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

PAPER ID : 21115 Roll No.

BCA Examination 2018-19

(Third Semester)

DISCRETE MATHEMATICS

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION–A

1. Attempt all parts of the following : 8×1=8

   (a) Define numeric function.

   (b) Write a recurrence relation which has only homogeneous solution.

   (c) How permutation differ from combination?

   (d) Define mutually exclusive events.

   (e) Define predicates.

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(f) Explain existential quantifiers with example.

(g) Differenciate between trivial and non-trivial tree.

(h) Define Euler graph.

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

(a) Find the generating function of the following sequence :

1, 2, 3, 4, ... n, ...

(b) Three group of children contain 3 girls and 1 boy, 2 girls and 2 boys, 1 girl and 3 boys. 1 child is selected at random from each group. Find the chance of selecting 1 girl and 2 boys.

(c) Negate following statements :

(i) $\exists x\, P(x) \vee \forall y\, Q(y)$

(i) $\forall x\, P(x) \wedge \exists y\, Q(y)$

(d) Prove that "the sum of the degrees of all vertices of a graph G is twice the number of edges in G."

SECTION–C

Note :– Attempt all questions.

3. Attempt any two parts of the following : 5×2=10

   (a) Define generating function. Also discuss its properties.

   (b) Solve following recurrence relation by method of generating function :

   $$a_{r+2} - 3\,a_{r+1} + 2\,a_r = 2 \text{ with } a_0 = 2,\ a_1 = 1$$

   (c) Find the generating function of numeric function

   $$a_n = 3^n + 5^n,\ n \geq 1$$

4. Attempt any two parts of the following : 5×2=10

   (a) Find the probability that a leap year has 53 Sundays.

   (b) Prove that

   $$n C_r + n C_{r+1} + n+1 C_{r+1}$$

   (c) In how many ways a cricket team sit around a round table when captain and vice captain always sit together?

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5. Attempt any two parts of the following : 5×2=10

(a) Use proposition rules to prove that $P \vee \sim(p \wedge q)$ is a tautology.

(b) What do you mean by first order logics. Find the truth value of following statement :

$$(p \wedge q) \rightarrow (\sim p \vee q)$$

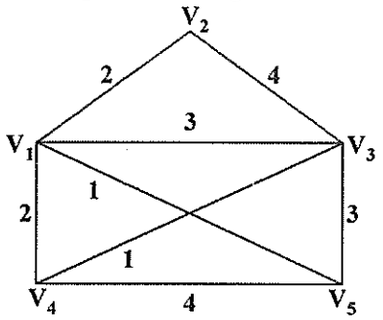
(c) Prove that :

$$(p \rightarrow q) \wedge (r \rightarrow Q) \cong (p \vee r) \rightarrow q$$

6. Attempt any two parts of the following : 5×2=10

(a) Prove that, the number of vertices of odd degree in a graph is always even.

(b) Find minimal spanning tree of the following graph using Prim's algorithm :



(c) Explain any one algorithm with example to find shortest path in a weighted graph.

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