Code No: MC1613/R16

MCA I Semester Supplementary Examinations, February-2020

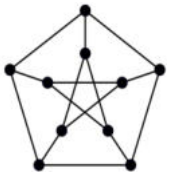
DISCRETE MATHEMATICAL STRUCTURES AND GRAPH THEORY

Time: 3 Hours **Max. Marks: 60**

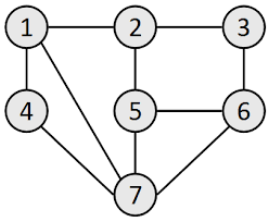
Answer Any **FIVE** *Questions*
All Questions Carry Equal Marks

1.	a	Show that P →S can be derived from the premises ¬P ∨ Q , ¬Q ∨ R, R →S	6M
	b	Prove ∀x (P(x) →R(x)), (∃x)((P(x) ∧ S (x)) ⇒ (∃x)((R(x) ∧ S (x))	6M
2.	a	Let R be the following equivalence relation on the set A={1,2,3,4,5} R= {(1,1) (1,5) (2,2) (2,3)(2,6)(3,2) (3,3) (3,6) (4,4) (5,1) (5,5) (6,2) (6,3) (6,6) } Find the partition of A induced by R i.e., Find the equivalence class of R	3M
	b	Show that the lattice (S_n, D) for n=100 is isomorphic to the direct product of lattices for n=4 and n=25	5M
	c	Explain the principles of Pigeon Hole	4M
3.	a	In how many ways can we select a committee of four Republicans, three Democrats and two independents from a group of 10 republicans, 12 Democrats and four Independents	5M
	b	In how many different strings can be made by reordering the letters of the word SUCCESS	4M
	c	What is the coefficient of $x^{101}y^{99}$ in the expansion of $(2x-3y)^{200}$?	3M
4.	a	Solve the following recurrence relation by substitution method $a_n = a_{n-1} + n$, $n \geq 1$ where $a_0 = 2$	4M
	b	Solve the recurrence relation $a_n - 7a_{n-1} + 12\, a_{n-2} = 0$ for $n \geq 2$ by using method of characteristic roots	4M
	c	Find an explicit formula for the Fibbonacci numbers	4M

5. a What is the Chromatic number of the graph 3M



b Find the BFS and DFS of the following graph 6M



c Prove that A complete graph K_n is planar if and only if $n \leq 4$ 3M

6. a Draw the Hasse diagram of the following lattices 6M
   i. (S_{36}, D)
   ii. (S_{45}, D)

   b Given an argument which will establish the validity of the following inference: 6M
   All integers are rational numbers
   Some integers are powers of 3
   Therefore, Some rational numbers are powers of 3

7. a How many positive integers not exceeding 1000 are divisible by 7 or 11 4M

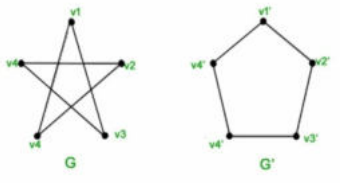
   b Calculate the number of unordered samples with n=6 and k=3 when 5M
   i) Repetition is allowed
   ii) Repetition is not allowed

   c How many subgraphs with at least one vertex does K_2 have? 3M

8. a Define Euler Circuit 2M

   b Use generating function to solve the following recurrence relation 5M
   $a_o = 2$, $a_1 = 3$, $a_n = 5a_{n-1} - 6a_{n-2} + 7^n$ for $n \geq 2$

   c Determine the given graphs are Isomorphic or not 5M



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