No. of Printed Pages: 03

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SARDAR PATEL UNIVERSITY

M.SC(IT) Sem-II EXAMINATION

2015

TUESDAY, 21th APRIL

2:30 pm to 4:30 pm

SUBJECT: MATHEMATICS-II (PS02FIIT02)

Maximum Marks: 70

Q-1 Write the correct option in the answer book. [10]

(1) The set $\{x \in R: 5 < x < 11\}$ is:

(a) finite (b) Infinite (c) Empty (d) none

(2) $P(8, 4) =$

(a) 1480 (b) 1680 (c) 168 (d) 1860

(3) We can select three objects from the given 10 objects in..... ways.

(a) $\binom{3}{10}$ (b) $\binom{10}{3}$ (c) $\frac{10!}{3!}$ (d) $\frac{9!}{3!}$

(4) Quartile deviation is defined as

(a) $\frac{Q_3 - Q_1}{2}$ (b) $\frac{Q_3 - Q_1}{3}$ (c) $\frac{Q_1 - Q_2}{2}$ (d) $\frac{Q_3 + Q_1}{2}$

(5) De Morgan's Law:

(a) $(A \cup B)^c = A^c \cap B^c$ (b) $(A \cap B)^c = (A \cap B)^c$

(c) $(A \cup B)^c = A \cap B$ (d) None

(6) Every monoid are:

(a) group (b) ring (c) semigroup (d) none

(7) The relation between correlation coefficient and regression coefficients is

(a) $r = \pm\sqrt{b_{XY} + b_{YX}}$ (b) $r = \frac{b_{XY} + b_{YX}}{2}$

(c) $r = \pm\sqrt{b_{XY} b_{YX}}$ (d) None of these

(8) Let $A = \{0,1\}$, then A closed under:

(a) multiplication (b) addition (c) Division (d) Subtraction (PTO)

(9) The number of elements in a set $\{ x \in Q: x^2 - 2 = 0 \}$ are:

(a) 1 (b) 2 (c) $\pm\sqrt{2}$ (d) 0

(10) The set {N, +} is.

(a) group (b) ring (c) monoid (d) semigroup

Q.2 Answer the following in short. **(Any Ten)** [20]

(1) Explain the positive correlation with two examples.

(2) Define range and variance.

(3) Find the number of ways that a party of seven persons can arrange themselves around a circular table.

(4) Find the number of distinct permutation that can be formed from all the letters of the word (i) STATISTICS (ii) UNMARRIED.

(5) Find the power set of a set {a, b, c}.

(6) Define the terms: Group, Monoid.

(7) If A = {1,2,3,.....12} and B = {4,6,7,....., 16} then find the symmetrical difference between A and B.

(8) If S is a nonempty set with the operation a*b = b. Is the operation* associative?

(9) How many committees of six with a given chair person can be selected from twelve persons?

(10) Define : one-one and onto function.

(11) Find variance of the following observations:

7, 7, 7, 7, 7, 7, 7, 7.

(12) Find dual of the following:

(i) $(A \cap B \cup C)^c = (A \cap C)^c \cap (A \cap B)^c$, (ii) $(A \cap \phi) \cup (U \cap A^c) = A$.

Q-3

(a) Prove that $1^2 + 2^2 + 3^2 + ... + n^2 = \frac{n(n+1)(2n+1)}{6}$. [05]

(b) By using algebra of sets , prove that $(\phi \cup A) \cap (B \cup A) = A$. [05]

Q-3 OR

(c) For a,b rational number set Q, define a*b = ab/5. Show that (Q, *) is a group under binary operation *. [05]

(d) If $f(x) = x^2 + 5x$ and $g(x) = 3x + 2$ then find : (i) fog (ii) fog(0) (iii) gof(1). [05]

Q-4

(a) Let n denote a positive integer. Suppose a function L is defined as [05]

$$L(n) = \begin{cases} 0 & \text{if } n = 1 \\ L([n/2]) + 1 & \text{if } n > 1 \end{cases}$$ Find L (25) and L (34).

(b) For a,b ∈ Q (rational numbers), define a*b = a + b — ab. [05]

(i) Is (Q,*) Semigroup?

(ii) Is (Q,*) Monoid ?

(iii) Find its inverse if it exist.

Q-4 OR

(c) Show that the set {1,2,3,4,5,6} is a group under multiplication modulo 7. [05]

(d) For a,b rational number, define a*b = ab/3. Is (Q,*) commutative? Show that (Q,*) is Monoid and find its inverse if it exist. [05]

Q-5

(a) A debating team consists of 3 boys and 3 girls. Find the number of ways they can sit in a row where:(a) there are no restrictions; (b) the boys and girls are each to sit together; (c) just the girls are to sit together. [05]

(b) Find the number of ways that four mathematics books, three history books, three chemistry books and two sociology books can be arranged on a shelf so that all books of the same subje are together. [05]

Q-5 OR

(c) A bag contains five red marbles and six white marbles. Find the number m of ways that four marbles can be drawn from the bag such that two of the marbles must be red and two of the marbles must be white. [05]

(d) Find n if : (1) 2P(n, 2) + 50 = P(2n, 2) (2) P(n, 4) = 840 [05]

Q.6 (a) Calculate Karl Pearson's coefficient of correlation between x and y from the following data: [06]

X	10	6	9	10	12	13	11	9
Y	9	4	6	9	11	13	8	4

(b) Write differences between correlation and regression. [04]

OR

Q.6 (a) Calculate the Standard Deviation the following table giving the age distribution of 542 members. [06]

Age in year	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of Members	3	61	132	153	140	51	2

(b) Given $\sum X = 125$, $\sum Y = 100$, $\sum X^2 = 650$, $\sum Y^2 = 436$, $\sum XY = 520$ and $n = 25$ Obtain the value of Karl Pearson's coefficient of correlation r. [04]

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