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MASTER OF SCIENCE (M.SC) IN COMPUTER APPLICATIONS
EXAMINATION : JUNE/JULY- 2022
SEMESTER - I
Sub: Discrete Mathematics (MSC-100-19)

Date : 29/06/2022

Total Marks : 60

Time: 10.00 am to 12.30 pm

Instruction:

1. All questions are compulsory unless and otherwise stated.
2. Bold figures to the right of every question are the maximum marks for that question.
3. Candidates are advised to attempt questions in order.
4. Answers written illegibly are likely to be marked zero.
5. Use of scientific calculators, Log tables, Mollier Charts is allowed.
6. Draw neat and labelled diagram wherever necessary.

Q.1 Answer the following in 2-3 lines (Any 5)**(10)**

1. If $f(x) = 5x + 3$ then, $f(x)$ is.... function.
 (a) one-one (b) many-one (c) not a (d) None of these
2. A binary operation $*$ in G is said to be ... , if $a * (b * c) = (a * b) * c$ for any $a, b \in G$.
 (a) commutative (b) associative (c) closure (d) inverse
3. A function which is 'one-one' as well as 'Onto' is said to be ...
 (a) injective (b) surjective (c) bijective (d) inverse
4. A matrix of which the value of determinant is zero is called as..... matrix.
 (a) singular (b) non-singular (c) scalar (d) diagonal
5. In how many ways a group of 4 persons can be formed from 4 ladies & 3 gentlemen?
 (a) 36 ways. (b) 35 ways. (c) 42 ways. (d) 40 ways.
6. The p.m.f. of binomial distribution can be expressed as....
 (a) ${}^n C_x \times p^x \times q^{(n-x)}$ (b) ${}^n C_x \times p^{(n-x)} \times q^x$
 (c) ${}^x C_n \times p^x \times q^{(n-x)}$ (d) ${}^n C_1 \times p^x \times q^{(n-x)}$
7. An element a in group G , is said to be idempotent, if...
 (a) $a^2 = a$ (b) $a^3 = a$ (c) $a^2 = \sqrt{a}$ (d) $a^3 = a^2$

Q.2 Answer the following in short. (Any 4)**(20)**

1. Show that : If G is a cyclic group then G is abelian.
2. Solve the equations by Cramer`s rule:
 $x + y + z = 6, 3x + 3y - z = 12, 2x + 3y + 4z = 14.$
3. If $p = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 4 & 2 \end{pmatrix}$, $q = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 3 & 1 \end{pmatrix}$. Find : p^{-1} & $p \cdot q p^{-1}$

4. If $f(x) = 5x + 4$, find $f^{-1}(x)$. Also find $f^{-1}(2)$ and $f^{-1}\left(\frac{1}{2}\right)$.
5. The probability that team A wins the match against team B is $\frac{2}{3}$. Find the probability that team A wins at least one game out of 4 games plays against team B.

Q.3 Answer the following in detail. (Any 3)

(30)

1. A random variable X follows Poisson distribution such that $P(X = 2) = \frac{3}{4}P(X = 1)$.

Find : (i) $P(X = 0)$ (ii) $P(X > 2)$ (Given that : $e^{-1.5} = 0.2231$)

2. In how many ways a committee of 3 people can be formed from 5 Doctors & 4 Engineers so that a committee should consists of (i) at least 1 doctor (ii) at the most 2 doctors (iii) all engineers (iv) no engineers (v) majority of doctors .
3. On a shooting range, the probability that A shoots the target is $\frac{1}{3}$ and that of B is $\frac{1}{5}$. If both of them tried independently then find the probability of the following events:
 - (i) Exactly one of them hit the target.
 - (ii) At least one of them hit the target.
 - (iii) At the most one of them hit the target.
 - (iv) Nobody hit the target.

4. i. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, Check whether matrix A satisfies the equation $A^2 - 5A + 7I = 0$

- ii. Find 'k' if, $A^2 = 8A + kI$ where, $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$
