S.No. : 38 BCAT 235

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Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 1115 Roll No.

BCA Examination 2018-19

(Third Semester)

DISCRETE MATHEMATICS

Time : Three Hours] *[Maximum Marks : 100*

Note :– (i) Attempt all questions.

(ii) All questions carry equal marks.

1. Attempt any two parts of the following : 10×2=20

(a) Determine the particular solution for the difference equation :

$$a_r - 4\,a_{r-1} + 4\,a_{r-2} = 2^r$$

(b) Determine the numeric function corresponding H_0 the following function

$$A(\not{z}) = \frac{1}{5 - 6\not{z} + \not{z}^2}$$

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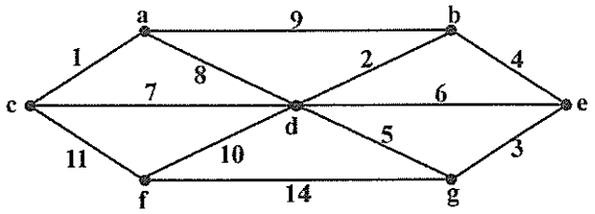
(c) Show how Kruskal's algorithm find a minimal spanning tree of the graph below :



2. Attempt any two parts of the following : 10×2=20

(a) What do you understand by recurrence relation? Also describe order and degree of recurrence relation.

(b) "A graph is a tree if and only if it is minimally connected" prove it.

(c) Define distance and center in a tree with suitable example.

3. Attempt any two parts of the following : 10×2=20

(a) Find the recurrence relation

$$a_r + 6\,a_{r-1} + 9\,a_{r-2} = 3$$

given that

$$a_0 = 0,\ a_1 = 1$$

(b) An unbiased cubic dice is thrown. What is the probability of getting :

(i) An even number

(ii) A multiple of 3

(c) Define parallel elge, simple graph, regular graph and degree of vertex with example.

4. Attempt any four parts of the following : 5×4=20

(a) Consider two numeric function a_r and b_r

$$a_r = \begin{cases} 2_r, 0 \le r \le 2 \\ 3^r - 1, r \ge 3 \end{cases}$$

$$b_r = \begin{cases} 0 \ , \ 0 \le r \le 1 \\ r+5, \ r \ge 2 \end{cases}$$

find $a_r + b_r$.

(b) Find exponential generating function for sequence

$\langle {}^4P_0, {}^4P_1, {}^4P_2 \ldots\ldots\ldots\ldots, {}^4P_4 \rangle$

(c) In how many can a committee of 5 member be selected from 6 men and 5 ladies, consisting of 3 men and 2 ladies.

(d) Show that

$$\neg (P \rightarrow \sim) \approx \{P \wedge (\neg q)\}$$

(e) How many edges has K_{10} graph?

(f) (i) How to find path length in rooted tree?

(ii) Show the shortest path in weighted graph.

5. Attempt any four parts of the following : $5 \times 4 = 20$

(a) There are 6 English, 4 Sanskrit and 5 Hindi books. In how many ways can they be arranged on a shelf so as to keep all the books of the same language together?

(b) Let P be the proposition, "the earth is flat". Let q be "all birds sing" and let r be "Lucknow is an Island". Write the following preposition :

(i) $\sim q \wedge r$

(ii) $\sim (q \wedge p)$

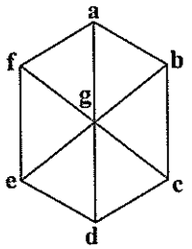
(iii) $p \wedge \sim (q \vee r)$

(c) What is Tautology? Explain with truth table.

(d) Does there exists a single graph with seven vertices having degrees

(1, 3, 3, 4, 5, 6, 6)

(e) Discuss the concept of graph colouring also discuss the chromatic number. Also determine the chromatic number of the following graph :



(f) State and prove Pigeon hole principle.

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