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Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Third Semester

Branch : Computer Science/ Information Technology

ENGINEERING MATHEMATICS—II (R, T)

(2009 Admissions – Improvement
2004 – 2009 Admissions – Supplementary)

Time : Three Hours Maximum : 100 marks

Answer any **one** *full question from each module.*
Each full question carries 20 *marks.*

Module 1

1. (a) Let p be "He is tall" and let q be "He is handsome". Write each of the following statements in symbolic form using p and q : (Assume that "He is short" means "He is not tall", i.e., $\sim p$)

   (i) He is tall and handsome.

   (ii) He is tall but not handsome.

   (iii) He is neither tall nor handsome.

   (iv) It is false that he is short or handsome.

   (b) Find the truth tables of the following :

   (i) $p \wedge (q \vee r)$

   (ii) $(p \wedge q) \vee (p \wedge r)$.

Or

   (c) Prove that disjunction distributes over conjunction ; i.e., prove the distribution law :

   $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$.

   (d) Determine the truth value of each of the following statements and also negate each of them.

   (i) $\forall x, |x| = x$. (ii) $\exists x, x^2 = x$.

   (iii) $\forall x, x + 1 > x$. (iv) $\exists x, x + 2 = x$.

Turn over

Module 2

2. (a) Let R and S be the relations on $A = \{1, 2, 3, 4\}$ defined by

$R = \{(1,1), (3,1), (3,4), (4,2), (4,3)\}$

$S = \{(1,3), (2,1), (3,1), (3,2), (4,4)\}$. Find the

(i) Composition relation $R \circ S$.

(ii) Composition $R^2 = R \circ R$ for the relation R.

Or

(b) Let $f : A \to B$ and $g : B \to C$ are one-to-one functions. Show that $gof : A \to C$ is one-to-one.

(c) Let R be a reflexive relation on a set A. Show that R is an equivalence relation if and only if (a, b) and (a, c) are in R implies that (b, c) is in R.

Module 3

3. (a) Let $S = \{2, 3, 4, 5, 12, 16, 24, 36, 48\}$ be ordered by divisibility. Find

(i) the predecessors and immediate predecessors of 12

(ii) the successors and immediate successors of 12.

(b) Define the dual of a statement in lattice L. Why does the principle of duality apply to L ?

Or

(c) Let $\lesssim$ S be a partial ordering of a set S. Define the dual order on S. How is the dual order related to the inverse of the relation $\lesssim$?

(d) Show why each element of a linearly ordered set can have at most one immediate predecessor.

Module 4

4. (a) Find the discrete numeric function corresponding to the generating function.

$$A(z) = \frac{(1+z)^2}{(1+z)^4}.$$

(b) Obtain the particular solution for $a_r - 5a_{r-1} - 6a_{r-2} = 1$.

Or

(c) Given that $a_0 = 0, a_1 = 1, a_2 = 4$ and $a_3 = 12$ satisfy the recurrence relation $a_r + C_1\, a_{r-1} + C_2\, a_{r-2} = 0$. Determine a_r.

Module 5

5. (a) Find the sum m of the degrees of the vertices of G where $V(G)=\{A, B, C, D\}$ and

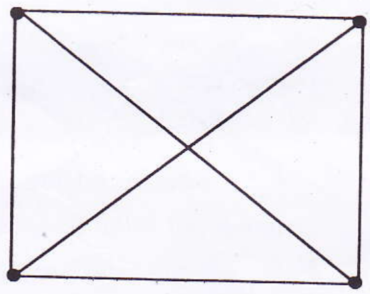
(i) $E(G)=[\{A, B\}, \{A, C\}, \{B, D\}, \{C, D\}]$.

(ii) $E(G)=[\{A, B\}, \{A, C\}, \{A, D\}, \{B, A\}, \{B, B\}, \{C, B\}, \{C, D\}]$.

(b) Find the connected components of G where $V(G)=\{A, B, C, X, Y, Z\}$ and $E(G)=[\{A, X\}, \{C, X\}]$.

Or

(c) Find all the spanning trees of the graph shown in figure below 1.



(5 × 20 = 100 marks)