



BAL-2352

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 4
 $n(A \cup B) = 90$ the n find $n(A' \cup B')$, $n(A' \cap B')$
and $n(A \cap B)$.
- (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 $f : R \rightarrow R$, $g : R \rightarrow R$, $f(x) = 2x + 3$, 3
 $g(x) = 4x$,
 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

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

(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) $\lim_{x \rightarrow 0} \frac{\tan 2x}{2x - \sin x}.$

(ii) $\lim_{x \rightarrow 0} \left(\frac{4 - 3x}{4 + 3x} \right)^{1/x}.$

(iii) $\lim_{x \rightarrow 1} \frac{\sqrt{3+x} - \sqrt{5-x}}{x^2 - 1}.$

(iv) $\lim_{x \rightarrow 0} \frac{x^2 + 1 - \cos x}{x \tan x}.$

(b) Evaluate :

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

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

(c) Evaluate :

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

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

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