

Roll No.

Total No. of Questions : 9]
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**BCA (CBCS) RUSA Ist Semester
Examination**

4037

MATHEMATICS-I
BCA-0101

Time : 3 Hours]

[Maximum Marks : 70

Note :- Attempt *five* questions in all, selecting *one* question each from Sections-A, B, C and D. Section E is compulsory and carries 30 marks. All other questions carry equal marks (10).

Section-A

1. (a) Find the solution of equation $\sqrt{x-3} + x = 3$.

$2\frac{1}{2}$

- (b) Which term of the sequence 90, 87, 83,

is zero.

5x2=10

C-584

(1)

Turn Over

2. (a) If $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 & 4 \\ 5 & 6 & 7 \end{bmatrix}$, verify that :

$$(A + B)' = A' + B'$$

$$\begin{pmatrix} -1 & 1 \\ -2 & 2 \end{pmatrix}$$

- (b) Using Binomial theorem, find the value of (10.1) upto 3 decimal places. $5 \times 2 = 10$

Section-B

3. (a) Find the area of the triangle with vertices $(1, 2)$, $(-1, 4)$ and $(0, 8)$. $2\frac{1}{2}$

- (b) Find the equation of line passing through point

$(3, 5)$ and is perpendicular to the line $x + 5y$

$$-4 = 0.$$

$$5 \times 2 = 10$$

4. (a) Find the equation of circle whose centre lies on x -axis and passing through point $(2, 3)$ with radius 5 units. $2\frac{1}{2}$

C-584

$$(2\frac{1}{2})$$

- (b) For what value of k , the line passing through points $(k, 4)$, $(1, 2)$ is parallel to the line passing through points $(3, -1)$, $(2, -2)$? $5 \times 2 = 10$

Section-C

5. (a) Prove that :

$$(\sec \theta + \tan \theta)^2 = \frac{1 + \sin \theta}{1 - \sin \theta}$$

- (b) Prove that :

$$\frac{\cos 25^\circ + \sin 25^\circ}{\cos 25^\circ - \sin 25^\circ} = \tan 70^\circ$$

6. (a) If $A + B + C = \pi$, then prove that :

$$\tan A + \tan B + \tan C = \tan A \tan B \tan C$$

- (b) From the cliff of a hill 1000 meter high, the

angles of depression of two buildings on same side of hill are at level 30° and 60° . Find the distance of each building from the foot of hill. $5 \times 2 = 10$

C-584

(3)

Turn Over

Section-D

7. (a) For what value of k , the function :

$$f(x) = \begin{cases} kx + 5, & x \leq 2 \\ x - 1, & x > 2 \end{cases}$$

is continuous at $x = 2$.

- (b) If $e^x + e^y = e^{x+y}$, prove that :

$$\frac{dy}{dx} = \frac{e^x(e^y - 1)}{e^y(e^x - 1)}$$

$$5 \times 2 = 10$$

8. (a) Find the area under the curve $y = x^2 + 1$, bounded by x -axis and ordinates $x = 2$ and

$$x = 3.$$

- (b) Evaluate :

$$\int x \log x \, dx$$

$$5 \times 2 = 10$$

Section-E

(Compulsory Question)

9. (A) (i) Find the coefficient of x^5 in the expansion of e^{2x} .

C-584

(4)

- (ii) Write the value of the expression :

$$\cos(A - B) - \cos(A + B)$$

- (iii) Write the centroid of triangle ΔABC , with

vertices $A(1, 4)$, $B(3, 2)$ and $C(2, 3)$.

- (iv) Construct matrix of order 2×3 , s.t.

$$A = [a_{ij}], \text{ when } a_{ij} = \frac{i}{j}.$$

- (v) Find the domain and range of the function :

$$f(x) = \frac{x+1}{2x+1}$$

- (vi) Find the derivative :

$$\frac{dy}{dx}$$

$$\text{when } y = 10^x + x^{10}.$$

- (vii) What is a singular matrix ?

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(5)

Turn Over

(viii) Evaluate :

$$\frac{d^2}{dx^2}$$

(1) Is it equal to 2? ?

(ix) Let ABC be a triangle with sides a , b and c . Write down the law of sines.

(x) Evaluate :

$$\int \frac{(\log x)^3}{x} dx$$

$$(1)$$

$$1 \times 10 = 10$$

(B) (i) Evaluate the determinant

$$\begin{vmatrix} 15 & 5 & 20 \\ 1 & 0 & 2 \\ 3 & 1 & 4 \end{vmatrix}$$

without expanding it.

(ii) Find a point on y-axis, which is equidistant from the points (7, -6) and (-3, -4).

(iii) Find the values of p and q in equation $x^2 + px + q = 0$, when p and q are its roots.

C-584

(6)

(iv) If $x = 5t$ and $y = \frac{3}{t}$, find $\frac{dy}{dx} = ?$

$$(1)$$

(v) Find the maximum and minimum value of

function $y = \sin x$, $x \in [0, 2\pi]$.

$$4 \times 5 = 20$$

C-584

(7)