 and 8251- description and interfacing with 8086. ADCs and DACs, - types, operation and interfacing with 8086. Interfacing Keyboards, alphanumeric displays, multiplexed displays, and high power devices with 8086.

INTERRRUPTS AND DMA : Interrupt driven I/O. 8086 Interrupt mechanism; interrupt types and interrupt vector table. Intel's 8259. DMA operation. Intel's 8237. Microcomputer video displays.

NOTE:

- 1) The syllabus above is common with B.Tech.V Sem. Electronics & Comm. Same paper will be set.
- 2) The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

Suggested Books:

1. D.V.Hall, Microprocessors and Interfacing, McGraw Hill 2nd ed.
2. J Uffenbeck, The 8086/8088 family, (PHI).
3. Liu, Gibson, Microcomputer Systems – The 8086/8088 family, (2nd Ed-PHI).

B.TECH ELECTRICAL ENGG.
MICROCONTROLLERS & APPLICATIONS
6th Semester (EE-304E)

L T
3 1

Theory : 100
Sessional : 50
Time : 3Hrs

UNIT 1

INTRODUCTION :Comparing Microprocessors and Microcontrollers. Technological trends in Microcontrollers development. Survey of microcontrollers- 4 bit, 8 bit, 16 bit, 32 bit microcontrollers. Applications of microcontrollers.

UNIT 2

8051 ARCHITECTURE :Block diagram, pin. Diagram of 8051. Functional descriptions of internal units, registers, PSW, internal RAM, ROM, Stack, Oscillator and Clock. I/O Pins, Ports and Circuits Connecting external memory. Counters and timers. Serial data interrupt. Serial data transmission /reception and transmission modes. Timer flag interrupt. External interrupt, software generated interrupts. External memory and memory space decoding, expanding I/Os, memory mapped I/O Reset & CLK Circuits.

UNIT 3

8051 INSTRUCTION SET AND PROGRAMMING :8051 Instruction syntax, addressing modes, Data transfer instructions, logical instructions, arithmetic instructions, Jump and Call instructions. Interrupts and interrupt handler subroutines. Writing assembly Language programs. Time delays. Pure S/W time delays. S/W polled timer. Pure H/W delay. Lookup tables. Serial data transmission using time delays and polling. Interrupt driven serial transmission and reception.

UNIT 4

8051 APPLICATIONS: Interfacing Keyboards Programs for small keyboards and matrix keyboards. Interfacing multiplexed displays, numeric displays and LCD displays. Measuring frequency and pulse width. Interfacing ADCs & DACs. Hardware circuits for handling multiple interrupts. 8051 Serial data communication modes- Mode 0, Mode 1, Mode 2 and Mode 3.

NOTE:

The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

Suggested Books:

1. K.J.Ayala, The 8051 Microcontroller – 2nd ed. Penram International.
2. Intel’s manual on “ Embedded Microcontrollers”

B.TECH ELECTRICAL ENGG.
MICROCONTROLLER APPLICATIONS LAB
6th Semester (EE-316-E)

L T P
- - 2

Sessional: 50
Viva: 25
Total: 75

Part – A

1. Copy a byte from TCON to register R2 using at least four different methods.
2. Store the number 8 DH in RAM Locations 30H to 34H.
3. Add the unsigned numbers found in internal RAM locations 25H, 26H and 27H together and put the result in RAM locations. 31H (MSB) and 30H (LSB).
4. Write a program to subtract 2 –data bytes indicated by strings. i.e. Subtract a string of 8-bit data indicated by R1 from a string of data indicated by R0. The number of data is indicated by R2.
5. The number A6H is placed somewhere in external RAM between locations 0100H and 0200H. Find the address of that location and put that address in R6 (LSB) and R5 (MSB). Find the address of the first two internal RAM locations between 0H and 60H, which contain consecutive numbers. If so, set the carry flag to 1, else clear the flag,
7. W. A. P to find minimum value of data in memory block 9000 to 90FF and store the result in 9100H.
8. W.A.P. to arrange the given ten numbers in ascending order.
9. W.A.P to generate BCD up counter and send each count to port A.
10. Multiply the unsigned number in register R3 by the unsigned number on port 2 and put the result in external RAM locations 10H (MSB) & 11H (LSB).

Part - B

1. An assembly language program to find the smaller of two numbers.
2. An assembly language program to find smallest number in an array of ten numbers.
3. An assembly language program to find whether the given number is even or odd.
4. An assembly language program to perform 16-bit division.
5. An assembly language program to input five numbers. calculate their sum & display the result.
6. An assembly language program to display your name on seven segment display.
7. An assembly language program to interface a/d & d/a converters.

NOTE: At least 10 experiments are to be performed with at least 5 from Part-A & at least 4 from Part-B separately.

B.TECH ELECTRICAL ENGG.
ELECTRIC DRIVES AND TRACTION
6th SEM. EE-310-E

L T
4 1

Theory : 100
Sessional : 50
Duration : 3Hrs

UNIT I

Introduction:- Definition & classification of different type of drives, Review of characteristics and components of electric drives, Speed control methods of various a.c. and d.c. drives, its advantages and applications, acceleration and retardation time, energy consideration.

Braking of drives:- Various methods of braking of a.c. and d.c drives, Automatic control arrangement, characteristics and application, acceleration and Retardation time ,Energy consideration.

Induction motor (A.C) drives:- Basic principle of induction motor drives, 3 \emptyset a.c voltage controller fed I.M drive, variable frequency control, voltage source inverter (VSI) and current source inverter (CSI), cycloconverter fed IM drive, Slip Power control, static rotor resistance control, chopper control of 3 - \emptyset slip ring induction motor.

UNIT II

D.C. drives:- Rectifier controlled circuits, Single phase fully controlled and half controlled rectifier fed separately excited d.c motor, 3 \emptyset fully and half controlled fed separately excited d.c. Motor, performance and characteristics of single phase and 3 \emptyset rectifier controlled d.c drives. Control techniques of d.c. drives using chopper, multi quadrant control of chopper fed motors.

UNIT III

Dynamics of Electric drives:-Components&ciassification of load torque,fundamental load torque equation, permissible frequency of starting and stopping, definite time,speed torque conventions, speed and current limit control, Automatic starting and pulling operation of synchronous motors.

Digitally Controlled (Microprocessor control of Electric drives) :- Application areas and functions of HP in drive technology, ~~V~~Block diagram of arrangement and comparison with other method, components for digital control, vector control of IM drive using HP.

UNIT IV

Traction Drives:- Nature of traction load, motors, conventional d.c & a.c traction drives,their characteritics, d.c traction using chopper controlled d.c motors, polyphase a.c motors for traction drives, speed time relationship,tractive effort for propelling a train,power of a traction motor.

Rating of motors:- Determination of motor rating, Nature of loads and classes of motor duty, frequency of operation of motor subjected to intermittent loads, pulse loads etc.Thermal model of motor for heating and cooling.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. Electric drives by S.K.Pillai, Wiley.
2. Thyristor D.C Drives by S.K.Sen.
3. Control System in Industry by Siskind, McGraw Hill.
4. Electric Machines & Drives by Fransver. Relevant I.S.I. Cader.

B.TECH ELECTRICAL ENGG.
ELECTRIC DRIVES LAB
6th SEM. EE- 320-E

| L | T | P | Total |
|---|---|---|-------|
| - | - | 2 | 2 |

Sessional: 25Marks
Practical : 25 Marks
Total : 50 Marks
Duration : 3 Hrs

1. Study of Industrial Applications of various mills.
2. Study of different types of a loading on a particular load.
 - (a) Intermediate Loading
 - (b) Continuous Loading
3. Three-phase fully controlled rectifier fed separately excited D.C. motor (1 H.P.) at different firing angle for obtaining speed torque characteristics. Complete unit with motor and accessories for obtaining torque (belt-pully arrangement).
4. Single-phase Half Controlled rectifier fed D.C. series motor (1 H.P.) at different firing angle for getting speed torque characteristics. Complete unit with motor and accessories for obtaining torque (belt-pully arrangement).
5. Chopper control of DC series motor (1 H.P.) for obtaining torque characteristics.
6. Chopper control of separately excited DC motor (1 H.P.) for obtaining speed torque characteristics.
7.
 - a) VSI controlled induction motor drives (either through controlled rectifier or chopper).
 - b) CSI controlled induction motor drives (either through controlled rectifier or chopper).
8. Half wave cycloconverter fed induction motor drive for obtaining torque speed characteristics, torque frequency for constant V/F ratio.
9.
 - a) VSI controlled synchronous motor drives with load commutation.
 - b) CSI controlled synchronous motor drives with load commutation.
10. Self controlled synchronous motor drives employing a cycloconverter.
11. Regenerative braking of separately excited DC motor.
12. AC dynamic braking (Rheostatic) of 3-phase induction motor.
13. Vector control of induction motor using microprocessor .
14. Microcontroller based speed control of any motor.

NOTE : The students must perform at least 10 experiments from the above list.

B.TECH ELECTRICAL ENGG.
ELECTRONIC MEASUREMENT & INSTRUMENTS LAB
5th Semester (EE-315E)

L T P
- - 2

Sessional : 25 Marks
Practical : 25 Marks
Total : 50 Marks
Time : 3hrs.

LIST OF EXPERIMENTS:

1. Experiment to measure displacement using LVDT.
2. Experiment to study & display parameter(liquid flow etc.) using LDR.
3. Experiment to measure temperature using RTD.
4. Experiment to measure temperature coefficient of material using thermocouple.
5. Experiment to measure pressure using strain guage.
6. Experiment to measure the distortion in amplifiers using distortion meter.
7. Experiment to study Op-Amp as instrumentation amplifier.
8. Experiment to study Op-Amp. as half wave & full wave precision rectifier.
9. To study & analyse CRO,sampling & storage CRO, digital CRO.
10. Experiment to study Op-Amp as AD/DA converter.
11. To study Nixie tubes,LED,LCD,discharge devices & familiarize with digital frequency meter,frequency synthesizers.
12. Experiment to measure the speed of d.c. motor using magnetic pick up.
13. Experiment to measure the speed of d.c. motor using photo-electric pick up.
14. To study Q-meter,digital data acquisition systems,random noise generator.

NOTE : At least 10 experiments are to be performed from the above list.

W

B.TECH ELECTRICAL ENGG.
MICROPROCESSORS APPLICATION LAB
5th Semester (EE-313E)

L T P
 - - 2

Exam : 25
 Sessional : 25
 Time : 3Hrs

Before starting with the experiments, teacher should make the students conversant with the following essential theoretical concepts.

- A. i) Programming Model of Intel's 8086.
 ii) Addressing Modes of Intel's 8086.
 iii) Instruction formats of Intel's 8086
- B. Instruction set of Intel's 8086.
- C. Assembler, and Debugger.

LIST OF EXPERIMENTS:

- I a) Familiarization with 8086 Trainer Kit.
 b) Familiarization with Digital I/O, ADC and DAC Cards.
 c) Familiarization with Turbo Assembler and Debugger S/Ws.
- II Write a program to arrange block of data in
 i) ascending and (ii) descending order.
- III i) Program for finding largest number from an array.
 ii) Program for finding smallest number from an array.
- IV Write a program to find out any power of a number such that $Z = X^N$.
 Where N is programmable and X is unsigned number.
- IV Write a program to generate.
 i) Sine Waveform (ii) Ramp Waveform (iii) Triangular Waveform Using DAC Card.
- V Write a program to measure frequency/Time period of the following functions.
 (i) Sine Waveform (ii) Square Waveform (iii) Triangular Waveform
 using ADC Card.
- VI Write a program to increase, decrease the speed of a stepper motor and reverse its direction of rotation using stepper motor controller card.
- VII write a programmable delay routine to cause a minimum delay = 2MS and a maximum delay = 20 minutes in the increments of 2 MS.
- VIII i) Use DOS interrupt to read keyboard string/character.
 ii) Use BIOS interrupt to send a string/character to printer.
- IX Write a program to :
 i) Create disk file.
 ii) Open, write to and close- a disk file.
 iii) Open, read from and close a disk file.
 iv) Reading data stamp of a file using BIOS interrupt.
- X i) Erasing UVPROMs and EEPROMs
 ii) Reprogramming PROMs using computer compatible EPROM Programmer.
- XI Studying and Using 8086 In-Circuit Emulator.
- XII Write a program to interface a two digit number using seven segment LEDs using 8086 & 8255 PPI.

NOTE: At least 9 experiments are to be performed from above list.

B.TECH ELECTRICAL ENGG.
POWER SYSTEM ANALYSIS & PROTECTION
6th Semester EE-302-E

| L | T | P/D | Total |
|---|---|-----|-------|
| 3 | 1 | - | 4 |

Theory : 100 Marks
Sessional: 50 Marks
Duration : 3Hrs

UNIT I

Introduction : Per unit quantities characteristics & representation of components of a power system, synchronous machines, transformers, lines cables & loads. Single line diagram, impedance diagram, line reactance diagrams.

Protective Relaying : Scheme of protection of generators, transformers, transmission lines & bus-bars, carrier current protection, functional characteristics of relays, operating principle of electromagnetic and static relays, over current, directional over current, differential relay, impedance relay.

UNIT II

Neutral grounding : Need for neutral grounding, various types of neutral grounding.

Circuit Interruption : Circuit interruption, theory of arc formation and its excitation in d.c., a.c. circuits, restriking & recovery voltage, interruption of capacitive & inductive currents. Rupturing capacity & rating of circuit breakers.

Circuit-Breakers : Classification of circuit-breakers, circuit-breakers of low medium, high & extra high voltages. Multibreak & resistance switching. Autorestore of high capacity & H.V. circuit breakers.

UNIT III

Fault Analysis:- Symmetrical faults: calculation of fault currents, use of current limiting reactors. Unsymmetrical faults: Types of transformation in power system analysis, symmetrical components transformation, sequence impedance of power system elements, Sequence network of power system analysis of unsymmetrical short faults sequence components filters, Network analysis & its application to interconnected system.

UNIT IV

Transients in Power Systems: Transient electric phenomenon, lightning & switching surges, travelling waves, reflection & refraction of waves with different line termination, Protection against dangerous pressure rises.

Stability of power System: Concepts of stability, power angle characteristics of Synchronous, steady state & transient stability swing waves.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

References:

1. Elements of power system analysis by W.D. Stevenson.
2. Electric Power System by B.M. Weddy.
3. The transmission & Distribution of electric energy by H.Cotton.
4. Modern Power System Analysis by I.J. Nagrath & D.P. Kothari.
5. A course in Electrical Power by Soni, Gupta & Bhatnagar.
6. Power System Analysis & Stability by S.S. Vadhwa
7. Electrical Power System by C.L. Wadhwa. 8. Electrical Power System by Ashfaq Hussain.

**B.TECH ELECTRICAL ENGG.
DIGITAL SIGNAL PROCESSING
6th Semester (EE- 306E)**

L T
4 1

Theory : 100
Sessional : 50
Time : 3Hrs

UNIT – I

The Z Transform analysis of LTI system, DFT, FFT : Transform and its properties, Inversion of Z-transform, One sided Z-transform and solution of differential equations. Analysis of LTI systems in Z-domain, causality, stability, schur-cohn stability test; relationship between Z-transform and Fourier transform. Frequency selective filters; all pass filters, minimum-phase, maximum-phase and mixed-phase systems.

Frequency domain sampling and DFT; properties of DFT, Linear filtering using DFT, Frequency analysis of signals using DFT, radix 2, radix-4, goertzel algorithm.

UNIT – II

Implementation of Discrete Time Systems: Direct form, cascade form, frequency sampling and lattice structures for FIR systems. Direct forms, transposed form, cascade form parallel form. Lattice and lattice ladder structures for IIR systems. State space structures Quantization of filter co-efficient structures for all pass filters.

UNIT – III

Design of FIR Filters : Characteristics of practical frequency selective filters. Filters design specifications peak pass band ripple, minimum stop band attenuation. Four types of FIR filters Design of FIR filters using windows. Kaiser window method comparison of design methods for FIR filters Gibbs phenomenon.

UNIT – IV

Design of IIR Filters : Design of IIR filters from analog filters, Design by approximation of derivatives, Impulse invariance method bilinear transformation method characteristics of Butterworth, Chebyshev, and Elliptical analog filters and design of IIR filters.

NOTE:

The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

Suggested Books:

1. John G. Proakis, Digital Signal Processing, PHI
2. S. K. Mitra, Digital Signal Processing , TMH
3. Rabiner and Gold, Digital Signal Processing, PHI
4. Salivahan, Digital Signal Processing , TMH
5. Digital Signal Processing: Alon V. Oppenheim;PHI

**B.TECH ELECTRICAL ENGG.
ADVANCED PROGRAMMING
6th Sem. (EE-312-E)**

L T
3 1

Theory : 100Marks
Sessional : 50 Marks
Duration : 3 Hrs.

UNIT I

Review: Review of C language, standard library, basics of C environment, pre-processors directives, illustrative simple C programs, header files.

Review of elementary data structures- arrays, stacks, queues, link list with respect to storage representation and access methods.

UNIT II:

Searching methods: Sequential, binary, Indexes searches.

Sorting: internal and external sorting, Methods: bubble, insertion, selection, merge, heap, radix and quick sort. Comparison with respect to their efficiency.

UNIT III

Introduction to C++ : C++ environment: objects, classes & their associations, object modeling techniques, namespaces, basics of OOP concepts: Data encapsulation, abstraction, inheritance, reusability ,polymorphism (compile time& run time). Illustrative C++ programs on the above topics.

UNIT IV

Topics in C++ : Access Specifiers: public, private & protected, Constructor : Constructor with default arguments, parameterized constructors, copy constructors, destructors, function overloading, operator overloading, friend functions & classes, types of inheritance, virtual functions. Illustrative C++ programs on the above topics.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

Reference:

1. Trembley and Sorenson, “ An Introduction of data structures with application” McGraw Hill.
2. Goodman, S.E., and Hetedniemi, S.T, “ Introduction to the design and Analysis” , McGraw Hill.
3. Herbert Schildt, “ C++ Complete reference”, TMH.
4. Herowitz E and Sahni S. “ Fundamentals of Data Structures”.
5. Schaum Series in C programming, TMGH.

B.TECH ELECTRICAL ENGG.
POWER ELECTRONICS – II
6th Semester EE-308-E

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|---|---|---|-------------------|---|--------|
| L | T | P | Theory | : | 100 |
| 3 | 1 | - | Class Work | : | 50 |
| | | | Total | : | 150 |
| | | | Duration of Exam. | : | 3 Hrs. |

UNIT - I

D.C. to D.C. CONVERTER :

Classification of choppers, Principle of operation, steady state analysis of class A choppers, step up chopper, steady state, switching mode regulator : Buck, Boost, Buck-boost, Cuk regulators. Current commutated and voltage commutated chopper, Basic scheme, output voltage control techniques, one, two and four quadrant choppers, step up chopper, voltage commutated chopper, current commutated chopper, MOSFET and transistor based choppers.

UNIT – II

D.C. TO A.C. CONVERTER :

Classification, basic series and improved series inverter, parallel inverter, single phase voltage source inverter, steady state analysis, half bridge and full bridge inverter : Modified Mc murray and modified Mc murray Bedford inverter, voltage control in single phase inverters, PWM inverters, reduction of harmonics, current source, Three phase bridge inverter.

UNIT – III

INVERTERS :

Basic circuit, 120 degree mode and 180 degree mode conduction schemes, modified McMurray – Bedford half bridge and bridge inverters, brief description of parallel and series inverter (CSI), transistor and MOSFET based inverters.

W

UNIT – IV

POWER SUPPLIES :

Switched mode D.C. and A.C. power supplies.

Applications : dielectric and induction heating. Block diagram of D.C. motor speed control.

DRIVES :

Introduction to electric drives : DC drives – converter and chopper fed D.C. drives, AC drives – stator voltage control, V/f control, rotor resistance control, static Scherbius system and static Kramer systems.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

SUGGESTED BOOKS :

1. M.H. Rashid, Power electronics : circuits devices and application, PHI.
2. Ned Mohan, Tore m. undeland, William P. Robbins, Power Electronics : Converters, application and design, John wiley & sons.
3. P.S. Bhimra, Power Electronics
4. M. Ramamoorthy an introduction to thyristors & their applications east-west press.
5. A.K. Gupta & L.P. Singh, Power electronics & introduction to Drives Dhanpat Rai Pub.Co.

**B.TECH ELECTRICAL ENGG.
POWER ELECTRONICS – I LAB.
5th Semester EE-317-E**

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|---|---|---|-------------------|---|--------|
| L | T | P | Class Work | : | 25 |
| - | - | 2 | Exam | : | 25 |
| | | | Total | : | 50 |
| | | | Duration of Exam. | : | 3 Hrs. |

LIST OF EXPERIMENTS :

1. Experiment to study characteristics of diode, thyristor and triac.
2. Experiment to study characteristics of transistor and MOSFET.
3. Experiment to study R and R-C firing circuits.
4. Experiment to study UJT firing circuit.
5. Experiment to study complementary voltage commutation using a lamp flasher.
6. Experiment to study complementary voltage commutation using ring counter.
7. Experiment to study thyristorised d-c- circuit breaker.
8. Experiment to study a.c. phase control.
9. Experiment to study full wave converter.
10. Experiment to study dc chopper.
11. Experiment to study series inverter.
12. Experiment to study of bridge inverter.
13. Experiment to study of single phase cycloconverter.

Note : At least ten experiments have to be performed in the semester. At least nine experiments should be performed from above list.

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B.TECH ELECTRICAL ENGG.
POWER ELECTRONICS – I
5th Semester EE-305-E

L T P
3 1 -

Class Work : 50
Exam : 100
Total : 150
Duration of Exam. : 3 Hrs.

UNIT I

INTRODUCTION :

Role of power electronics, review of construction and characteristics of power diode, Shottky diode, power transistor, power MOSFET, SCR, DIAC, Triac, GTO, IGBT & SIT.

UNIT – II

Ratings and protections, series and parallel connections, R, RC and UJT firing circuit and other firing circuits based on ICs and microprocessors; pulse transformer and opto-coupler, commutation techniques.

AC REGULATORS :

Types of regulator, equation of load current, calculation of extinction angle, output voltage equation, harmonics in load voltage and synchronous tap changer, three phase regulator.

UNIT - III

CONVERTERS :

One, two, three, six and twelve pulse converters, fully and half controlled converters, load voltage waveforms, output voltage equation, continuous and discontinuous modes of operation, input power factor of converter, reactive power demand effect of source inductance, introduction to four quadrant / dual converter, power factor improvement techniques, forced commutated converter, MOSFET and transistor based converters.

UNIT – IV

CYCLOCONVERTERS (A.C. to A.C. CONVERTER) :

Basic principle of frequency conversion, types of cycloconverter, non-circulating and circulating types of cycloconverters.

Classification, principle of operation of step up and step down cycloconverter, single phase to single phase cycloconverter with resistive and inductive load. Three phase to single phase cycloconverter : Half wave and full wave. Cosine wave crossing technique. Three phase to three phase cycloconverter. Output voltage equation of cycloconverter.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all , selecting at least one question from each unit.

TEXT BOOK :

1. Power Electronics : MH Rashid; PHI

REFERENCE BOOKS :

1. Power Electronics : PC Sen; TMH
2. Power Electronics : HC Rai; Galgotia
3. Thyristorised Power Controllers : GK Dubey, PHI
4. Power Electronics and Introduction to Drives : A.K. Gupta and L.P. Singh; Dhanpat Rai.
5. Power Electronics : P.S. Bhimbra.

B.TECH ELECTRICAL ENGG.
ALALOG ELECTRONIC CIRCUITS
5th Semester EE-307-E

L T P
3 1 -

Class Work : 50
Exam : 100
Total : 150
Duration of Exam. : 3 Hrs.

UNIT – I

REVIEW: Review of working of BJT, JFET & MOSFET & their small signal equivalent circuits, Biasing of BJT, JFET, MOSFET circuits.

SINGLE AND MULTISTAGE AMPLIFIERS :

Classification of amplifiers, analysis of various single stage amplifier configurations, multistage amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, pass-band of cascaded stages, effect of an emitter bypass capacitor on low Frequency response, multistage CE amplifier.

UNIT – II

FEEDBACK AMPLIFIERS :

Feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers, input resistance, output resistance, voltage series feedback, current series feedback, current shunt feedback, voltage shunt feedback.

OSCILLATORS :

Sinusoidal oscillators, Barkhausen criteria, R-C phase shift oscillator, general form of oscillator circuit, Wien-bridge oscillator, crystal oscillator.

UNIT – III

POWER AMPLIFIERS :

Study of Class A, B and C operations, Class A large signal amplifiers, higher order harmonic distortion, efficiency, transformer coupled power amplifier, class B amplifier : efficiency & distortion; class A and class B push-pull amplifiers; class C power amplifier.

UNIT – IV

LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS :

Review of opamp, Scale changer, phase shifter, adder, voltage to current converter, current to voltage converter, DC voltage follower, Bridge amplifier, AC coupled amplifier, AC voltage follower, Integrator, differentiator.

NON-LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS :

Comparators, sample & hold circuits, Logarithmic amplifier, anti-log amplifier, logarithmic multiplier, waveform generators, Miller & Bootstrap sweep generators, regenerative comparator (Schmitt Trigger), multivibrators, ADC.

NOTE: The question paper shall have eight questions in all organized into four sections, each section having two questions from each of the four units. The candidate shall have to attempt five questions in all, selecting at least one question from each unit.

TEST BOOK :

1. Integrated Electronics : Milman Halkias, TMH.
2. Microelectronic Circuits : Sedra & Smith.
3. Operational Amplifiers : GaiKWad
4. Electronic Circuit Analysis and Design (Second edition) : D.A. Neamen; TMH

B.TECH ELECTRICAL ENGG.
POWER ELECTRONICS –II LAB.
6th Semester EE-318-E

| | | | | | |
|---|---|---|-------------------|---|--------|
| L | T | P | Class Work | : | 25 |
| - | - | 2 | Exam | : | 25 |
| | | | Total | : | 50 |
| | | | Duration of Exam. | : | 3 Hrs. |

LIST OF EXPERIMENTS :

1. To plot the graph between average output voltage V_o V/S speed of DC motor, DC generator $\frac{1}{2}$ HP using chopper ckt. (Variable pulse width control strategies).
2. To study the speed control of three phase induction motor using cycloconverter.
3. To find the output voltage of switched mode regulators. Buck-boost, cuk regulators by varying the duty cycle.
4. Draw the voltage waveform across thyristors, capacitors and average output voltage of Jones & Morgan chopper ckt. Give the comparison between two.
5. To find the output frequency of a single phase series inverter by varying (R, L, C component).
6. To draw the waveforms of a parallel inverter using two SCR's.
7. To draw the average output voltage of three phase to single phase cycloconverter (bridge type) for $\alpha = 30, 45, 60, 90$.
8. To find the r.m.s. value of output voltage by varying delta angle of single phase IGBT based P.W.M. inverter using :
 - i) Multiple P.W.M. Technique.
 - ii) Sinusoidal P.W.M. Technique.
9. To reduce the harmonics of inverter by using phase displacement control technique.
10. To study the operation of single phase dual converter, and also verify the equation $\alpha_1 + \alpha_2 = 180$.
11. To find the average output voltage of step up MOSFET based chopper ckt.

Note : At least nine experiments have to be performed in the semester. At least eight experiments should be performed from above list.

B.TECH ELECTRICAL ENGG.
Control System Lab.
5th Semester EE-311-E

L T P Total
- - 2 2

Sessional : 25 Marks
Practical : 25 Marks
Total : 50 Marks
Duration : 3Hr.

1. Experiment to study D.C. Position control system.
2. Experiment to study linear system simulator.
3. Experiment to study light intensity control using P & PI controller with provision for disturbance and transient speed control.
4. Experiment to study D.C motor speed control.
5. Experiment to study the stepper motor characteristics and its control through microprocessor kit.
6. Experiment to study Temperature control system..
7. Experiment to study Compensation design.
8. Experiment to study relay control system.
9. Experiment to study Potentials Metric Error detector.
10. Experiment to study SC Position control system.
11. Experiment to study synchros.

NOTE : At least 7 experiments are to be performed from the above list, other than this, two more experiments are to be performed depending upon the scope.

B.TECH ELECTRICAL ENGG.
ADVANCED PROGRAMMING LAB
6th Semester EE-314-E

L T P/D
- - 3

Sessional 50Marks
Practical : 25arks
Total : 75 Marks
Duration : 3 Hrs.

- 1) WAP to implement stack.
- 2) WAP to implement queues
- 3) Write a program to perform following operations on linked list. a) Insertion of a node b. Deletion of node.
- 4) WAP to sort a list using following a).Insertion sort b) Quick sort c) Bubble sort
- 5) WAP to implement searching techniques.
- 6) WAP to find addition & multiplication of two matrices using classes.
- 7) WAP that shows the use of copy constructor & distructor.
- 8) Implement a program using compile time polymorphism (function& operator overloading).
- 9) Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results maybe a DM object or DB object, depending on the units in which the results are required. The display should be in the format of feet and inches or metres and cenitmetres depending on the object on display
- 10) WAP which shows the use of inheritance(multiple & multilevel)
- 11) WAP to find roots of quadratic equation using run- time polymorphism.

NOTE : At least 9 practicals are to be performed from above list.