Roll No…….. **Total No. of Printed Pages: 2**
Total No. of Questions: [09]

BCA (Semester – 2nd)
FUNDAMENTALS OF MATHEMATICS
Subject Code: BMAT0204
Paper ID: [160110]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a) Write the definition of square matrix with example.
b) Write the definition of symmetric matrix with example.
c) Find the determinant of matrix $A = [0\ 1\ 2\ 1\ 0\ 3\ 2\ 3\ 0\ ]$
d) Determine the median and mode for the set $\{2,\ 3,\ 7,\ 5,\ 5,\ 13,\ 1,\ 7,\ 4,\ 8,\ 3,\ 4,\ 3\}$.
e) Find the probability of throwing 9 with 2 dice.
f) Differentiate $2x^3 \cos cos\ 3x$ with respect to x.
g) If $y = 3x^4 - 2x^2 + 5x - 2$ then find $\frac{dy}{dx}$.
h) Solve $\int 3x^4 dx$.
i) Determine $\int (4 + \frac{3}{7}x - 6x^2) dx$.
j) Evaluate $\int 4 \cos cos\ 3x\ dx$.

Section – B **(5 marks each)**

Q2. If $A = [1\ 0\ 3\ 2\ 1\ 2\ 1\ 3\ 1\ ]$ and $B = [2\ 2\ 0\ 1\ 3\ 2\ 3\ 2\ 0\ ]$ then find AB.

Q3. Find the rank of matrix $A = [1\ 3\ -\ 2\ 4\ -\ 5\ 6\ 3\ 5\ 2\ ]$.

Q4. Find the mode from the following data:

Age	0 - 6	6 - 12	12-18	18-24	24-30	30-36	36-42
Frequency	6	11	25	35	18	12	6

Q5. Differentiate the following expression $= cos\left(\sqrt{(4x - 1)}\right)$.

Q6. Evaluate $\int_0^{\pi/2} 3sin^2 x\ dx$.

Section – C **(10 marks each)**

Q7. (a) Solve the following simultaneous equations using Cramer's rule

$$x + y + z = 4; \quad 2x - 3y + 4z = 33; \quad 3x - 2y - 2z = 2$$

(b) The students got the following percentage of marks in economics and statistics. Calculate the coefficient of correlation.

Roll No.	1	2	3	4	5	6	7	8	9	10
Marks in E	78	36	98	25	75	82	90	62	65	39
Marks in S	84	51	91	60	68	62	86	58	53	47

Q8. (a) Find the maximum and minimum value of the curve $y = x^3 - 3x + 5$.

(b) Evaluate $\int \frac{2x}{4x^2-1} dx$.

Q9. (a) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ correct to 3 decimal places, using Simpson's $\frac{3}{8}$ rule. (h = 1)

(b) Use the trapezoidal rule with 6 intervals to evaluate the integral correct to 3 decimals.

$$\int_1^3 \frac{2}{\sqrt{x}} dx$$