12. ELECTRONICS

Scheme :

Min.Pass Marks : 36   Max.Marks : 100

Part-I   3 hrs. duration   Max.Marks : 33

Part-II   3 hrs. duration   Max.Marks : 33

Part-III   3 hrs. duration   Max.Marks : 34

Practical

Min. Pass Marks : 18   5 hrs. duration   Max.Marks : 50

Paper-I-Circuit Analysis

Note : The paper will be divided into five units. Two questions will be set from each unit. Five questions are to be attempted in all.

The candidates are required to attempt one question from each unit.

Max. Marks : 33   Time : 3 hrs.

Unit-I

Difference between linear and non-linear devices. Resistance and inductance their types and behaviour with D.C. and A.C. sources, colour codes.

Transient growth and decay of current in L-R circuit and time constant. Measurement of inductance by Rayleigh's method.

Unit-II

Capacitance- their types on the basis of size and medium and behaviour with D.C. source, colour codes. Charging and discharging of capacitance through resistance.

Measurement of high-resistance by leakage method. Behaviour of series and parallel L-C-R Circuit with D.C. and A.C. sources. Phaser diagrams and concept of j operator.

Unit-III

Network definitions. Constant voltage and constant current sources. Kirchhof's law's and applications. Mesh and node circuit analysis.

Reduction of a complicated circuit into T and π equivalent, conversion between T and π configurations. Two port analysis, its h, y and z parameters. Actions equivalent of Z-port network, input and output impedances

Unit-IV

• Superposition theorem, Reciprocity theorem. Thevenin theorem, Maximum power transfer theorem, coupled circuits, mutually inductively coupled circuit, reflected impedance Q, impedance Q matching.

Unit-V

Concept of filters, Low, high, band pass and band elimination filters, M-derived filters, T and π configuration of filters, Cascading filters, short circuit and open circuit impedances. Design considerations of Filters.

Fourier analysis of periodic wave. Analysis of square, triangular wave forms. Analysis of output wave forms of half and full wave rectifiers. Experimental determination of the Fourier components of a square wave.

Reference :
1. Hand Book of electronics by Gupta & Kumar.
2. Basic Electronics by Bernard Grov.

Paper-II Semiconducting and Opoto electronic devices

Note: The paper will be divided into five units. Two questions will be set from each unit. Five questions are to be attempted in all. The candidates are required to attempt one question from each unit.

Max. Marks: 33   Time : 3 hrs.

Unit-I

Metal, insulators and semiconductors, intrinsic semiconductors, mobility and conductivity, extrinsic semiconductor (N-type and P-type), Physical concepts of carrier concentration, carrier life time, diffusion, continuity equation and hall effect.

Dipolar space charge region and potential barrier, voltage and current equation, forward and reverse bias characteristics, DC and AC resistance.

Unit-II

Transistor fabrication, N-P-N and P-N-P transistors, CB, CE and CC configurations α, β and γ gains. Z, Y and h equivalents of transistors in various configurations (both in static and dynamic equivalents), characteristics of transistors in various configurations, AC and DC load line.

Unit-III

Transistor parameters and factors effecting the transistor parameters. Transistor as an amplifier, comparison among three transistor amplifier configurations (single stage). Amplifier and its graphical analysis.

Unit-IV

Field effect transistors (FET), Junction Field Effect Transistor (JFET) and MOSFET, Uni-junction transistors (UJT) : construction working and their characteristics.

Unit-V

Varactor diode, tunnel diode and their characteristics, photo

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conductivity cell, P-N photodiodes, PIN photodiodes, avalanche photo diodes, simple applications of photodiodes, photo voltaic effect, solar cell LED, photo-multiplier tubes.

Reference Books :

1. Hand book of electronics by Gupta and Kumar.
2. Applied electronics by G.K. Mithal.
3. Engineering electronics by Ryder.

Paper-III Digital Computer Electronics

Note : The paper will be divided into five units. Two question will be set from each unit. Five questions are to be attempted in all. The candidates are required to attempt one question from each unit.

Max. Marks : 34   Time : 3 hrs.

Unit-I

Number system,—Introduction to digital computer. Number systems-decimal, binary, octal, hexa-decimal and their inter conversion, signed binary numbers, binary arithmatic addition, subtraction, multiplication and division. Meaning of bit, nibble, byte, BCD code, Excess three code, other four bit codes, five bit code, gray code alfa numeric displays (ASCII code).

Unit-II

Logic Gates & Boolean Algebra— Meaning of gate, OR, AND NOT NOR NAND Gates and their truth table. Diode and TTL Logic laws of Boolean Algebra, DeMorgan's theorem, simplification of boolean expressions-sum of product method. Algebraic simplification. Exclusive or gate.

Unit-III

Arithmetic and Sequential logic—Introduction to ALU (Arithmetic Logic Unit), exclusive OR gate, half adder, excess-3 adder, half and full subtractor, signed binary numbers, z's compliment adder-subtractor. Simple conventional circuit designs.

RS flip-flop, flip flop, RST flip flop, D flip flop, J.K. flip flop, Schimett trigger.

Unit-IV

Shift Register/Bistable multivibrator as binary counter (Elementary) shift counter, Four bit binary counter, decade counter, gating a counter. BCD counter, ring counter, up down counter

Unit-V

SSI & MSI integrated circuits, magnetic core, Magnetic core logic, Magnetic memory, Addressing Semi conductor memories, bi polar, MOS, magnetic drum storage, ROM, PROM, EPROM, RAMS.

Digital clock, Decimal decoder, Seven segment decoder, dot matrix decoder.

Experiments for Practical work

Note : A candidate has to perform at least sixteen experiments in all taking eight experiments from each section 'A' and 'B'. In practical examination, the candidate will be required to perform two experiments one from section 'A' and other from section 'B'.

The distribution of marks will be as follows :

Time duration : 5.00 hrs.

Expts (two)-30
(15 for each expt) marks
Viva Voce 10 marks
Practical record 10 marks
Total 50 marks

Section-A

1. To draw the characteristic curves of transistors (common base)
2. To study the characteristic of various diodes.
3. To study the characteristic of Solar cell.
4. To study the characteristic of photodiodes and LED's.
5. To study the phase relationship between voltage and current in LR circuit.
6. To study the phase relationship between voltage and current in CR circuit.
7. To study the phase relationship between voltage and current LCR circuit.
8. To study the LCR series resonance circuits and find the quality factor.
9. To study the LCR parallel resonance circuit.
10. To study the Fourier analysis of square wave voltage.

Section-B

To study the RS flip-flop circuit and verify its truth table.
To study the half adder and substractor.
Verification of superposition theorem.
Verification of Norton's theorem.

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5. Verification of Thevenin theorem.
6. Verification of DeMorgan's theorem.
7. To study the arithmetic logical unit (ALU).
8. To design AND, OR and NOT logic gates and verify their truth tables.
9. To design and study 4-bit up-down counter.
10. To study decoders and encoder.

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