22MCA1C4L

MCA I Semester (NEP) Degree Examination, June - 2023
COMPUTER SCIENCE
## Mathematics for Computer Applications

Time : 3 Hours

Maximum Marks : 70

Instruction to Candidates : *Answer **any five** full questions (Q. **1** is **Compulsory**).*

**1.** (a) Find Eigen values and Eigen vectors of matrix $A = \begin{matrix} 5 & 4 \\ 1 & 2 \end{matrix}$ **7**

    (b) State and explain principle of Inclusion and Exclusion.   **7**

2. (a) What are nested quantifiers ? Translate the following statements into English.   **7**
       (i) $\forall x \, \forall y \, (x+y=y+x)$ Domain : Real numbers.
       (ii) $\forall x \, \forall \, \exists y \, (x=-y)$ Domain : Real numbers
       (iii) $\forall x \, \forall y \, ((x>0)^\wedge(y<0) \to (xy<0))$ Domain : Real numbers.
       (iv) Assume $P(x, y)$ is $(xy=yx)$ Domain : Real numbers.
       (v) Assume $P(x, y)$ is $(xy=6)$ Domain : Real numbers.

    (b) Find tautology or contradiction for the following statements.   **7**
       (i) $A \to (A \vee B)$
       (ii) $(P \to (\sim P)) \to \sim P$
       (iii) $(Q \wedge \sim P) \wedge P$

3. (a) Solve the recurrence relation using characteristic rules and methods where $F_0=3$ and $F_1=17$.   **7**

    (b) Define Homogeneous and in-homogeneous recurrence relation with example. Solve the following recurrence relation using substitution method.   **7**
       (i) $a_n = a_{n-1} + n^2$ where $a_0=7$

       (ii) $a_n = a_{n-1} + \dfrac{n(n+1)}{2}$, $n \geq 1$

4. (a) Let 'X' is a continuous variable with probability density function given by :   **7**
       $f(x) = kx \ (0 \leq x < 2)$
             $= 2k \ (2 \leq x < 4)$
             $= -kx + 6k \ (4 \leq x < 6)$
       Find k, mean value of x and variance of the distribution.

    (b) The following data are the number of seeds germinated out of 10 on damp filter paper for 80 sets of seeds. Fit a binomial distribution to these data.   **7**

x :	0	1	2	3	4	5	6	7	8	9	10
f :	6	20	28	12	8	6	0	0	0	0	0

5. (a) Show that the maximum number of edges in a simple graph with n vertices is $n\dfrac{(n-1)}{2}$. **7**

(b) Show that the following graphs G_1 and G_2 are isomorphic. **7**

G_1 :

G_2 :
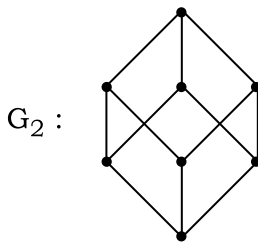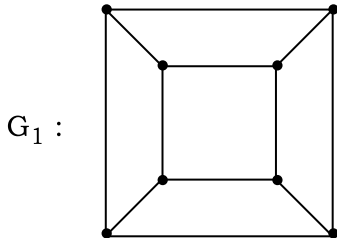
6. (a) Explain any five rules of Inference. **7**

(b) Solve the following recurrence relation using generating function. **7**
(i) $a_n - 6a_{n-1} + 12a_{n-2} - 8a_{n-3} = 0.$
(ii) $a_n = 3a_{n-1} + 2,\ n \geq 1$ and $a_0 = 1.$

7. (a) Two cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the mean and variance of the number of access. **7**

(b) Show that the given graph is Hamiltonian graph. **7**

G :
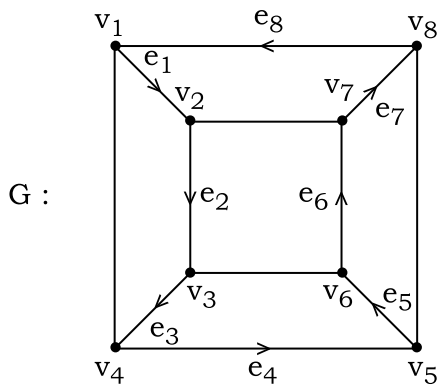
8. (a) Define planar graph. Prove that a complete graph five vertices is non-planar. **7**

(b) Four cards are drawn successfully with replacement from a well shuffled pack of 52 cards. If a success is getting a king or queen of heart or club, then find the mean, variance of the number of successes. **7**

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