

Con. 243-09.

ZN-1040

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions from the **remaining** questions.
 (3) All questions carry **equal** marks.

1. (a) Find how many integers between 1 and 60 are not divisible by 2, nor by 3, and nor by 5 ? 10
 (b) In a survey of 60 people, it was found that 25 read News week magazine, 26 read Time, and 26 read Fortune. Also 9 read both Newsweek and Fortune. 11 read both Newsweek and Time. 8 read both Time and Fortune and 8 read no magazine at all. 10
 (i) Find the number of people who red all the 3 magazines.
 (ii) Determine the number of people who read exactly one magazine.

2. (a) $(P \vee Q) \leftrightarrow [Q \vee (R \rightarrow P)]$ 20
 (b) $[P \wedge (P \rightarrow Q)] \rightarrow Q$
 (c) $(P \vee Q) \vee \sim P$
 (d) $\sim (\sim P \vee \sim Q)$

3. (a) Define weight of a codeword and find the weights of the following :— 10
 (i) $x = 010010$ (ii) $x = 111011$.
 (b) Find the hamming distance between the codes : 10
 (i) $x = 010000$ $y = 000101$
 (ii) $x = 001100$ $y = 010110$

4. Consider the $(3, 8)$ encoding function $e : b^3 \rightarrow b^8$ defined by 20
 $e(000) = 00000000$ $e(100) = 10100100$
 $e(001) = 10111000$ $e(101) = 10001001$
 $e(010) = 00101101$ $e(110) = 00011100$
 $e(011) = 10010101$ $e(111) = 00110001$

How many errors will e detect ?

5. Let $A = \{ 1, 2, 3, 4 \}$ and relation $R = \{ (1, 2), (1, 3), (2, 4), (3, 2) \}$. Find the transitive closure of R by Warshall's Algorithm. 20
 6. (a) Let $A = \{ 1, 2, 3, 4, 6 \}$ and let R be the relation on A defined by "x divides y" written xy. So that 20
 $R = \{ (1, 1), (1, 2), (1, 3), (1, 4), (1, 6), (2, 2), (2, 4), (2, 6), (3, 3), (3, 6), (6, 6) \}$.
 Draw the directed graph of R.
 (b) Find the matrix M of the relation R in the problem (6a).