CB

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MASTER OF SCIENCE (M.SC) IN COMPUTER APPLICATIONS

EXAMINATION : JANUARY - 2023

SEMESTER - I

Sub: Discrete Mathematics (MSC-100-22)

Date : 03/01/2023 **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. A coin is tossed 8 times. Find the probability of getting exactly 6 heads.

2. In how many ways a four digit numbers can be formed by using the digits 0,1,2,3,4,5,6, if repetition of the digits is not allowed?

3. If $X \sim B(n, p)$.Find the value of q if, $P(x=2) = P(x=4)$.

4. If $p = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 1 & 3 \end{pmatrix}$, $q = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 2 & 4 \end{pmatrix}$. Find $q^{-1}p$

5. Find the distinct arrangements of the letters of the word 'MATHEMATICS'

6. Check whether the following functions are even or odd?

   (i) $f(x) = \dfrac{2x^2 - 3}{5}$ (ii) $f(x) = 5x^2 - 6x - 1$

7. If $f(x) = \dfrac{5x+4}{7}$. Find $f^{-1}(x)$. Also find $f^{-1}\left(\dfrac{1}{7}\right)$.

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

1. Solve the equations by Cramer`s Rule:
   $x - y - 2z = -1$, $3x + 4y - 8z = 9$, $x - 3y + z = -2$

2. Prove the Right cancellation law in a Group.

3. Find Karl Pearson`s coefficient of correlation for the following data:

X	11	13	12	10	14
Y	3	4	7	5	6

4. With the help of truth tables, show that : $\sim (p \leftrightarrow q) \equiv [(p \wedge (\sim q)) \vee ((\sim p) \wedge q)]$

5. Find the expected value and Variance for the following probability distribution:

X	0	1	2	3	4
P(X)	0.15	0.12	0.40	0.23	0.10

Q.3 Answer the following in detail. (Any 3) **(30)**

1. Solve:
   (i) If G is a group in which $(a.b)^k = a^k.b^k$ for three consecutive integers k. $\forall a,b \in G$. Show that : G is abelian group.
   (ii) If G be a group & $a,b \in G$. Then the equation $ax = b$ and $ya = b$ have unique solution in G.

2. Find $P(X \geq 3)$, $P(X < 4)$ and P(X is an odd number) for the following data:

X	0	1	2	3	4	5	6
F(X)	0.15	0.33	0.43	0.63	0.74	0.88	1

3. A problem in Statostics is given to three students A, B & C , whose chances of solving it are 1/3, 1/4 & 1/5 respectively. Find the probability of the following events:
   (i) Atleast one of them could solve the problem.
   (ii) At the most one of them could solve the problem.
   (iii) The problem remain unsolved.
   if all of them solved the problem independently.

4. Find lines of regressions Yon X and X on Y for the following data:

X	59	60	61	62	63
Y	78	82	82	79	81
