**Q.P.Code: 38996**

**(3 Hours)** **[Total Marks: 80]**

N.B. (1) Question No. 1 is compulsory
(2)Assume suitable data if necessary
(3)Attempt any three questions from remaining questions

1
(a) Convert $(1473.45)_{10}$ into octal, binary and hexadecimal. (3)
(b) Add $(57)_{10}$ and $(26)_{10}$ in BCD. (3)
(c) Prove OR-AND configuration is equivalent to NOR-NOR configuration. (4)
(d) Subtract using 1's and 2's complement method $(15)_{10} - (21)_{10}$. (4)
(e) Encode the data bits 0 1 0 1 into a seven bit even parity Hamming code. (2)
(f) Prove NAND as universal gate. (2)
(g) Define a redundant group. (2)

2 (a) Given the logic expression: (10)
$AB + A\overline{C} + C + AD + A\overline{B}C + ABC$
1. Express in standard SOP
2. Draw the K-map for the equation
3. Minimize and realise using NAND gates only.

(b) Design 2-bit magnitude comparator. (10)

3 (a) Design a logic circuit to convert BCD to Gray code. (10)
(b) Implement a full adder using demultiplexer. (10)

4 (a) Compare different logic families with respect to fan in, fan out, speed, propogation delay and power dissipation. (5)
(b) Design 16:1 Multiplexer using 4:1 Multiplexer. (5)
(c) Explain 4 bit bidirectional shift register. (10)

5 (a) Design mod 12 asynchronous down counter. (10)
(b) Convert D flipflop to JK flipflop and SR flipflop. (10)

6 Write short note on (any four):- (20)
(a) Multivibrators
(b) VHDL
(c) Race around condition
(d) State table
(e) Ring Counter