Code: 13A05302 **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations June 2017

DISCRETE MATHEMATICS

(Common to CSE and IT)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Use a Venn diagram to illustrate the set of all months of the year whose names do not contain the letter R.

(b) Use set builder notation to give a description of any two of these sets.

(i) {0, 3, 6, 9, 12}

(ii) {−3,−2,−1, 0, 1, 2, 3}

(iii) {m, n, o, p}

(c) Given the relation R={(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4)} ,decide whether it is reflexive or symmetric or anti-symmetric or transitive.

(d) Translate the logical equivalence $(T \wedge T) \vee \neg F \equiv T$ into an identity in Boolean algebra.

(e) How many ways are there to select five players from a 10-member tennis team to make a trip to a match at another school?

(f) What is the minimum number of students required in a discrete mathematics class to be sure that at least six will receive the same grade, if there are five possible grades, A, B, C, D, and F?

(g) Let R = {(1, 1), (2, 1), (3, 2), (4, 3)}. Find the powers Rn, n = 2, 3, 4, . …

(h) Define multi graph with example.

(i) How many edges are there in a graph with 10 vertices each of degree six?

(j) Define minimum spanning tree.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Show that among any 4 numbers one can find 2 numbers so that their difference is divisible by 3. (Avoid considering the cases separately. Use Pigeonhole Principle!).

(b) Show that among any n+1 numbers one can find 2 numbers so that their difference is divisible by n.

OR

3 (a) What is the power set of the set {0, 1, 2}?

(b) What is the power set of the empty set? What is the power set of the set {ø}?

(c) Use a membership table to show that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

UNIT – II

4 Show that in a Boolean algebra, the idempotent laws $x \vee x = x$ and $x \wedge x = x$ hold for every element x.

OR

5 Consider the following relations on {1, 2, 3, 4}:

R_1 = {(1, 1), (1, 2), (2, 1), (2, 2), (3, 4), (4, 1), (4, 4)},

R_2 = {(1, 1), (1, 2), (2, 1)},

R_3 = {(1, 1), (1, 2), (1, 4), (2, 1), (2, 2), (3, 3), (4, 1), (4, 4)},

R_4 = {(2, 1), (3, 1), (3, 2), (4, 1), (4, 2), (4, 3)},

R_5 = {(1, 1), (1, 2), (1, 3), (1, 4), (2, 2), (2, 3), (2, 4), (3, 3), (3, 4), (4, 4)},

R_6 = {(3, 4)}.

Which of these relations are reflexive?

UNIT – III

6 Explain Groups, Subgroups and Normal Subgroups.

OR

7 (a) How many arrangements can be made out of the letters of the word 'ENGINEERING'?

(b) 25 buses are running between two places P and Q. In how many ways can a person go from P to Q and return by a different bus?

Contd. in page 2

UNIT – IV

8 Explain briefly about The Growth functions with example.

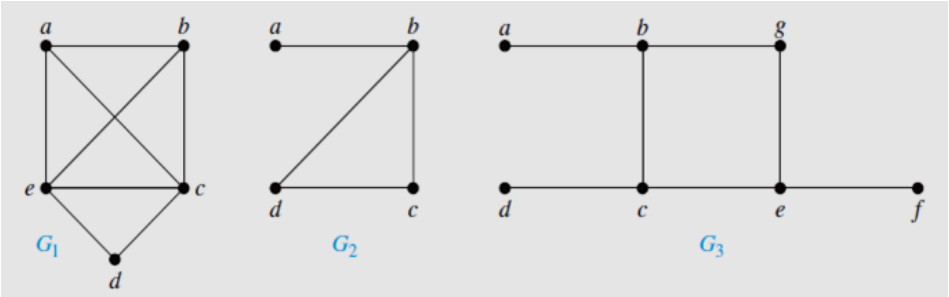
OR

9 Explain the following terms with an example:

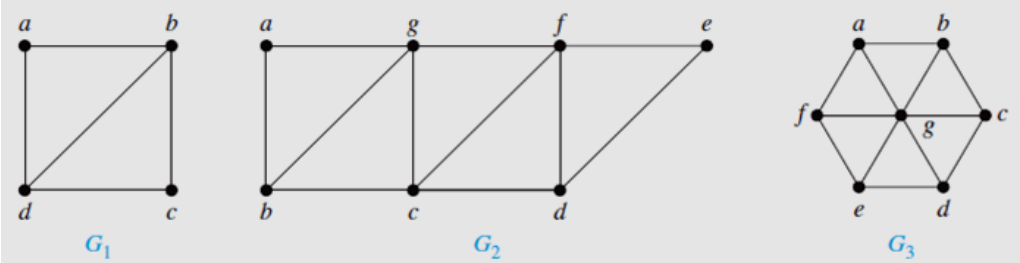
(a) Generating Functions.
(b) Recursive Algorithms.
(c) Correctness of Recursive Algorithms.
(d) Complexities of Recursive Algorithms.

UNIT – V

10 (a) Which of the following simple graphs in the figure below, have a Hamilton circuit or, if not, a Hamilton path?

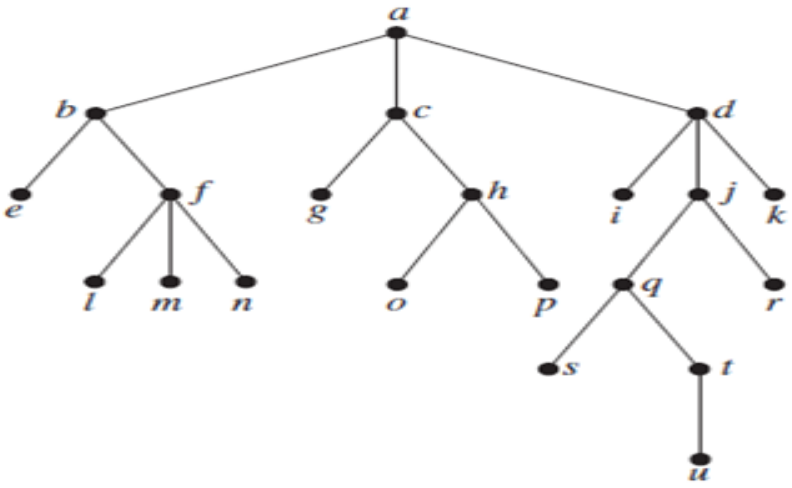


(b) Which graphs shown in Figure have an Euler path?



OR

11 Answer these questions about the rooted tree illustrated.



(i) Which vertex is the root?
(ii) Which vertices are internal
(iii) Which vertices are leaves?
(iv) Which vertices are children of j?
(v) Which vertex is the parent of h?
(vi) Which vertices are siblings of o?
(vii) Which vertices are ancestors of m?
(viii) Which vertices are descendants of b?

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