Roll No. ☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages : 02**

Total No. of Questions : 09

BMCI (2014 & Onwards)   (Sem.–2)
MATHEMATICS – II
Subject Code : BMCI-201
Paper ID : [72462]

Time : 3 Hrs.   **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION–A

1. **Write briefly :**

   (a) Find x, y, z, t if $2\begin{bmatrix} x & z \\ y & t \end{bmatrix} + 3\begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix} = 3\begin{bmatrix} 3 & 5 \\ 4 & 6 \end{bmatrix}$.

   (b) Define rank of a matrix.

   (c) Is matrix multiplication commutative? Give details to support your answer or provide an example.

   (d) Evaluate $\int \frac{\sin 4x}{\sin x} dx$.

   (e) Give formulae for integration using Trapezoidal rule and Simpson's 3/8 rule.

   (f) Differentiate $\cos^{-1}(1 - 2x^2)$ if $0 < x < 1$.

   (g) Find $\frac{dy}{dx}$ when $y = e^{\sin x^2}$.

   (h) Define measures of central tendency.

   (i) The following table gives the daily income of 10 workers. Find the arithmetic mean.

Wokers	A	B	C	D	E	F	G	H	I	J
Daily Income	120	150	180	200	250	300	220	350	370	260

   (j) Calculate the standard deviation of the following values:

   5, 10, 25, 30, 50.

SECTION–B

2. Differentiate with respect to x:

(a) $\log (x^x + \operatorname{cosec}^2 x)$

(b) $\dfrac{\sec x + \tan x}{\sec x - \tan x}$.

3. Apply Gauss Jordan method to solve:

$$x + y + z = 9;$$
$$2x - 3y + 4z = 13;$$
$$3x + 4y + 5z = 40.$$

4. (a) Evaluate $\int \sin (\log x)\, dx$.

(b) $\int \dfrac{2x}{(x^2 +1)\,(x^2 +2)}\, dx$.

5. (a) If $x^3 + y^3 = 3ax$ find $\dfrac{dy}{dx}$.

(b) Evaluate $\int \dfrac{1}{2x^2 + x -1}$.

6. Calculate the mean deviation for the following distribution :

Profit of Companies	10-20	20-30	30-50	50-70	70-80
No. of Companies	5	8	16	8	3

SECTION–C

7. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$. Find adj. A and verify that A.(adj A) = (adj A).A = | A | I_3.

8. (a) Evaluate $\displaystyle\int_{0}^{\pi/2} \sqrt{\tan}\ x + \sqrt{\cot}\ x\, dx$.

(b) Find the positive nos. x and y such that $x + y = 60$ and xy^3 is max.

9. (a) Evaluate $\int e^x (\tan x + \log \sec x)\, dx$.

(b) If Rs. 500 amounts to Rs. 583.20 in two years compounded annually. Find the rate of interest per annum.