

AT - 424

First Semester B. C. A. (Part - I) Examination

DIGITAL TECHNIQUES - I

Paper - 1 ST 3

P. Pages : 4

Time : Three Hours]

[Max. Marks : 60

Note : Draw neat diagrams wherever necessary.**EITHER**

1. (A) What is Radix/Base of number system ?
Explain with examples. 3

(B) Convert

$$(i) (100101)_2 \rightarrow (?)_{10}$$

$$(ii) (37.125)_{10} \rightarrow (?)_2 \rightarrow (?)_8 \quad 5$$

(C) Perform the following Additions :—

$$(i) \begin{array}{r} 011 \\ + 110 \\ \hline \end{array} \quad (ii) \begin{array}{r} 1011 \\ + 1110 \\ \hline \end{array} \quad 4$$

OR

- (P) Define logic gate. Which are basic gates ?
Draw its symbol. 4

AT-424

P.T.O.

- (Q) Why NAND and NOR gates are called universal gates ? Explain. 4
- (R) Explain subtraction using 2's complement method with examples. 4

EITHER

2. (A) State the classification of logic family. 3
- (B) Explain the characteristics of logic family
- (i) Fan – in
 - (ii) Fanout
 - (iii) Noise immunity. 3
- (C) Explain the construction and working of CMOS NAND gate. 6

OR

- (P) Explain DTL logic with circuit diagram. 6
- (Q) Explain the working of TTL NAND gate. 6

EITHER

3. (A) Explain K-map for two, three and four variables. 6

- (B) State and prove De Morgan's theorem. 6

OR

- (P) Reduce the following equation using K-map
 $f(A, B, C, D) = \sum m(1, 5, 6, 7, 11, 12, 13, 15)$ and implement the final equation using logic gates. 6

- (Q) Prove the following Boolean equations and draw logic diagrams

(i) $ABC + A\bar{B}C + AB\bar{C} = A(B + C)$

(ii) $\overline{A \cdot B} + A \cdot B = A \cdot \bar{B} + B \cdot \bar{A}$. 6

EITHER

4. (A) Explain with neat diagram 4-bit parallel Adder. 6
- (B) Explain half subtractor with logic diagram. 6

OR

- (P) Explain full adder with logic diagram. 6
- (Q) Explain construction and working of 4-bit parallel adder/subtractor with 2's complement method. 6

EITHER

5. (A) What is decoder ? Explain 3:8 decoder with logic diagram. 6
- (B) What is demultiplexer ? Explain 1:16 demultiplexer. 6

OR

- (P) What is multiplexer ? Explain 16:1 MUX. 6
- (Q) Explain 4:16 decoder. 6

