SEAT No. **SARDAR PATEL UNIVERSITY**

BCA SEM-I EXAMINATION

(NC: OLD Course)

MONDAY, 22nd OCTOBER, 2018

10:00 am to 12:00 noon

US01FBCA02: MATHEMATICS-I　　　　**Total Marks: 70**

Q:1 Choose the correct option in the following, mention the correct option with　[10]
the answers in the answer book.

(1) Geometric mean of x, y, z is given by

(a) $\sqrt{xyz}$　　　(b) $\sqrt{x+y+z}$　　　(c) $\sqrt[3]{xyz}$　　　(d) none

(2) The set $\{x \in R: 0 < x < 3\}$ is

(a) finite　　　(b) infinite　　　(c) empty　　　(d) none

(3) The number of elements in the power set of a set $\{2,3,4,5\}$ are:

(a) 0　　　(b) 8　　　(c) 16　　　(d) 32

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

(a) multiplication　　(b) addition　　(c) division　　(d) subtraction

(5) The set $\{N,+\}$ is

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

(6) A Square matrix A is said to be skew symmetric if.....

(a) $A \neq A^T$　　(b) $A = -A^T$　　(c) $A = A^T$　　(d) None

(7) Dot product of u = (1, 2, 3), v = (0, -1, 4) is

(a) 14　　(b) (0, -2, 12)　　(c) (1, 1, 7)　　(d) 10

(8) Median of 2, 3, 7, 9, 6, 4, 8 is

(a) 7　　　(b) 6　　　(c) 4　　　(d) 9

(9) If f(x) = 2x - 3, then $f^2(2)$ =

(a) 1　　(b) -1　　(c) 0　　(d) 2

(10) Every monoid are

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

Q:2 Attempt any ten in short.　　　　　　　　　　　　　　　　[20]

(1) For a, b rational number, define a*b = ab/5. Find identity element for given binary operation.

(2) Find Median height(in cm) of seven students for the following data
150, 165, 154, 156, 159, 145, 157

(P.T.O)

(1)

(3) Define Geometric mean.

(4) In $(Z_{10}, \times_{10})$, find 3^{-1}, 5^{-1} ,if exists.

(5) If S is a nonempty set with the operation $a*b = a$. Is the operation:
(i) associative?, (ii) commutative ?.

(6) If $A = \begin{bmatrix} 1 & 0 & 2 \\ 4 & 5 & -1 \\ -1 & 2 & 3 \end{bmatrix}$ then find $A + A^T$ and $A - A^T$.

(7) If $f(x) = x + 5$ and $g(x) = 3x +2$ then find fog .

(8) Using determinants solve the following simultaneous equations
$3x - 2y = 5$, $5x +4y =1$.

(9) Find dual of the following:

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

(10) Find Arithmetic mean of the following data of marks of 10 students
48, 65, 43, 31, 57, 37, 60, 59, 49 and 77.

(11) Find the power set of a set $A = \{1, 2, 3\}$.

(12) Find x, y, z if $(2x, 3, y) = (4, x + z, 2z)$.

Q:3

(a) By using algebra of sets , prove that $(\phi \cup A) \cap (B \cup A) = A$.

[5]

(b) Define a function F as $F (a, b) = 0$ if $a < b$.

[5]

$$= F (a- b, b) +1 \quad \text{if} \quad b \le a.$$

Find $F (4,3)$ and $F(14,3)$.

Q:3   OR

(c) Prove that $1^2 +2^2 +3^2 +\ldots\ldots+n^2 = \dfrac{n(n+1)(2n+1)}{6}$.   [5]

(d) Define invertible function and hence find inverse of the function   [5]
$f(x) = \dfrac{7x-3}{5x-2}$, $x \ne \dfrac{2}{5}$.

Q:4

(a) If $G = \{1,2,3,4,5,6\}$ then prove that G is a group under multiplication modulo 7. Is it finite group?   [5]

(b) For a,b rational number, define $a*b = a + b + ab$. Is $(Q,*)$ commutative?   [5]
Show that $(Q,*)$ is Monoid and find its inverse if it exist.

Q:4   OR

(c) Define a group homomorphism. Show that f: $G \to G'$ defined by $f(a) = 2^a$ is   [5]
a homomorphism where G is a group of real numbers under addition and
G' is a group of positive real numbers under multiplication.

(d) For a,b ∈ Q (rational numbers), define a*b = ab/3.　　　　　　　[5]

    (i) Is (Q,*) Semigroup?　　　(ii) Is (Q,*) Monoid ?

    (iii) Find the inverses of elements of (Q,*), if it exist.

Q:5

(a) If $A = \begin{bmatrix} 1 & -2 & 3 \\ 6 & 0 & 9 \\ 5 & -7 & 11 \end{bmatrix}$ then find the determinant of A.　　　　[5]

(b) If $u = (1, 4, 3)$, $v = (-5, -2, 5)$, then evaluate: $\|u\|$, $\|v\|$, $\|u+v\|$, $\|u-3v\|$.　　[5]

Q:5　　　　　　　　　　　　　　OR

(c) If $A = \begin{bmatrix} 2 & 4 \\ 3 & 0 \\ 3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 2 & 3 \\ 7 & 1 & 5 \end{bmatrix}$ then prove that $(AB)' = B'A'$.　　[5]

(d) Define: equality of vectors, norm of a vector. Find x and y if　　　[5]

    $x(2, 1) + y(1, 6) = (7, 1)$

Q:6 Find Arithmetic Mean, Medain and Mode of the following distribution:　　[10]

(a)

Marks	0-10	10-20	20-30	30-40	40-50
Number of students	2	8	20	16	4

OR

Q:6 The marks of 40 students who attended a workshop competitive exam　　[10]
(b) are as follows:

    27　32　57　34　36　48　49　31　51　34

    49　45　51　29　47　36　50　46　30　46

    35　35　48　41　53　36　37　47　47　30

    43　45　42　30　46　50　28　44　48　49

Classify the above data in exclusive classes & one of them being 40 – 44.
Also obtain mean of the distribution.

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