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No. of Printed Pages: 03

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M.SC(IT) Sem-II EXAMINATION

2015

TUESDAY, 21th APRIL

2:30 pm to 4:30 pm

SUBJECT: MATHEMATICS-II (PS02FIIT02)

			•	Maximum	n Marks: 70
Q-1	Write the correct or	otion in the answer book.			[10]
(1)	The set $\{x \in \mathbb{R}: 5 < $	x <11} is:			-
	(a) finite	(b) Infinite	(c) Emp	oty (d) none	
(2)	P(8, 4) =				
	(a) 1480	(b) 1680	(c) 168	(d) 1860	• •
(3)	We can select three	objects from the given 1	0 objects in ways.		
	(a) $\begin{pmatrix} 3\\10 \end{pmatrix}$	(b) $\begin{pmatrix} 10\\ 3 \end{pmatrix}$	(c) $\frac{10!}{3!}$	(d) $\frac{9!}{3!}$	
(4)	Quartile deviation is	s 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) $(A \cup B)^c = A^c$	҈ҀВ°	(b) (A∩B)°=	= (A∩B) °	
	(c) $(A \cup B)^c = A$	ПВ	(d) None		•
(6)	Every monoid are:				
	(a) group	(b) ring	(c) semigroup	(d) none	
(7)	The relation betwee	n correlation coefficient	and regression coefficie	ents is	
	(a) $r = \pm \sqrt{b_{XY} + b}$	YX	(b) $r = \frac{B_{x}}{2}$	2 2	
	(c) $r = \pm \sqrt{b_{XY}b_{Y}}$	X	(d) None o	f these	•
(8)	Let $A = \{0,1\}$, then A	A closed under:			
	(a) multiplicatio	n (b) addition	(c) Division	(d) Subtraction	(PTO)
		, 			•

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 (9) The number of elements in a set { x ∈ Q: x² - 2 = 0} are: (a) 1 (b) 2 (c) ±√2 (d) 0 (a) group (b) ring (c) monoid (d) semigroup (a) group (b) ring (c) monoid (d) semigroup (e) answer the following in short. (Any Ten) (f) Explain the positive correlation with two examples. (f) Explain the positive correlation with two examples. (g) Define range and variance. (g) Find the number of ways that a party of seven persons can arrange themselves around a circular table. (g) Find the number of distinct permutation that can be formed from all the letters of the word (i) STATISTICS (ii) UNMARRIED. (g) Find the power set of a set {a, b, c}. (h) Define the terms: Group, Monoid. (f) If A = {1,2,3,,12} and B = {4,6,7,,16} then find the symmetrical difference between A and B. (g) How many committees of six with a given chair person can be selected from twelve (i = 350, sec.) (i) (A ∩ B ∪ C)^c = (A ∩ C)^c ∩ (A ∩ B)^c, (ii) (A ∩ φ) ∪ (U ∩ A^c) = A. (a) Prove that 1² + 2² + 3² + + n² = n(n+1)(2n+1)/6. (b) By using algebra of sets, prove that (φ ∪ A) ∩ (B ∪ A) = A.	[20]
 (b) The set {N, +} is. (c) group (b) ring (c) monoid (d) semigroup Q-2 Answer the following in short. (Any Ten) (i) 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 the set of a variance of the following: (i) (A ∩ B ∪ C)^c = (A ∩ C)^c ∩ (A ∩ B)^c, (ii) (A ∩ \operation A) ∪ (U ∩ A^c) = A. Q-3 (a) Prove that 1² + 2² + 3² + + n² = n(n+1)(2n+1)/6 (b) By using algebra of sets, prove that (\operation (\overline U A)) ∩ (B ∪ A) = A. 	[20]
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 (9) How many committees of six with a given chair person can be selected from twelve persons? (1e) Define : one one one one function. (11) Find variance of the following observations: 7, 7, 7, 7, 7, 7, 7, 7, 7. (12) Find dual of the following: (i) (A ∩ B ∪ C)^c = (A ∩ C)^c ∩ (A ∩ B)^c, (ii) (A ∩ φ) ∪ (U ∩ A^c) = A. Q-3 (a) Prove that 1² + 2² + 3² + + n² = n(n+1)(2n+1)/6. (b) By using algebra of sets , prove that (φ ∪ A) ∩ (B ∪ A) = A. 	
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 (10) Define : one - one and only function. (11) Find variance of the following observations: 7,7,7,7,7,7,7,7,7. (12) Find dual of the following: (i) (A ∩ B ∪ C)° = (A ∩ C)° ∩ (A ∩ B)°, (ii) (A ∩ φ) ∪ (U ∩ A°) = A. Q-3 (a) Prove that 1² + 2² + 3² + + n² = n(n+1)(2n+1)/6. (b) By using algebra of sets, prove that (φ ∪ A) ∩ (B ∪ A) = A. 	
7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7	
(i) $(A \cap B \cup C)^{c} = (A \cap C)^{c} \cap (A \cap B)^{c}$, (ii) $(A \cap \phi) \cup (\cup \cap A^{c}) = A$. Q-3 (a) Prove that $1^{2} + 2^{2} + 3^{2} + \dots + n^{2} = \frac{n(n+1)(2n+1)}{6}$. (b) By using algebra of sets, prove that $(\phi \cup A) \cap (B \cup A) = A$.	
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(b) By using algebra of sets, prove that $(\phi \cup A) \cap (B \cup A) = A$.	
=9 using algebra of sets, prove that $(\phi \cup A) (B \cup A) = A$.	[05]
	[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]
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(2-4)

(a) Let a denote a positive integer. Suppose a function L is defined as

$$L(n) = \frac{0 \quad ij! n = 1}{L([n/2]) + 1 \quad ij! n > 1}$$
 F nd L (25) and L (34) :

(b) For $a, b \in Q$ (rational numbers), define a*b = a + b - ab.

(i) Is (Q,*) Semigroup?

(ii) Is (Q, *) Monoid?

(iii) Find its inverse if it exist.

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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 [05] Monoid and find its inverse if it exist.
- Q-5
- (a) A debating team consists of 3 boys and 3 girls. Find the number of ways they can sit in a row [05] where:(a) there are no restrictions; (b) the boys and girls are each to sit together; (c) just the girls are to sit together.
- (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.

Q-5

OR

- (c) A bag contains five red marbles and six white marbles. Find the number m of ways that [05] 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.
- (d) Find n if: (1) 2P(n, 2) + 50 = P(2n, 2) (2) P(n, 4) = 840 [05]

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

	X	10	6	9	10	12	13	11	9
	Y	9	4	6	9	11	13	8	4
Write differences betwee	en con	relati	on a	ind	regre	ssion		I	I

(b)

a)

(b)

OR

Calculate the Standard Deviation the following table giving the age distribution of 542 members.

ĺ	Age in year	20-30	30-40	40-50	50 60	60.70		r	_
	No. of Members	3	61	122	50-00	60-70	70-80	80-90	l
L		5	01	132	153	140	51	2	
Given $\sum X = 125$, $\sum Y = 100$, $\sum Y^2 = 650$, $\sum Y^2$									Ĺ

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

- X-

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[06]

[04]

[06]

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