B. Voc. (ACTECH) (Sem. I) (CBCS) Examination

April / May – 2015

Foundation of Speed Mathematics & Statistics

Faculty Code : 003
Subject Code : 039103

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

1   M.C.Q. :   **20**

(1) Singleton set is also known as _____

(A) unit set   (B) null set

(C) equal set   (D) None

(2) $A = \{x, y, z\}$ how many subsets does $P(A)$ contain ?

(A) 8   (B) 4

(C) 3   (D) None

(3) $A \cap A' =$ _____

(A) ϕ (B) U

(C) A (D) A'

(4) Null set is denoted by _____

(A) ϕ (B) { }

(C) both (A) and (B)   (D) None

(5) $A = \{1, 2\}$, $B = \{2, 3\}$, $A - B =$ _____

   (A) $\{1, 2\}$ (B) $\{3\}$

   (C) $\{1\}$ (D) None

(6) $A \cup \phi =$ _____

   (A) U (B) ϕ

   (C) A (D) None

(7)   If $A \subset B$ then B is called _____ of A.

   (A) subset   (B) superset

   (C) singleton set   (D) None

(8) $(A + B)^T =$ _____

   (A) $A + B$ (B) $A^T + B^T$

   (C) AB (D) None

(9)   A column matrix contains _____ columns.

   (A) 2   (B) 1

   (C) 3   (D) None

(10) Identify the matrix $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$

(A) row matrix   (B) zero matrix

(C) column matrix   (D) scalar matrix

(11) If $AB = I$ then B is called _____ of A.

(A) diagonal   (B) orthogonal

(C) square   (D) inverse

(12) Identity matrix is denoted by _____.

(A) A (B) U

(C) O (D) I

(13) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then $A^T = $ _____

(A) $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$ (B) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

(C) $\begin{bmatrix} 4 & -2 \\ 3 & 1 \end{bmatrix}$ (D) None

(14) $(8)_{10} = (\underline{\quad})_2$

(A) 100   (B) 1000

(C) 0010   (D) None

(15) $(101)_2 = (\underline{\hspace{1cm}})_{10}$

    (A) 0.1   (B) 1

    (C) 5   (D) None

(16) When three points are co-linear, then area is _____.

    (A) 0   (B) –1

    (C) 1   (D) None

(17) For two parellel lines which of the condition is true ?

    (A) $m_1 m_2 = -1$ (B) $m_1 \pm m_2$

    (C) $m_1 = m_2$ (D) None

(18) When proving that given vertices are the vertices of an equilateral triangle, it is necessary to show

    (A) two of its sides are equal

    (B) all of its sides are different

    (C) all of its sides are equal

    (D) none

(19) $(11001)_2 = (\underline{\hspace{1cm}})_{10}$

    (A) 25   (B) 35

    (C) 45   (D) None

(20) $(4201)_8 = (\underline{\hspace{1cm}})_{10}$

    (A) 2177   (B) 2100

    (C) 2265   (D) None

2 (a) Any three : **6**

      (1) Write down distribution laws in a set theory.

      (2) Explain methods of representation of a set.

      (3) Define :

            (i) Subset

            (ii) Equal set

      (4) Define :

            (i) Square matrix

            (ii) Diagonal matrix

      (5) $A = \begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix}$ find A^{-1}.

      (6) $B = \begin{bmatrix} 10 & 20 \\ 30 & 40 \end{bmatrix}$ find $adj\,(adj\,B)$.

(b) Any three : **9**

      (1) Define union of sets and write down properties of union.

      (2) $A = \{11,12\}$, $B = \{10,11,12\}$ find $B \times A$, A^2.

      (3) $A = \{a,b,c\}$, $B = \{c,d\}$, $C = \{a,d\}$ verify that

         $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

(4) If $A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 1 \\ 4 & 5 \end{bmatrix}$ find $3A - B'$.

(5) $A = \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$ find matrix B such that $A + 2B = A^2$.

(6) The distance between two points $(k, -5)$ $(2, k)$ is 13 find k.

(c) Any two :   10

(1) Prove that $A \cap (B \cap C) = (A \cap B) \cap C$.

(2) Verify that (1,10) (2,1) and (-7,0) are the vertices of an isosceles triangle.

(3) The x-intercept of a line is 3 times than its y-intercept and line passing through the point (2,–3) find equation of line.

(4) $A = \begin{bmatrix} 0 & 4 & 3 \\ 1 & -3 & -3 \\ -1 & 4 & 4 \end{bmatrix}$ find A^2, also identify its type.

(5) $A = \begin{bmatrix} 1 & 3 \\ 5 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 2 \\ 0 & 1 \end{bmatrix}$ verify that

$adj(AB) = (adj\ B) \cdot (adj\ A)$.

3 (a) Any three :   **6**

      (1) Define : Parellel line, Perpendicular line.

      (2) Write equation of line having slope m and passing through the point (x_1, y_1).

      (3) Convert these numbers from Decimal to Binary :
          (1) 50   (2) 78.

      (4) Convert these numbers from Decimal to Octal :
          (1) 24   (2) 112.

      (5) Find 1's complement and 2's complement of 110011.

      (6) Explain five more rule technique.

   (b) Any three :   **9**

      (1) Explain :

          Binary number system

          Decimal number system.

      (2) Convert : Hexadecimal to Decimal :

          (1)   85A

          (2)   1AF3

      (3) Find a point which divides the line joining (3,6) (6,11), externally in the ratio 2 : 1.

      (4) A line joining the points (–8,3) (2,1) is parellel to the line joining (11,–1) and (k,0) find k.

      (5) Explain : Spider technique.

      (6) Write advantages of meditation.

(c) Any two : **10**

(1) Explain in brief skills to improve memory.

(2) Write a short note on visualization technique.

(3) Subtract following number by 1's complement method :

$$(0111)_2 - (0011)_2$$

(4) Convert : Binary to Octal.

(i) $(1110)_2 = (\quad)_8$

(ii) $(100100100)_2 = (\quad)_8$

(5) Find equation of line passing through $(-3,1)$ and perpendicular to the line $5x - 2y + 7 = 0$.

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