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SARDAR PATEL UNIVERSITY
F Y BBA (ITM) (I Sem.) Examination (NC)
Friday, 22ND April-2016
02.30 pm - 04.30 pm
UM01CBB107 - Business Mathematics

Total Marks: 60

Note: Figures to the right indicate marks

- Q.1 A.** If $U = \text{set of letters of the word 'W H E A T'}$ [05]
 $A = \text{set of letters of the word 'W H A T'}$
 $B = \text{set of letters of the word 'H E A T'}$
 $C = \text{set of letters of the word 'E A T'}$
 then find (i) $(A \cap B) \times (B \cap C)$ (ii) $(A - B)' \cap C'$ (iii) $(A \cap B \cap C)'$
- B.** (i) Express the following in the form of an interval: $|x - 4| \leq 5$ and $x \leq 0$. [05]
 (ii) Express $0.0\overline{2}32323\ldots$ into a quotient form.
- C.** (i) If $U = \{p, q, r, s\}$, $A = \{p, q, r\}$ and $B = \{q, r, s\}$, then [05]
 verify that $(A \cup B) - B = A \cap B'$.
 (ii) If $A = \{-3, -2, 2, 0\}$ and $B = \{3, 2, -2, 0\}$ then find (i) $A \times B$ (ii) $A \Delta B$.

OR

- Q.1 A.** State & verify De-Morgan's law by Venn diagram. [05]
- B.** State and prove De - Morgan's law by taking $U = \{x / -5 \leq x \leq 5 ; x \in \mathbb{Z}\}$; $A = \{-1, 0, 1, 2, 5\}$, [05]
 $B = \{-2, 0, 2, 3, 4\}$.
- C.** (i) Express the following inequalities in a modulus form: $-7 < x < 8$. [05]
 (ii) If $A = \{x : -1 < x < 1, x \in \mathbb{Z}\}$, then find power set of A.

Q.2 A. Prove that
$$\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4abc$$
 [05]

B. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, then prove that $A^2 - 4A = 5I$ and use this to find A^{-1} . [05]

C. Define Transpose of a matrix. Show that $A = \frac{1}{3} \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$ is an orthogonal matrix. [05]

OR

Q.2 A. If $A = \begin{bmatrix} 4 & 1 & 3 \\ 2 & 0 & 5 \\ 1 & 3 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & 0 \\ 0 & 4 & 3 \\ 2 & 1 & 5 \end{bmatrix}$ [05]

then verify that (i) $(AB)' = B' A'$ (ii) $(A + B)' = A' + B'$.

(P.T.O.)

B. Solve the following equations by Cramer's rule; [05]

$$\begin{vmatrix} x+2 & 3 \\ y+1 & 5 \end{vmatrix} = 8, \quad \begin{vmatrix} x-1 & y-1 \\ 1 & 6 \end{vmatrix} = 4$$

C. Solve the following equations using inverse of a matrix: [05]

$$\begin{matrix} 2x+y=4 \\ 5x+3y=9 \end{matrix}$$

Q.3 A. Show the equation of a line making intercepts a and b on the axes. [04]

B. Find the equation of a line whose slope is 2 and which passes through the point of intersection of the lines $x - 4y + 18 = 0$ and $x + y - 12 = 0$. [05]

C. (i) Find a, if the distance between A(-3,-2) and B(a,1) is $3\sqrt{10}$. [06]
(ii) Find the equation of a line having slope $\frac{2}{3}$ and the intercept on y-axis as 6.

OR

Q.3 A. Find the equation of a line which passes through the points (1,-2) & makes the intercepts on the axes equal in magnitude & opposite in signs. [05]

B. For what values of k, the lines $3x - (3k+2)y + 2 = 0$ and $2x - (k-3)y - 1 = 0$ are (i) parallel ? (ii) perpendicular ? [05]

C. (i) Show that the points (2,3), (6,5) and (12,8) are collinear. [05]
(ii) Given A(4,5), B(2a+1, 2a-1), C(7,4) and $\overline{AB} \perp \overline{BC}$, find a.

Q.4 A. Write working rules for limit. [03]

B. Evaluate the following: [12]

1. $\lim_{x \rightarrow 2} \frac{x^3 - 3x^2 + 3x - 2}{2x^3 - 5x^2 - x + 6}$

2. $\lim_{n \rightarrow \infty} \left(\frac{n}{n+4} \right)^{5n+3}$

3. $\lim_{x \rightarrow -1} \frac{x^{-3} - a^{-3}}{x^{-2} - a^{-2}}$

OR

Q.4 A. Evaluate the following: [11]

1. $\lim_{x \rightarrow 3} \frac{3-x}{\sqrt{3+x} - \sqrt{6}}$

2. $\lim_{x \rightarrow 0} \frac{2(5)^x + 3(2)^x - 5}{x}$

3. $\lim_{n \rightarrow \infty} (\sqrt{n^2 + n + 1} - \sqrt{n^2 + 1})$

B. If $f(x) = x^2$ then find $\lim_{x \rightarrow 0} \frac{f(x+2) - f(x-2)}{x}$ [04]

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