## MODULE - I

1. (a) Demonstrate the function of diffusion capacitance with a neat sketch. Derive an expression for diode current equation.
[BL: Understand| CO: 1|Marks: 7]
(b) In a full wave rectifier, the transformer RMS secondary voltage from center tap to each end of the secondary is 50 V . The load resistance is 900 ohms . If the diode resistance and transformer secondary winding resistance together has a resistance of 100 ohms , determine the average load current and RMS value of load current.
[BL: Apply| CO: 1|Marks: 7]
MODULE - II
2. (a) Outline the operation of CB configuration and obtain an expression for current gain.
[BL: Understand| CO: 2|Marks: 7]
(b) The transistor shown in Figure 1 is the amplifier circuit which has the following h-parameters $h_{f e}=140, h_{i e}=0.86 \mathrm{~K} \Omega, h_{r e}=1.5^{*} 10^{-4}, h_{o e}=25 \mho$. Find the total input impedance and current gain by using exact hybrid model?
[BL: Apply| CO: 2|Marks: 7]


Figure 1

## MODULE - III

3. (a) State and prove De Morgan's theorem. Explain the gray to binary and binary to gray conversion with examples.
[BL: Understand| CO: 3|Marks: 7]
(b) Implement the function $\mathrm{F}(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D})=\sum \mathrm{m}(1,5,6,9,11,12,13)$ using NAND-NAND logic. [BL: Apply| CO: 3|Marks: 7]
4. (a) List out the basic logic gates with truth tables. Differentiate between BCD code, 2421 code and excess-3 code.
[BL: Understand| CO: 4|Marks: 7]
(b) Simplify the following function into canonical $\mathrm{POS}, \mathrm{Z}=(\mathrm{A}+\mathrm{C}+\mathrm{D})(\mathrm{B}+\mathrm{C})$.
[BL: Apply| CO: 4|Marks: 7]

## MODULE - IV

5. (a) How do you convert a decoder into a demultiplexer? Explain 4-bit carry look-ahead adder with necessary diagram and relevant expressions.
[BL: Understand CO: $5 \mid$ Marks: 7]
(b) Obtain the simplified Boolean expression using K-map $\mathrm{F}(\mathrm{W}, \mathrm{X}, \mathrm{Y}, \mathrm{Z})=\sum \mathrm{m}(1,5,6,8,9,10)+\sum \mathrm{d}(2,4)$.
[BL: Apply| CO: 5|Marks: 7].
6. (a) Implement the full subtractor circuit using half subtractor and justify with boolean expressions.
[BL: Understand| CO: 5|Marks: 7]
(b) Realize a hazard free circuit for the following minterm $\mathrm{F}(\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D})=\sum \mathrm{m}(0,4,5,7,8,11,12,13,15)$.
[BL: Apply| CO: 5|Marks: 7]

## MODULE - V

7. (a) Outline the operation of Johnson counter and Ring counter with neat sketch.
[BL: Understand| CO: 6|Marks: 7]
(b) Design a counter circuit to count $1,5,9,12,13,15,1,5,9,12,13$ using SR flip flop.
[BL: Apply| CO: 6|Marks: 7]
8. (a) Illustrate a JK flip-flop using NAND-NAND logic and obtain its characteristic expression and excitation table.
[BL: Understand| CO: 6|Marks: 7]
(b) Differentiate between combinational and sequential circuits. Design a 4 bit bidirectional shift registers using D flip-flop.
[BL: Apply| CO: 6|Marks: 7]
