

Time : 3 hours

Full Marks : 200

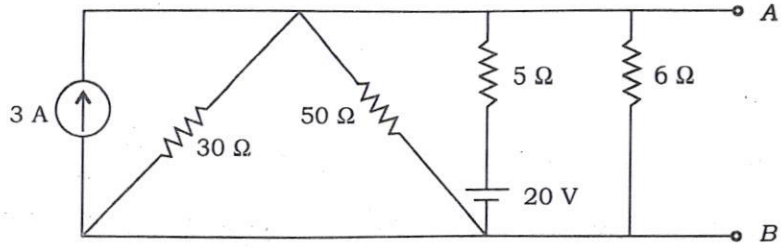
Instructions :

- (1) Answer **ten** questions choosing at least **five** from each Section.
- (2) The figures in the margin indicate full marks for the questions.
- (3) Assume suitable data, if necessary and indicate the same clearly.

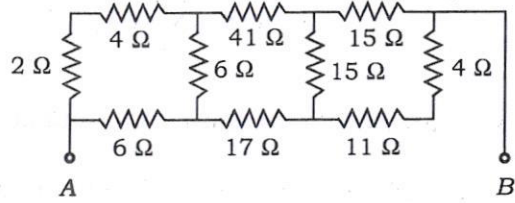
SECTION—A

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|--------|--|----|
| 1. (a) | What are insulators, conductors and semiconductors? | 5 |
| (b) | What is an intrinsic semiconductor? How is an N-type semiconductor created? | 7 |
| (c) | What are majority and minority charge carriers? | 4 |
| (d) | Write about drift and diffusion process of charge carriers in semiconductors. | 4 |
| 2. (a) | What is an ideal voltage and a current source? Explain. | 4 |
| (b) | Describe the formation process of a P-N junction in a semiconductor diode. | 10 |
| (c) | Draw the V-I characteristics of a semiconductor diode. | 6 |
| 3. (a) | State Kirchhoff's voltage and current law. | 4 |
| (b) | State superposition theorem and maximum power transfer theorem. | 4 |
| (c) | An alternating voltage $(80 + j60)$ volts is applied to a circuit and current flowing is $(-4 + j10)$. Find the impedance of the circuit, the power consumed and the phase angle. | 12 |

4. (a) State Thevenin's and Norton's theorems. 6
 (b) Find the Thevenin equivalent circuit between A and B of the given circuit. 8



- (c) Find the equivalent resistance of the given network between points A and B. 6



5. (a) Describe the construction and working principle of a permanent magnet moving-coil instrument. 7
 (b) Calculate the value of shunt resistance and multiplying factor for converting a 5 mA meter with 20 ohm internal resistance into a 5 A ammeter. 5
 (c) What are primary and secondary transducers? Give example. 4
 (d) What are active and passive transducers? Give example. 4
6. (a) What are the capacity of memory having 32-address lines and 8-data lines? 4
 (b) What are erasable and non-erasable memories? Explain. 4
 (c) What are volatile and non-volatile memories? Explain. 4
 (d) What are the programmable logic devices? Describe the various types of programmable logic devices. 5
 (e) Convert the hexadecimal number ABC to decimal. Show the different steps. 3

7. (a) What is meant by radiation pattern of an antenna? Explain. 4
 (b) What are the different types of aperture in antenna theory? Write in brief. 8
 (c) What is meant by characteristic impedance of a transmission line? Explain. 4
 (d) What is meant by polarization of a radio wave? What are the different types? 4

SECTION—B

8. (a) What are class A, class B, class C and class AB amplifiers? Explain. 8
 (b) What are the multivibrators and oscillators? What are the differences between them? 4
 (c) Write the expressions for frequency and duty cycle of a 555 timer IC based astable multivibrator. Draw the circuit diagram. 8
9. (a) Write the Boolean algebra expressions of De Morgan theorem. 3
 (b) Express the Boolean function $F = A + \overline{B}C$ in a sum of minterms. The function has the three variables A, B, C. 7
 (c) Design a logic circuit to implement the operation specified in the following truth table. Draw the circuit. 10

Inputs			Output
A	B	C	
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

10. (a) Draw the internal block diagram of Intel 8255 programmable peripheral interface IC. 6
 (b) Write a note on the features of Intel 8255 programmable peripheral interface IC. 7
 (c) What are the different operating modes of Intel 8255 programmable peripheral interface IC? Explain. 7