F 3082

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Reg. No.................................

Name.....................................

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Computer Science/Information Technology

ENGINEERING MATHEMATICS II—(R,T)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

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 m and n be integers. Prove that $n^2 = m^2$ if and only if n is m or n is $-m$.

   (b) "If there was a ball game, then travelling was difficult. If they arrived on time, then travelling was not difficult. They arrived on time. Therefore, there was no ball game". Show that these statements constitute a valid argument.

Or

2. (a) Construct the truth table for $(P \to Q) \wedge (Q \to P)$.

   (b) Show that $p \to q, \sim(q \vee r) \Rightarrow \sim p$.

   (c) Symbolize : "All the world loves a lover".

Module 2

3. (a) Show that one of any m consecutive integers is divisible by m.

   (b) Let R be a binary relation on the set of all strings of 0s and 1s such that $R = \{(a, b) | a$ and b are strings that have the same number of 0s}. Is R reflexive ? Symmetric ? Antisymmetric ? Transitive ? An equivalence relation ? A partial ordering relation.

Or

4. (a) Let R be a binary relation from A to B. The converse of R, devoted R^{-1}, is a binary relation from B to A such that $R^{-1} = \{(b, a) | (a, b) \in R\}$ Let R_1 and R_2 be binary relations from A to B. Is it true that $(R_1 \cup R_2)^{-1} R_1^{-1} \cup R_2^{-1}$?

Turn over

(b) Explain Pigeonhole principle. using it, show that if any 5 numbers from 1 to 8 are chosen, then two of them will add upto 9.

Module 3

5. (a) Show that for any elements a, b, c in a modular lattice

$$(a \vee b) \wedge c = b \wedge c \text{ implies } (c \vee b) \wedge a = b \vee a.$$

(b) Show that a lattice $(A, \leq)$ is distributive if and only if for any elements a, b c in A, $(a \wedge b) \vee (b \wedge c) \vee (c \wedge a) = (a \vee b) \wedge (b \vee c) \wedge (c \vee a)$.

Or

6. (a) Show that $(a * b)' = a' \oplus b'$ and $(a \oplus b)' = a' * b'$ hold in a complemented, distributive lattice.

(b) Show that the lattice $\langle S_n, D \rangle$ for n = 216 is isomorphic to the direct product of lattices for n = 8 and n = 27.

Module 4

7. (a) Find a simple expression for the generating function of the discrete numeric function : $0 \times 1, 1 \times 2, 2 \times 3, 3 \times 4, \ldots\ldots\ldots$

(b) Solve the recurrence relation $a_r - 2\,a_{r-1} + 2\,a_{r-2} - a_{r-3} = 0$, given that a_0 = 2, a_1 = 1 and a_2 = 1.

Or

8. (a) Determine the discrete numeric function corresponding to the generating function

$$A(z) = \frac{7z^2}{(1-2z)(1+3z)}.$$

(b) Let $4a_r + c_1\,a_{r-1} + c_2\,a_{r-2} = f(r), r \geqq 2$ be a second order linear recurrence with constant coefficients. For some boundary conditions a_0 and a_1, the solution of the recurrence is $1 - 2r + 3 \cdot 2^r$. Determine a_0, a_1, c_1, c_2 and $f(r)$.

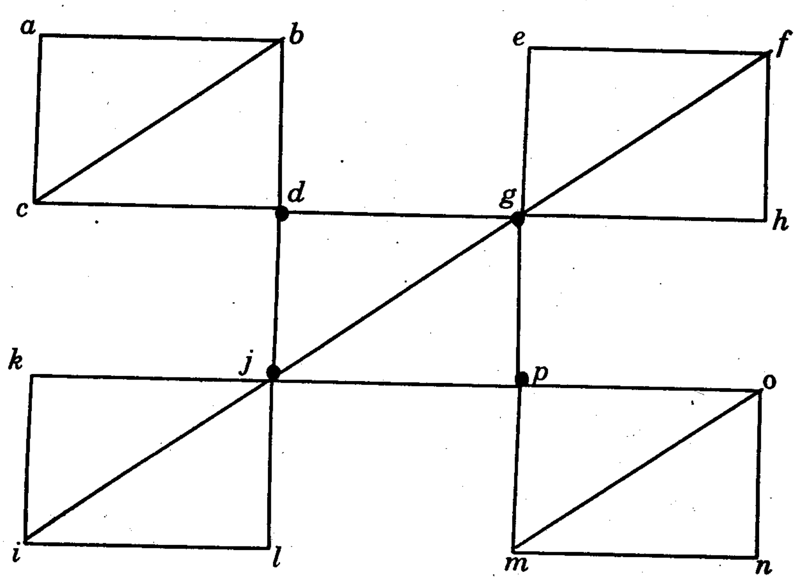
Module 5

9. (a) Show that in a connected planar linear graph with 6 vertices and 12 edges, each of the regions is bounded by 3 edges.

(b) Show that the sum of the in-degrees over all vertices is equal to the sum of the out-degrees over all vertices in any directed graph.

Or

10. Draw the different spanning trees in the following graph :



(5 × 20 = 100 marks)