Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

BMCI (2013 Batch) (Sem.–3)

MATHEMATICS – III (Computer Oriented)

Subject Code : BMCI-302

M.Code : 70646

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

Q1. Answer briefly :

a) If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$. Prove that $AA^T = I$

b) Determine the rank of the matrix $= \begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$

c) Find the geometric mean for the weight of 5 persons in lbs given by 100, 120, 85, 140, 110.

d) Obtain mode of the following distribution

Marks:	10-20	20-30	30-40	40-50	50-60	60-70
Frequency :	8	12	25	45	11	9

e) Find y in terms of x when $\frac{dy}{dx} = x^3$ and $y = 8$ at $x = 2$

f) Find the derivative of $y = \sin x$ (log cos x)

g) Evaluate $\int_{-1}^{3} |x-2|\,dx$

h) Evaluate $\int (\tan x + \cot x)\,dx$

i) Define Trapezoidal rule and simpson's y_3 rule.

j) Evaluate $\int_{0}^{6} \frac{dx}{1+x^2}$ using Simpson's 3/8 rule taking $h = 1$.

SECTION–B

Q2. Solve the following equations using Gauss elimination method.

$x + 2y + 3z = 0,\ 2x + 3y + 4z = 0,\ 7x + 13y + 19z = 0$

Q3. If $y = \ln \sqrt{\frac{1+\tan x}{1-\tan x}}$, prove that $\frac{dy}{dx} = \sec 2x$

Q4. Evaluate $\int \sec^3 x\,dx$

Q5. Calculate the first four moments of the following distribution about mean :

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

Q6. Find $\frac{dy}{dx}$:

(i) $y = (x^2 - 5x + 6)^{1/3} (x^2 + 1)^{2/3}$

(ii) $x^y = e^{x-y}$

SECTION–C

Q7. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$. Show that $A^3 = A^{-1}$

Q8. Prove that $\int \sqrt{x^2 - a^2}\,dx = \frac{x}{a}\sqrt{x^2 - a^2} - \frac{a^2}{2}\log|x + \sqrt{x^2 - a^2}| + C$ where C is constant.

$c_1 - \frac{a^2}{2}\log a.$

Q9. Find the shortest distance between the line $y = 10 - 2x$ and the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.