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BAL-2352-R Seat No._____

M. Sc. (CA & IT) (Sem. I) Examination

March / April - 2014

102 : Mathematics - I

(New Course)

Time : **3** Hours] [Total Marks : **70**

Instructions : (i) All questions are compulsory.

(ii) Figures on the right side indicate full marks.

1 (a) Define the following terms with example : **8**

(i) Equality of two sets

(ii) Universal set

(iii) Complement of a set

(iv) Power set.

(b) If $n(U)=100$, $n(A)=60$, $n(B)=50$ and $N(A\cup B)=90$ the n find $n(A'\cup B')$, $n(A'\cap B')$ and $n(A\cap B)$. **4**

(c) Prove that : $A\times(B\cap C)=(A\times B)\cap(A\times C)$. **3**

(d) State and prove De Morgan's law for sets. **3**

2 (a) Define the following terms with suitable examples : **8**

(i) Domain and range

(ii) Logarithmic function

(iii) Even function

(iv) Invertible function.

(b) The fixed cost in the production of transistors is Rs. 1,50,000 and the variable cost per unit is Rs. 500. If the selling price of a transistor is Rs. 750. **4**

Find :

(i) Revenue function

(ii) Cost function.

(c) If $f : R \to R$, $g : R \to R$, $f(x) = 2x + 3$, $g(x) = 4x$, **3**

find $fog(-4)$, gog, fof.

(d) State with proper reason whether the following statements are true or false : **3**

(i) Every set has at least two subsets.

(ii) $C \in \{a, \{b, c\}, d\}$.

(iii) $n(A) = 4$, $n(B) = 6 \Rightarrow n(A \times B) = 10$.

3 (a) Define the following terms with suitable example : **8**

(i) Singular matrix

(ii) Unit matrix

(iii) Symmetric matrix

(iv) Diagonal matrix.

(b) Find A^{-1} if $A = \begin{bmatrix} 2 & 3 & -1 \\ 3 & 2 & 1 \\ 1 & -5 & 3 \end{bmatrix}$. **4**

(c) Solve the following equation by Cramer's rule : **3**

$$\frac{3}{x} - \frac{4}{y} - \frac{2}{z} = 1;\ \frac{1}{x} + \frac{2}{y} + \frac{1}{z} = 2;\ \frac{2}{x} + \frac{5}{y} - \frac{2}{z} = 3.$$

(d) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ find value of **3**

$A^2 + 4A + 7I$.

4 (a) Evaluate any four : **8**

(i) $\lim\limits_{x \to 0} \dfrac{\tan 2x}{2x - \sin x}$.

(ii) $\lim\limits_{x \to 0} \left(\dfrac{4 - 3x}{4 + 3x} \right)^{1/x}$.

(iii) $\lim\limits_{x \to 1} \dfrac{\sqrt{3 + x} - \sqrt{5 - x}}{x^2 - 1}$.

(iv) $\lim\limits_{x \to 0} \dfrac{x^2 + 1 - \cos x}{x \tan x}$.

(b) Evaluate :

(i) $\lim_{x \to \infty} \left(1 + \frac{5}{3x}\right)^x$

(ii) $\lim_{x \to 0} \left(\frac{2^{3x} - 2^x}{x}\right)$.

(c) Evaluate : **4**

(i) $\lim_{n \to \infty} \frac{1 + 2 + 3 + \ldots\ldots + n}{(n+4)(n-3)}$.

(ii) If $f(x) = \sqrt{x^2 + 3}$, then find

$\lim_{x \to 1} \frac{f(x) - f(1)}{x - 1}$.