

Department of Electronics
Sri Y N College(Autonomous) – Narsapur
Andhra Pradesh, India

B.Sc. Electronics Syllabus
2019-20



SRI YAN COLLEGE (AUTONOMOUS)

(Affiliated to Adikavi Nannaya University)

Thrice Accredited by NAAC at 'A' Grade

Recognized by UGC as "College with Potential for Excellence"

I B.Sc. Electronics (CBCS)

Semester I (w.e.f. 2019-20)

Paper-I: BASIC CIRCUIT THEORY

UNIT-I: AC CIRCUIT FUNDAMENTALS (2 Essays + 1 Short)

(14 Lectures)

The Sinusoidal voltage current - wave –Average and RMS value of a wave– Phasor representation - 'j' operator, polar and rectangular forms of complex numbers, Differences between A.C and D.C. Concept of Impedance, frequency response of basic elements R, L & C. AC applied to RC, RL and RLC circuits – Phasor diagrams - Power factor in AC circuits – Simple Problems.

UNIT-II: PASSIVE NETWORKS (2 Essays + 2 Short)

(12 Lectures)

Concepts of ideal and practical voltage & current sources, regulation - Kirchhoff's current law – and Kirchhoff's voltage law – Method of solving AC and DC circuits by Kirchhoff's laws - Branch current method, Mesh analysis - Nodal analysis, star to delta & delta to star network conversions - Numerical problems

UNIT-III: NETWORK THEOREMS (2 Essays + 2 Shorts)

(12 Lectures)

Superposition Theorem–Thevenin's Theorem– Nortons' Theorem–Thevenising a circuit – Thevenin Norton conversions -Maximum power transfer Theorem–Millmans' Theorem- Reciprocity Theorem – Problems in the above all the theorems.

UNIT-IV: RC AND RL CIRCUITS (2 Essays + 1 Short)

(12 Lectures)

Transient response of RC and RL circuits with DC input, Time constants- Frequency response of RC and RL circuits, their action as Low pass and High pass filters - Passive differentiating and integrating circuits - Numerical problems.

UNIT-V : SERIES AND PARALLEL RESONANCE CIRCUITS (2 Essays + 2 Shorts)

(10 Lectures)

Series Resonance: Expression for Resonant frequency, frequency response curve, Bandwidth, Q-factor, selectivity, Relation between Q-factor, Resonant frequency and Bandwidth. Voltage Magnification circuit.

Parallel Resonance: Expression for Resonant frequency, frequency response curve, Bandwidth, Q-factor, selectivity, Relation between Q-factor, Resonant frequency and Bandwidth. Current Magnification circuit.

Comparison of Series and parallel Resonance. Tank circuit, LC oscillations- Numerical problems.

Text Books:

1. Electronic circuits by David A. Bell 7th edition Oxford higher education
2. Robert L. Boylestad, "Introductory circuit analysis", Universal Book Stall Fifth edition.2003.
3. Circuit analysis by P. Gnanasivam – Pearson education
4. Networks, lines & fields by Ryder-PHI
5. Circuit and Networks – A. Sudhakar and Shyam mohan –TMH.

Blue Print (Guide lines to Paper Setter)

Unit No	Essay Questions	Short Answer Questions
I	2	1
II	2	2
III	2	2
IV	2	1
V	2	2



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I B.Sc. Electronics (CBCS)
Semester I (w.e. f. 2019-20)
Paper-I: BASIC CIRCUIT THEORY

Time: 3hrs

Max.Marks:75

PART-I

Answer any FIVE questions

5x5m = 25 m

1. Explain power factor in A C circuits.
2. State and explain Kirchhoff's Current and voltage laws.
3. Explain Branch current method with example
4. State and prove Maximum Power Transfer theorem.
5. State and Prove milliman 's Theorem.
6. Explain the frequency response of an RL circuit as a high pass filter
7. Explain how a LC tank circuit produces oscillations.
8. Compare Series and Parallel resonance in RLC circuits.

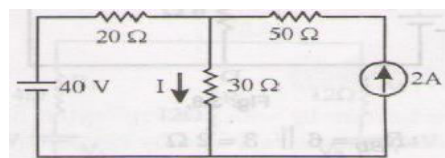
PART-II

Answer any FIVE questions, choosing at least TWO from Sections A&B.
Each question carries 10marks.

5x10m=50m

SECTION-A

9. Define and derive expressions for RMS and Average values of a sine wave.
10. Define power factor. Derive an expression for power factor in ac circuits.
11. Explain the loop current method of solving two source networks.
12. Explain the conversion of Star to Delta and Delta to Star networks.
13. State and explain superposition theorem. Find the current 'I' in the circuit using superposition theorem.



SECTION-B

14. State and prove Thevenin's theorem.
15. Discuss the frequency response of an LR circuit.
16. Discuss the working of RC circuit as high pass and low pass filters.
17. Derive expression for resonant frequency of series RLC circuit and explain its frequency response.
18. Derive expression for band width of a parallel LCR circuit.



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Semester I (w.e. f. 2019-20)

Paper-I: BASIC CIRCUIT THEORY LAB

Demonstration of C.R.O: Demonstration using CRO Kit - Block diagram concepts etc., in lab session (Using slides.)

(At least 8 experiments should be done)

1. Measurement of D.C & A.C voltage, frequency using CRO.
2. Verification of Kirchhoff's Laws
3. Thevenin's theorem – Verification.
4. Norton's theorem – Verification.
5. Maximum power transfer theorem – Verification.
6. CR Circuit – Frequency response (Low pass and High pass)
7. LR Circuit – Frequency response (Low pass and High pass)
8. LCR Series resonance circuit – frequency response, Determination of Q and Band width
9. LCR Parallel resonance circuit – frequency response, Determination of Q and Band width

LAB MANUAL

Zbar, Malvino and Miller, Basic Electronics, A Text Lab Manual, Tata McGraw Hill.

***Lab experiments are to be done on breadboard and simulation software (using Multisim) and output values are to be compared and justified for variation.**



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Semester II (w.e. f. 2019-20)

Paper-II: ELECTRONIC DEVICES & CIRCUITS

UNIT-I:: SEMICONDUCTOR DIODES (2 Essays + 2 Shorts) (12 Lectures)

P-N junction diode - P-N junction theory, depletion region, barrier potential, forward bias and reverse bias of diode, Junction capacitance, Diode current equation (no derivation), Effect of temperature on reverse saturation current, V-I Characteristics. Zener and Avalanche Break down mechanisms, Zener diode - V-I characteristics, Regulated power supply using Zener diode, Varactor Diode and Tunnel Diode - Principle, Working & Applications.

UNIT-II::BIPOLAR JUNCTION TRANSISTOR (BJT)(2 Essays + 1 Short) (16 Lectures)

PNP and NPN transistors, current components in BJT, Early effect, CB, CE Configurations, Static Input and Output characteristics of BJT in CB & CE configurations. Transistor as an amplifier. CE configuration as two port network. h-parameters - h-parameter equivalent circuit of transistor in CE configuration. Stability factor, thermal runaway, Biasing- fixed bias and voltage divider bias methods, DC load line analysis and determination of Q-point

UNIT-III:: FIELD EFFECT TRANSISTOR & UJT (2 Essays +2 Shorts) (14 Lectures)

Types of FETs, JFET Construction, Working, Drain & Transfer characteristics and FET Parameters. Enhancement MOSFET and Depletion MOSFETs Construction, Working and Drain characteristics. Comparison of FET&BJT and JFET&MOSFET.

UNIT-IV::(2 Essays +1 Short) (8 Lectures)

Uni-Junction Transistor (UJT) Construction, working, Characteristics of UJT and Application of UJT as a Relaxation oscillator.

PHOTO ELECTRIC DEVICES

Construction and working of Photo conductive cell (LDR), Photo-Voltaic cell, Solar cell, Photo diode, LED and LCD.

UNIT-V :: POWER SUPPLIES:(2 Essays+ 2 Shorts) (10 Lectures)

Rectifiers - Half wave, full wave and bridge rectifiers, Efficiency, Ripple factor and Regulation. Filters- Types of filters, L-Section and Π -section filters working (no derivation for ripple factor). Block diagram of regulated power supply. Three terminal IC regulators (78XX and 79XX). Principle and working of Switch Mode Power Supply (SMPS) (Elementary ideas).

TEXTBOOKS:

1. Electronic Devices and Circuits David A.Bell, Fifth edition. Oxford university press
2. A.P Malvino, "Principles of Electronics", TMH, 7th edition
3. T.F. Bogart, Beasley, "Electronic Devices and circuits", Pearson Education, 6th Edition
4. N.N. Bhargava, D.C Kulshreshtha, and S.C Gupta, "Basic Electronics and Linear Circuits" TMH
5. T.L.Floyd, "Electronic Devices and circuits", PHI, Fifth edition
6. V.K. Mehta, "Principles of Electronics", S Chand & Co. New edition

REFERENCE BOOKS:

1. Sedha R.S., A TextBook of Applied Electronics, S. Chand & Company Ltd.
2. Unified Electronics, Vol. I (Circuit Analysis and Electronic devices) by Agarwal-Arora.

Blue Print (Guide lines to Paper Setter)

Unit No	Essay Questions	Short Answer Questions
I	2	2
II	2	1
III	2	2
IV	2	1
V	2	2



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Semester II (w.e. f. 2019-20)

Paper-II: ELECTRONIC DEVICES & CIRCUITS

Time: 3 Hrs

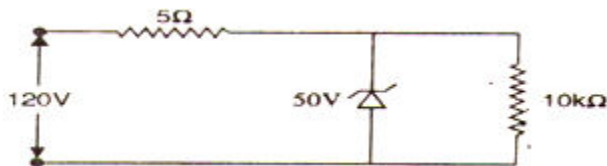
Max. Marks: 75

PART – A

Answer any FIVE questions.

5 x 5 = 25 Marks

1. Explain the terms 'depletion region' and 'barrier potential' of a PN junction.
2. In a Zener voltage regulator circuit, calculate the voltage drop across 5Ω series resistor and also current through the Zener diode when load $R_L=10k\Omega$.



3. For a fixed bias circuit, $V_{CC}=12V$, $V_{CE}=2V$, $\beta=80$ and $I_C=4mA$. Calculate R_C and R_B .
4. Give the comparison between FET over BJT.
5. Explain UJT as a relaxation oscillator.
6. Explain the construction and working of LDR.
7. Explain the construction and working of Photo Diode
8. Explain the working of π -section filter.

Answer any FIVE questions, choosing at least TWO from Sections A&B.

Each question carries 10marks.

5x10m=50m

PART – B

9. Explain the working of PN junction diode in forward bias and reverse bias conditions.
10. Describe the construction and working of Tunnel Diode. Draw its V-I characteristics.
11. Draw the experimental arrangement to draw input and output characteristics of a transistor in CE configuration. Explain the characteristic curves.
12. Define Stability factor. Explain voltage divider bias circuit of a transistor.
13. Describe the operation of JFET. Draw and explain its output characteristic curves.

PART – C

14. Describe the construction and working of an UJT with its Emitter Characteristics.
15. Explain the construction, working and applications of photovoltaic cell.
16. Describe the construction and working of LED. Mention its applications.
17. Explain the working of full wave rectifier and obtain the expression for its efficiency.
18. Draw the block diagram of SMPS and explain its working.



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Paper-II: ELECTRONIC DEVICES & CIRCUITS LAB

(Any 8 experiments should be done)

1. V-I Characteristics of Junction Diode.
2. V-I Characteristics of Zener Diode.
3. Regulated Power Supply using Zener Diode.
4. BJT input and output Characteristics (CE Configuration) and determination of h-parameters.
5. Characteristics of JFET determination of parameters.
6. Characteristics of UJT and determination of parameters.
7. LDR characteristics.
8. Characteristics of C-filter and π section filters using full wave rectifier.
9. IC Transistor Series and shunt Voltage regulator.
10. IC Regulated Power Supply (78xx).

LAB MANUAL:

1. Zbar. Malvino and Miller, Basic Electronics, A Text Lab manual, Tata McGraw Hill .
2. Sugaraj Samuel R., Horsley Solomon. B.E.S.Practicals.

***Lab experiments are to be done on breadboard and simulation software (using Multisim) and output values are to be compared and justified for variation.**



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Semester III (w.e. f. 2019-20)

Paper-III: ANALOG ELECTRONICS & DIGITAL PRINCIPLES

UNIT-I: Amplifiers and Oscillators: (2 Essays + 2 Shorts) (14 Lectures)

Classification of Amplifiers (Qualitative only), RC coupled CE amplifier working and its frequency response. Concept of Feedback, types of feedback, Advantages and disadvantages of negative feedback (Qualitative Only). Oscillators: Types of oscillators. Barkhausen criterion for sustained Oscillations, Colpitts oscillator and RC Phase Shift oscillators working and Frequency of Oscillation (No Derivation for Frequency of Oscillation)

UNIT-II: Operational Amplifier: (2 Essays + 1 Short) (10 Lectures)

Basic Op-amp, Characteristics of an ideal and practical op-amp (IC 741), Block diagram of Op-Amp, Virtual Ground, differential amplifier, Inverting, Non-Inverting amplifiers, Adder, Subtractor, Voltage follower, Integrator, Differentiator, Voltage to current and Current to voltage converters., Logarithmic amplifier.

UNIT-III: Applications of Op-amps: (2 Essays + 2 Shorts) (14 Lectures)

Voltage regulator, Comparator & Zero crossing detector, Schmitt Trigger, Wien's bridge Oscillator, Triangular Wave Generator, Active filters (Basics): low pass, high pass & Band pass filters.

IC555 Timer: Functional block Diagram, Astable, Monostable, working and their applications.

UNIT-IV: Number Systems & Codes: (2 Essays + 1 Short) (10 Lectures)

Decimal, Binary, Octal, Hexadecimal Number systems and conversion from one another, Complements (1's and 2's), Arithmetic (addition, and subtraction by complement method), Representation of Signed & Unsigned Numbers, BCD, Gray, Excess-3 code conversion from one to another.

UNIT - V: Logic Gates and Logic families: (2 Essays + 2 Shorts) (12 Lectures)

Digital logic gates: OR, AND, NOT, XOR and XNOR, Universal gates (NAND and NOR), IC logic families: TTL & CMOS Logic families (NAND & NOR Gates), Comparison of TTL & CMOS Families.

Text Books:

1. Electronics Devices & Circuits ,Millman and Halkias,Tata Mc Graw Hill(TMh)
2. Principles of Electronics-V K Mehta & Rohit Mehta,S Cnand & Co
3. Unified Electronics , Vol. II ,A.S. Prakashan, Meerut.
4. Electronic Devices & Circuits, Sanjeev Gupta & Santosh Gupta, Dhanpat Rai Pub
5. Operational Amplifiers & Linear Integrated Circuits, Ramakant A.Gayakwad, PHI.
6. G.K.Kharate-Digital electronics-oxford university press
7. M.Morris Mano, " Digital Design " 3rd Edition, PHI, New Delhi.

Reference Books :

8. Jacob Millan ,Micro Electronics,McGraw Hill.
9. Mithal G K, Electronic Devices and Circuits Thana Publishers.
- 10.Allan Motter shead ,Electronic Devices and Circuits – An Introduction- Prentice Hall

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Unit No	Essay Questions	Short Answer Questions
I	2	2
II	2	1
III	2	2
IV	2	1
V	2	2



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Semester III (w.e. f. 2019-20)

Paper-III: ANALOG ELECTRONICS & DIGITAL PRINCIPLES

Time: 3hrs

Max.Marks:75

PART-I

Answer any FIVE questions

5x5m = 25 m

1. What is feedback? Explain different types of feedback
2. Explain concept of Barkhausen criterion for sustained oscillations.
3. Write any Five Characteristics of Ideal Op-Amp?
4. Explain the Working of Op-Amp as Comparator
5. Draw the circuit diagram of an Monostable multivibrator using IC 555 timer and write its applications.
6. Subtract $100111_{(2)}$ from $110011_{(2)}$ Using 2's complement method and verify the result
7. Show that the NAND & NOR Gates are Universal Logic Gates
8. Write a short note on Comparison of TTL and CMOS families

PART-II

Answer any FIVE questions, choosing at least TWO questions from Sections A&B.

Each question carries 10 marks.

5x10m = 50m

SECTION-A

9. Draw the circuit diagram of single stage RC coupled CE amplifier and explain its working. Draw its frequency response curve.
10. Draw the circuit diagram of Phase shift oscillator and explain its working.
11. Draw the circuit diagram of inverting and non-inverting amplifiers and explain. Derive expression for their gains.
12. Discuss the working of Integrator and Differentiator circuits using Op-amp.
13. Draw the circuit diagram of Triangular wave generator using op-amp and explain its operation. Derive expression for its frequency of oscillation.

SECTION-C

14. Draw the circuit diagram of Astable multivibrator using IC 555 timer and explain its operation?
15. Explain in detail the system of converting Binary number to Decimal number and Decimal number to Binary number.
16. Explain with suitable examples of 1's and 2's complement method of subtraction used in binary number system.
17. Describe the following gates and draw their truth tables.
(i) AND (ii) OR (iii) X-OR (iv) NAND gate (v) NOR gates
18. Draw the circuit diagram of a TTL NAND gate and explain its working.



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Paper-III: ANALOG ELECTRONICS & DIGITAL PRINCIPLES LAB

➤ **Any 8 Experiments Among the following Experiments.**

1. To construct & determine the frequency of the **Colpitt's Oscillator** using transistor.
2. To construct & determine the frequency of the **RC Phase-Shift Oscillator** using transistor.
3. Op-Amp as **inverting & Non-inverting Amplifier** using IC741
4. Op-Amp as **Integrator & Differentiator** using IC741
5. Op-Amp as **Adder & Subtractor** using IC741
6. To construct & determine the frequency of the **Wien's Bridge Oscillator** using IC741
7. To construct & determine the frequency of the **Astable Multivibrator** using IC-555
8. **Schmitt Trigger** using IC-555 timer
9. Verification of Truth Tables of IC-logic gates using ICs.
10. Realization of basic gates using discrete components (resistor, diodes & transistor).
11. Realization of basic gates using Universal gates (NAND & NOR gates).

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Semester IV (w.e. f. 2019-20)

Paper-IV: DIGITAL ELECTRONICS & DIGITAL IC APPLICATIONS

UNIT-I: (2 Essays + 1 Short)

(12 Lectures)

Boolean Algebra: Boolean laws & theorems, De-Morgan's laws, Standard form of Boolean expressions (SOP&POS), Minimization Techniques (Karnaugh Map Method: 4 variables), Don't care condition.

UNIT-II: (2 Essays + 2 Shorts)

(12 Lectures)

Combinational Digital circuits : Adders - Half & Full Adders, Subtractors-Half & Full Subtractors, Parallel Binary Adder and Parallel Binary Subtractor, Multiplexers (2:1,4:1) and Demultiplexers (1:2, 1:4), Encoder (8-line-to-3-line) and Decoder (3-line-to-8-line).

UNIT-III: (2 Essays + 2 Shorts)

(12 Lectures)

Sequential Digital circuits: Flip-Flops: R-S Flip-Flop, R-S-T Flip-Flop, D Flip-flop, J-K Flip-Flop, T- Flip-Flop, Master-slave JK Flip-Flop their working & Truth Tables.

UNIT-IV: (2 Essays + 2 Shorts)

(14 Lectures)

Registers: Shift Register, Shift left register and shift right register. **Counters:** Asynchronous: Mod-16, Mod-10 Down counters, Synchronous: 4-bit Up / Down counter & Ring counter.

Design of Code convertor: BCD to Seven Segment, BCD to Grey, Grey to Binary.

UNIT-V: (2 Essays + 1 Short)

(10 Lectures)

Data Converters: Introduction, Digital to Analog (DAC) converter: Binary weighted Resistor DAC, R-2R Ladder type DAC, Analog to Digital Converters (ADC): Successive Approximation type ADC.

Text Books:

1. M.Morris Mano Digital System Design, Pearson Education Asia,(4th Edition)
2. Modern Digital Electronics-R..P Jain,TMH
3. Ronald J Tocci."Digital systems-Principles & Applications"6/e.PHI. New Delhi.1999.
4. G.K. Kharate-Digital Electronics-Oxford University Press.

References:

5. S.Salivahana & S Arivazhagan-Digital Circuits design
6. Fundamentals of Digital Circuits by Anand Kumar
7. Jacob Millan ,Micro Electronics, McGraw Hill.

Blue Print (Guide lines to Paper Setter)

Unit No	Essay Questions	Short Answer Questions
I	2	1
II	2	2
III	2	2
IV	2	2
V	2	1



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Semester IV (w.e. f. 2019-20)

Paper-IV: DIGITAL ELECTRONICS & DIGITAL IC APPLICATIONS

Time: 3hrs

Max.Marks:75

PART-I

Answer any FIVE questions

5x5m = 25 m

1. State and prove De-Morgan's theorems.
2. Draw and explain the working of 4:1 multiplexer.
3. Explain the operation of half adder with truth table.
4. Write about T Flip-flop
5. Draw the circuit diagram of JK flip-flop and give its truth table.
6. Differentiate between Counter and Register. Give their applications.
7. Explain briefly about Ring Counter.
8. Draw circuit of Weighted Resistor DAC and explain its principle of working.

PART-II

Answer any FIVE questions, choosing at least TWO from Sections A&B.

Each question carries 10marks.

5x10m=50m

SECTION-A

9. Explain standard representation of logic functions SOP and POS with suitable examples.
10. Explain the four variable Karnaugh Map method with example.
11. Explain the operation of Full Adder with Truth Table.
12. Explain the working of Encoder (8-line-to-3-line) with truth table
13. Draw and explain the working of Clocked RS flip-flop with truth table.

SECTION-C

14. With a neat circuit diagram, explain the working of Master Slave JK Flip-Flop.
15. Draw and explain the working of negative edge triggered synchronous 4-bit Up-counter.
16. Discuss the design of BCD to Grey, Grey to Binary Code convertors.
17. Draw the circuit diagram of R-2R Ladder type DAC and explain its working.
18. Draw the circuit diagram of Successive Approximation type ADC and explain its working.



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Semester IV (w.e. f. 2019-20)

Paper-IV: DIGITAL ELECTRONICS & DIGITAL IC APPLICATIONS LAB

➤ **Any 8 experiments among the following experiments.**

1. Verification of De-Morgan's laws
2. Construction of Half adder and full adders & Verify their truth Tables using gates
3. Construction of Half subtractor and full subtractor & Verify their truth Tables using gates
4. Construction of RS ,JK, D& T Flip-Flops & verify their truth Tables using NAND gates
5. Construction of Master Slave JK Flip-Flop & verify truth Table
6. Construction of Decade Counter and Study of Wave forms
7. Design a 4 x 1 Multiplexer using gates
8. 4-bit binary parallel adder and subtractor using IC 7483
9. BCD to Seven Segment Decoder using IC -7447/7448

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Semester V (w.e.f. 2019-20)

Paper-V: MICROPROCESSORS PROGRAMMING & APPLICATIONS

Total: 60 Lectures

Unit I (2 Essays + 2 Shorts)

(12 Lectures)

Introduction to Microprocessors: Introduction, Applications, Basic block diagram.

Microprocessor 8085: Features, Architecture-Block diagram, Pin description of 8085, registers of 8085, Types of Buses, Instruction set classification.

Unit II (2 Essays + 1 Short)

(12 Lectures)

Memory System: Basic Interfacing Concepts, 2K X 8 ROM, RAM to 8085, Interfacing of I/O Mapped I/O and Memory Mapped I/O, Difference between I/O Mapped I/O and Memory Mapped I/O. Instruction cycle - machine cycle - T-states, Timing diagrams for Opcode Fetch Cycle, Memory Read, Memory Write, I/O Read, I/O Write, Addressing modes

Interrupts of 8085: Interrupt structure of 8085

Unit III (2 Essays + 2 Shorts)

(12 Lectures)

Programming 8085: Introduction to assembly Language Programming, Addition, Subtraction, Multiplication, Division, Largest/smallest & Ascending/Descending (all 8-bit data), Stack & Subroutines concept, Debugging program.

Unit IV (2 Essays + 1 Short)

(12 Lectures)

Interfacing Devices to 8085: Programmable peripheral interface (PPI) intel 8255- Pin functions, Different Modes & Block Diagram, Keyboard and Display Interface 8279 (Architecture).

Unit V (2 Essays + 2 Shorts)

(12 Lectures)

Applications of 8085: Interfacing of simple Temperature controller, Stepper motor control.

Introduction to Microprocessor 8086(Additional Input): Features of 8086 (16-bit Microprocessor), Architecture of 8086, Pin Description of 8086, Concept of parallel Processing.

Reference Books:

1. Microprocessor Architecture Programming & Applications with 8085, 2002, R.S. Goankar, Prentice Hall.
2. Fundamentals of Microprocessor & Microcomputer: B.Ram-Danpat Rai Publications.
3. Muhammad Ali Mazidi, "Microprocessor & Microcontrollers", Pearson, 2006
4. Microprocessor & its Applications, 2nd Edition, A Nagoor Kani, RBA Publications.

Blue Print (Guide lines to Paper Setter)

Unit No	Essay Questions	Short Answer Questions
I	2	2
II	2	1
III	2	2
IV	2	1
V	2	2



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Semester V (w.e.f. 2019-20)

Paper-V: MICROPROCESSORS PROGRAMMING & APPLICATIONS

Time: 3hrs

Max.Marks:75

PART-I

Answer any FIVE questions

5x5m = 25 m

1. Explain the Basic Block Diagram of Microprocessor.
2. Explain the different types of buses in 8085 Microprocessor.
3. What are the differences between I/O Mapped I/O and Memory Mapped I/O?
4. Explain about the Stack.
5. Write an Assembly Language Program to find the Addition of Two 8-bit Numbers.
6. Explain the control word of Programmable Peripheral Interface (PPI)-Intel 8255
7. Write the features of 8086 Microprocessor
8. Explain the concept of parallel processing in 8086 Microprocessor.

PART-II

Answer any FIVE questions, choosing at least TWO from Sections A&B.

Each question carries 10marks.

5x10m=50m

SECTION-A

9. Draw and Explain the Architecture of 8085.
10. Explain the pin diagram of 8085 Microprocessor
11. Explain the various Addressing Modes of 8085 With Examples
12. Describe the Hardware and Software Interrupts of 8085
13. Write an Assembly Language Program to find the Largest Number in an array of 8-bit Numbers in 8085.

SECTION-B

14. Write an Assembly Language Program to arrange an array of 8-bit numbers in Ascending Order of 8085
15. Draw the functional block diagram of 8255 Programmable Peripheral Interface (PPI) and explain.
16. Draw and Explain the Interfacing of Keyboard Controller-Intel 8279 with 8085.
17. Draw and Explain the Interfacing of Stepper motor with 8085.
18. Explain the Pin Description of 8086 with neat diagram.



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Semester V (w.e. f. 2019-20)

Paper-V: MICROPROCESSORS PROGRAMMING & APPLICATIONS LAB

(Hardware & Software)

(Any Eight experiments should be done)

(30 Lectures)

8085 Microprocessor programming Lab

1. Addition & Subtraction (8 & 16-bits)
2. Multiplication & Division (8 - bit)
3. Largest & Smallest number in the given array.
4. Ascending & Descending order.
5. Binary to ASCII
6. ASCII to Binary
7. BCD to ASCII
8. ASCII to BCD.
9. Block Transfer of Data.
10. Waveform generation using DAC interface.
11. Stepper motor interface.



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Semester V (w.e.f. 2019-20)

Paper-VI: ELECTRONIC COMMUNICATION SYSTEMS

(Total: 60 Lectures)

Unit I (2 Essays + 2 shorts)

(14 Lectures)

Basics of Communication Systems: Introduction, Block diagram, Noise in Communication systems, Types of noise, Signal-to-Noise (S/N) ratio, Figure of Merit.

Modulation & Demodulation (Qualitative only): Introduction, Need for modulation, Types, Amplitude Modulation: AM Modulating Amplifier, Amplitude Demodulation: AM Diode detector; Frequency Modulation: Varactor diode Modulator, FM Discriminators: Ratio Detector.

Unit II (2 Essays + 1 Short)

(12 Lectures)

Transmitters & Receivers: Introduction, AM Transmitters: AM Broadcast Transmitter, FM Transmitters : Directly modulated FM Transmitter, FM Stereo Transmitter, AM broadcast receivers: Superhetrodyne receiver, FM receivers: Stereo FM receiver, Introduction to Antennas, Basic Principle, Types of Antennas (Qualitative only).

Unit III (2 Essays + 2 Shorts)

(14 Lectures)

Digital Communications: Introduction, Elements of Digital Communication System, advantages, PCM, Sampling Theorem, Quantization, Digital Modulation Techniques: Concepts of ASK, FSK, PSK, QPSK (Qualitative only), Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Pulse Modulation: Concepts of PAM, PWM, PPM (Qualitative only).

Unit IV (Additional input) (2 Essays + 2 Short)

(12 Lectures)

Satellite Communications: Introduction to Satellite Communication, Satellite orbits, Basic Components, Constructional features.

Fiber Optic Communications: Basic fiber optic system, Advantages, Modes of propagation, Concept of Numerical aperture, Basic Optical Communication System.

Unit V (Additional input) (2 Essays + 1 Short)

(12 Lectures)

Cellular Mobile Communications – Basic concept, concept of cell sectoring and cell splitting, SIM number, IMEI number, block diagram of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies., block diagram of mobile phone handset, 4G & 5G concepts.

Reference Books:

1. Principles of Communication Engineering, Anokh Singh, A.K. Chhabra., S.Chand, publication
2. Electronic Communication Systems. G. Kennedy, 3rd Edn., Tata McGraw Hill
3. R.P Sing and S.D. Sapre, Communication Systems: Analog and Digital, Tata McGraw Hill
4. Advanced Electronic Communication Systems-Tomasi, 6th edition, prentice Hall.
5. Communication Systems, S Haykin, 2006, Wiley India
6. Unified Electronics, Vol.II, J.P. Agarwal, A.S.Prakashan publication.

Blue Print (Guide lines to Paper Setter)

Unit No	Essay Questions	Short Answer Questions
I	2	2
II	2	1
III	2	2
IV	2	2
V	2	1



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Paper-VI: ELECTRONIC COMMUNICATION SYSTEMS

PART-I

Answer any FIVE questions

5x5m = 25 m

1. Explain the concept of noise in communication systems.
2. Write about different type's modulations in communication systems
3. Explain the basic principle of antenna
4. Explain about Quantization.
5. Compare PAM, PWM and PPM Modulation Techniques.
6. Explain the Basic Components of Satellite Communication System.
7. What are the advantages of Fiber Optic System?
8. Explain briefly about the GSM Technology.

PART-II

Answer any FIVE questions, choosing at least TWO from Sections A&B.

Each question carries 10marks.

5x10m=50m

SECTION-A

9. Draw and Explain the Block diagram of Communication System.
10. What is Amplitude Modulation? Explain the operation of AM Modulating Amplifier
11. Draw the Block diagram of Superhetrodyne receiver and explain the function of each block.
12. Draw and Explain the Block diagram of FM Receiver.
13. Explain about the Pulse Code Modulation System (PCM) with neat diagram.

SECTION-B

14. What is Multiplexing? Explain about Time Division Multiplexing.
15. Explain types of the Satellite Orbits and state their merits and demerits.
16. Draw and Explain the Basic Optical Communication System.
17. Draw & explain the block diagram of mobile phone handset.
18. Draw & Explain the block diagram of mobile communication network.



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Semester V (w.e. f. 2019-20)

Paper-VI: ELECTRONIC COMMUNICATION SYSTEMS LAB

(Hardware & Circuit Simulation Software)

(Any Eight experiments should be done)

(30 Lectures)

1. Amplitude Modulator circuit and study of its wave forms
2. Amplitude Demodulator circuit and study of its wave forms
3. Frequency Modulator circuit and study its wave forms
4. Frequency Demodulator circuit and study its wave forms
5. Study of AM Transmitter & Receiver
6. Study of FM Transmitter & Receiver
7. TDM circuit and study its wave forms
8. FDM circuit and study its wave forms
9. Pulse Amplitude Modulation(PAM) circuit and study its wave forms
10. Pulse Width Modulation(PWM) circuit and study its wave forms
11. Pulse Position Modulation(PPM) circuit and study its wave forms
12. Pulse Code Modulation(PCM) circuit and study its wave forms
13. Modulation of LED and detection through Photo detector.



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Semester VI (w.e. f. 2019-20)

Paper-VII: MICROCONTROLLERS AND INTERFACING

(Total :60 Lectures)

Unit I (2 Essays + 2 Shorts)

(12 Lectures)

Introduction to Microcontrollers: Introduction to Microcontrollers, Harvard vs Von Neumann Architectures, RISC & CISC Microcontrollers.

Microcontroller 8051: Overview of 8051 family, Key Features of 8051, block diagram of 8051 Microcontroller, Architecture of 8051, Pin Diagram & Memory organization of 8051

Unit II (2 Essays + 1 Short)

(12 Lectures)

Programming of 8051: Introduction, Addition, Multiplication, Division, Largest/smallest & Ascending/Descending order (all 8-bit data), Program Counter, PSW register, Stack, Addressing modes, Instruction set, Jump, Loop & Call instructions.

Unit III (2 Essays + 2 Shorts)

(12 Lectures)

I/O Port Programming of 8051: Introduction, I/O Ports Pins Description and their functions.

Timer & Counter Programming of 8051: Introduction to Timers & Counters, Timer/Counter Operation Modes.

Unit IV (2 Essays + 1 Short)

(12 Lectures)

Serial Port Programming of 8051: Basics of Serial Communication, 8051 Serial Communication, 8051 connection to RS232, 8051 Serial Communication Modes.

Interrupts Programming of 8051: Introduction to 8051 Interrupts, 8051 Interrupt Structure, Programming, Timer Interrupts-External Hardware Interrupts & Serial Communication Interrupts.

Unit V (2 Essays + 2 Shorts)

(12 Lectures)

Interfacing 8051 Microcontroller to Peripherals: ADC & DAC Interfacing, LCD, LED , Key board & Stepper Motor interfacing

Reference Books:

1. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
2. The 8051 Microcontroller Hardware, Software and Applications: V Udayashankara, M S M Swamy-McGraw-Hill Company.
3. Microcontrollers Theory & Applications Ajay V Deshmukh- McGraw-Hill Company.
4. Microcontrollers-Architecture, Programming, Interfacing & System Design: Raj Kamal, Pearson Education India.

Blue Print (Guide lines to Paper Setter)

Unit No	Essay Questions	Short Answer Questions
I	2	2
II	2	1
III	2	2
IV	2	1
V	2	2



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Semester VI (w.e. f. 2019-20)

Paper-VII: MICROCONTROLLERS AND INTERFACING LAB

(Hardware & Software)

(Any Eight experiments should be done)

(30 Lectures)

8051(AT89C51) Microcontroller Programming

1. Program to Find the sum of an array of N 8-bit Numbers
2. Program to multiply/ Divide Two 8-bit Numbers
3. Program to find the Largest/Smallest Number in an array of N 8-bit numbers
4. Program to arrange the N numbers in Ascending/descending Order
5. Program to Convert Packed BCD to ASCII/ASCII to Packed BCD
6. Program to Toggle all the bits of p0,p1,p2 every 250ms. Assume a crystal frequency of 11.0592
7. Program to Generate a Square wave with an 'ON' time of 3ms and an 'OFF' time of 10ms on all pins of Port0 using Timer 0 in mode1. Assume a crystal frequency of 11.0592
8. Program to Transfer the Message "ELECTRONICS" using Serial Communication.
9. Program to Display the Message "ELECTRONICS" Continuously on the LCD using delays.
10. Program to Generate Staircase & Triangular Waveforms using DAC Interfacing.
11. Program for temperature sensor interfacing through serial port on 8051
12. Program to Interface a Stepper Motor & rotate it Clock Wise or Anti-Clock Wise Direction.
13. Program to drive PWM control of DC motor.
14. Hello LED – Flash LED at a rate such that the LED appears always on. Estimate the on set of the rate when the LED appears to stay on
15. Use the switch to select the LED (from RGB led) and then the potentiometer to set the intensity of that LED and thus create your own color from amongst 16 million colors.



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Semester VI (w.e.f. 2019-20)

Paper-VII: MICROCONTROLLERS AND INTERFACING

Time: 3hrs

Max.Marks:75

PART-I

Answer any FIVE questions

5x5m = 25 m

1. Explain the differences between Harvard & Von-Neumann architectures.
2. What are the key features of 8051 Microcontroller?
3. Write an Assembly Language Program to add Two 8-bit numbers.
4. Write an Assembly Language Program to Toggle all the bits of P0, P1, and P2 every 250ms. Assume a crystal frequency of 11.0592 MHz.
5. Explain the function of TMOD register in Timers of 8051?
6. Write a short note on SCON Register of 8051
7. Draw the interfacing diagram of ADC to 8051
8. Describe the functions of the pins of the LCD?

PART-II

Answer any FIVE questions, choosing at least TWO from Sections A&B.

Each question carries 10marks.

5x10m=50m

SECTION-A

9. Draw the architecture of 8051 and explain each block?
10. Write in detail the memory organization of 8051 Microcontroller?
11. Explain the Various addressing modes of 8051 with examples?
12. Write an Assembly Language Program to arrange an array of 8-bit numbers in Ascending Order of 8051.
13. Write the various parallel I/O ports of 8051 and explain their multiple functions.

SECTION-B

14. Explain the Mode 1 Operation of Timers in 8051 with an example?
15. Explain the various modes of serial data communication in 8051.
16. What is an interrupt? Explain about various interrupts in 8051. .
17. Draw and explain the interfacing of DAC with 8051
18. Draw and explain the interfacing of LCD with 8051.



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Semester VI (w.e. f. 2019-20)

Paper-VIIIICE1: EMBEDDED SYSTEMS DESIGN

(Total: 60 Lectures)

Unit I (2 Essays + 2Shorts)

(12 Lectures)

Introduction to Embedded Systems: Overview of Embedded Systems, Features, Applications, Architecture of an Embedded System, Development and Testing Tools, Introduction to Application Software & Communication Software.

Unit II (2 Essays + 1 Short)

(12 Lectures)

The Process of Embedded System Development: The Development Process using Waterfall Model.

Advanced Communication Principles: Need for communication interfaces, Parallel Communication, Serial Communication, Wireless Communication, Serial Protocols: I²C, CAN and USB. Parallel Protocols: PCI BUS and ARM BUS. Wireless Protocols: Bluetooth, and IEEE 802.11.

Unit III (2 Essays + 2 Shorts)

(12 Lectures)

Embedded Systems Using AVR Microcontrollers: Introduction to AVR Microcontrollers Features of AVR ATmega32 Microcontroller, Architecture of AVR ATmega32, General Purpose Registers (GPRs), Status Register, Memories of AVR ATmega32.

Unit IV (2 Essays + 1 Short)

(12 Lectures)

DSP-based Embedded Systems: Need for DSP-based Embedded Systems, An Overview of Digital Signal Processing, Applications of DSP, Digital Signal Processor Architecture, DSP-based Embedded System Design Process.

Unit V (2Essays + 2Shorts)

(12 Lectures)

Robotics: Overview of Robotics, Components of Robot, Robot Locomotion-Types of robot Locomotion, ,Types of Robot, Use of Embedded Systems in Robotics ,Applications of Robotics.

Artificial Intelligence (AI): Introduction, contributions of AI, Applications of AI, Research areas of AI.

Reference Books:

1. AVR Microcontroller and Embedded Systems: Using Assembly and C by Muhammad Ali Mazidi,
2. Sarmad Naimi, SepehrNaimi, PHI.
3. Embedded system Design - Frank Vahid and Tony Givargis, John Wiley, 2002
4. Atmel AVR Microcontroller Primer: Programming and Interfacing by Steven F. Barrett, Daniel J. Pack, Morgan& Claypool Publishers.
5. Embedded Software Primer by David E Simon, Addison Wesley
6. Embedded/Real-Time Systems: Concepts, Design, & Programming by Dr K V K K Prasad, Dreamtech press.
7. AVR Microcontroller Datasheet, Atmel Corporation, www.atmel.com
8. Robotic Engineering – An Integrated Approach by Richard D Klafter, Thomas A. Chmielewski and Michael Negin (PHI)

Blue Print (Guide lines to Paper Setter)

Unit No	Essay Questions	Short Answer Questions
I	2	2
II	2	1
III	2	2
IV	2	1
V	2	2



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Semester VI (w.e. f. 2019-20)

Paper-VIICE1: PROJECT WORK

VIIICE1 Project Work



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Semester VI (w.e. f. 2019-20)

Paper-VIIIICE1: EMBEDDED SYSTEMS DESIGN

Time: 3hrs

Max.Marks:75

PART-I

Answer any FIVE questions

5x5m = 25 m

1. Write the features of an Embedded System.
2. Explain about Communication Software.
3. Discuss about the Parallel Communication.
4. Write a short note on Status Register of AVR ATmega32 Microcontroller
5. What are the features of AVR ATmega32 Microcontroller
6. Explain the need for DSP based Embedded Systems.
7. Write the Applications of Robotics.
8. Write a short on contributions of Artificial Intelligence.

PART-II

Answer any FIVE questions, choosing at least TWO from Sections A&B.

Each question carries 10marks.

5x10m=50m

SECTION-A

9. Draw and explain the Architecture of an Embedded System?
10. Discuss about Development & Testing Tools of an Embedded System?
11. Discuss about the Development Process of an Embedded System using Waterfall Model
12. Discuss about the Wireless Protocols (a) Bluetooth (b) IEEE 802.11
13. Draw and Explain the Architecture of AVR ATmega32 Microcontroller.

SECTION-B

14. Explain about memories of AVR ATmega32 Microcontroller?
15. Draw and Explain the Architecture of Digital Signal Processor.
16. Explain Different Applications of DSP.
17. What is Robot Locomotion? Explain different Types of Robot Locomotion's?
18. Explain Research Areas of Artificial Intelligence



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Semester VI (w.e. f. 2019-20)

Paper-VIICE2: CONSUMER ELECTRONICS

Unit I (2 Essays + 2 Short)

(12 Lectures)

Microwave Ovens: Microwaves (Range used in Microwave Ovens), Microwave oven block diagram, LCD timer with alarm, Single-Chip Controllers, Types of Microwave oven, Wiring and Safety instructions, Care and Cleaning.

Unit II (2 Essays + 1 Short)

(12 Lectures)

Washing Machines: Electronic controller for washing machines block diagram & its working Washing machine hardware and software, Types of washing machines, Fuzzy logic washing machines.

Unit III (2 Essays + 2shorts)

(12 Lectures)

Air Conditioners and Refrigerators: Air Conditioning, Components of Air Conditioning Systems, All water Air Conditioning systems, All Air Conditioning systems, Concepts of Unitary and Central Air Conditioning systems, Split Air Conditioners.

Unit IV (2 Essays + 1Short)

(12 Lectures)

Electronic Gadgets and Office Appliances: Barcode Scanner and Decoder, Xerox, Fax, Automated Teller Machines (ATMs), Calculator, Concepts of GPRS, GPS Navigation system.

Unit V (2 Essays + 2Shorts)

(12 Lectures)

Audio Video Systems: PA system: Microphone, Amplifier, Loudspeakers, Set Top boxes , Block diagram and its working of CATV, Dish TV, and CCTV, Concepts of LCD & LED displays, Remote Control Switch & its block diagram.

Reference Books:

1. S.P. Bali Consumer Electronics Pearson Education(2008)
2. R.G. Gupta Audio and Video systems Tata McGraw Hill(2004)

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Unit No	Essay Questions	Short Answer Questions
I	2	2
II	2	1
III	2	2
IV	2	1
V	2	2



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Semester VI (w.e. f. 2019-20)

Paper-VIICE2: CONSUMER ELECTRONICS LAB

(Hardware & Software)

(30 Lectures)

1. Study of PA systems for various situations – Public gathering , closed theatre / Auditorium, Conference room, Prepare Bill of Material(Costing)
2. Installation of Audio/Video systems – site preparation , electrical requirements , cables and connectors
3. Market Survey of products (at least one from each module)
4. Identification of block and tracing the system. Assembly and Disassembly of system using Toolkit
5. Assembly and Disassembly of system and printer.



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Paper-VIII CE2: CONSUMER ELECTRONICS

Time: 3hrs

Max.Marks:75

PART-I

Answer any FIVE questions

5x5m = 25 m

1. Draw the simple block diagram of digital timer in microwave Oven and explain in brief.
2. Explain different types of Microwave Ovens.
3. Explain the washing machine hardware with a neat diagram
4. Explain the components of a Air Conditioning system
5. Explain unitary, central and split Air conditioning systems in brief.
6. Explain about the ATM operation with a ATM requirements block diagram
7. Explain SET Top box operation with a diagram
8. Distinguish between LCD and LED displays

PART-II

Answer any FIVE questions, choosing at least TWO from Sections A&B.

Each question carries 10marks.

5x10m=50m

SECTION-A

9. Draw the block diagram of Microwave Oven and explain the function of each block.
10. Explain the operation of single chip microcontrollers with the help of block diagram.
11. Explain the mechanism of the Washing machine control with a neat sketch.
12. Explain developing the system for a washing machine control.
13. With the help of suitable diagram All- Air Air-conditioning system.

SECTION-B

14. Explain All Water Air-conditioning system with a neat diagrams
15. Explain the block diagram of Facsimile machine and explain.
16. Draw the block diagram of Barcode Scanner and Decoder and explain.
17. Draw the block diagram of CATV and explain its operation
18. Draw the Block diagram of Dish TV and explain its working.



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PAPER-VIIIICE3: POWER ELECTRONICS

Unit- I (2Essays + 2 Shorts)

(12 Lectures)

Power Electronics: Introduction, Need for Semiconductor Power devices, Block diagram of Power Electronic System, Semiconductor Power Devices -Thyristor family, Classification of Power Electronic Systems and Applications. **Silicon Controlled Rectifier (SCR) or Thyristor-** Structure and basic operation, Static V-I characteristics, Two transistor analogy.

Unit- II (2Essays + 1Short)

(12 Lectures)

Power Devices: Diac and Triac: Basic structure, working and V-I characteristics of Diac and Triac. **Power MOS FET:** Basic structure, Operation modes, Switching characteristics. **Power BJT:** Basic structure, Second break down, Saturation and Quasi-saturation state. **Insulated Gate Bipolar Transistors (IGBT):** Basic structure, I-V Characteristics, Switching characteristics

Unit- III (2Essays + 2 Shorts)

DC Choppers: Introduction to DC choppers, Types of DC choppers, Block diagram of DC chopper and Principle of operation, Classification of DC Choppers (Type A-E), principle of operation and analysis of Step-down (Buck), Step-up (Boost), Step down/up (Buck-boost) choppers without isolation.

Unit-IV (2Essays + 1 Short)

(12 Lectures)

Power Inverters: Principle of operation of single phase Inverter, Applications and Classification of Inverters, Series and Parallel Inverters – Circuit description, Operation modes with wave forms. Single phase Half bridge and Full Bridge Inverters with R load. Performance parameters of Inverters,

Unit- V (2Essays + 2Shorts)

(12Lectures)

Applications of Power Electronics Devices: Need and function of UPS and SMPS, Block diagram of UPS system, SMPS – Principle of working, Block diagram of SMPS system. Static AC and DC circuit breakers- HVDC Transmission, Advantages. RF heating - Principle of Induction heating and Dielectric heating.

Reference Books:

1. Power Electronics, M.D.Singh&K.B. Khanchandani, TMH
2. Power Electronics, K. Hari Babu, Scitech Publication.
3. Power Electronics, M.S.Jamil Asghar,PHI.
4. Power Electronics, P.C.Sen, TMH
5. Power Electronics & Controls, S.K. Dutta
6. Power Electronics Circuits, Devices and Applications,.H.Rashid, Pearson Education

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Unit No	Essay Questions	Short Answer Questions
I	2	2
II	2	1
III	2	2
IV	2	1
V	2	2



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PAPER-VIIIICE3: POWER ELECTRONICS LAB

(Any 6 experiments should be done)

1. Study of V-I characteristics of DIAC
2. Study of V-I characteristics of a TRIAC
3. Study of V-I characteristics of a SCR
4. SCR as a half wave and full wave rectifier switch R and RL loads
5. Study of V-I characteristics of MOSFET
6. Study of V-I characteristics of IGBT
7. Design of Snubber circuit
8. Study of PWM modulator circuit.
9. Study of chopper circuits
10. Study of Serial bridge inverter.
11. Study of parallel bridge inverter.
12. DC motor control using SCR.



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PAPER-VIIIICE3: POWER ELECTRONICS

Time: 3 Hrs

Max. Marks: 75

PART-I

Answer any **FIVE** questions.

5 X 5 = 25 Marks

1. What are different turn-ON methods of an SCR and explain.
2. Explain the Snubber circuit.
3. Explain the operating modes of TRIAC.
4. Explain the classification of DC choppers.
5. Explain the Morgan Chopper.
6. Write the Applications and Classification of Inverters.
7. Explain the operation of Single phase inverter.
8. Explain the principle of RF Induction heating and give its applications.

PART-II

Answer any **FIVE** questions, choosing at least **TWO** from Sections **A&B**. Each question carries 10 marks.

5 X 10 = 50 Marks

SECTION-A

9. Explain the basic structure and static V-I characteristics of an SCR.
10. Explain the Classification of Power Electronic Systems and give two Applications each.
11. Explain the structure of *n*-channel depletion MOSFET with a diagram and also explain its V-I characteristics.
12. Explain the structure, working and switching characteristics of IGBT.
13. Explain the operation of Step-up DC chopper circuit and give its analysis.

SECTION-B

14. Explain the operation of a Step down/up DC chopper circuit.
15. Explain the working of Single phase Bridge inverter with R load.
16. Explain the working of a Series inverter with circuit diagram.
17. Draw the block diagrams of ON line and OFF line UPS systems and explain briefly the operation of each UPS system.
18. Draw the Block diagram of SMPS system and explain its working.