

Roll No. 6211

Total No. of Questions : 9]
(2111)

[Total No. of Printed Pages : 7

**BCA (CBCS) RUSA Ist Semester
Examination**

4508

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) Solve the equation $4^{1+x} + 4^{1-x} = 10$.

(b) The sum of three numbers in A.P. is 24 and

the product is 440. Find the numbers.

5×2=10

C-571

(1)

Turn Over

2. (a) Find the coefficient of x^5 in the expansion of $(x + 3)^8$.

- (b) If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$, $f(x) = x^2 - 2x - 3$, show that

$$f(A) = 0.$$

$$5 \times 2 = 10$$

Section-B

3. (a) Find the centroid of the triangle whose vertices are $(1, -1)$, $(4, 3)$, $(1, 1)$.

- (b) The perpendicular from the origin to the line $y = mx + c$ meets it at the point $(-1, 2)$. Find the values of m and c .

$$5 \times 2 = 10$$

4. (a) Find the distance between the parallel lines $3x - 4y + 7 = 0$ and $3x - 4y + 5 = 0$.

- (b) Show that the line $x + y = 5$ touches the circle $x^2 + y^2 - 2x - 4y + 3 = 0$. Find the point of contact.

$$5 \times 2 = 10$$

C-571

(2)

Section-C

5. (a) Prove that :

$$\frac{\tan \theta - \cot \theta}{\sin \theta \cos \theta} = \sec^2 \theta - \operatorname{cosec}^2 \theta$$

- (b) Find the value of :

$$\frac{\tan 69^\circ + \tan 66^\circ}{1 - \tan 69^\circ \tan 66^\circ}$$

$$5 \times 2 = 10$$

6. (a) Solve $\sin x + \sin 3x + \sin 5x = 0$.

- (b) Two trees A and B are on the same side of a river. From a point C in the river the distance

of the trees A and B is 2.50 m and 300 m

respectively. If the angle C is 45° , find the

distance between the trees. ($\sqrt{2} = 1.414$)

$$5 \times 2 = 10$$

C-571

(3)

Turn Over

Section-D

2. (a) Evaluate the limit :

$$\lim_{n \rightarrow \infty} \frac{6x^2 + 2x + 1}{6x^2 - 3x + 1}$$

(b) Differentiate :

$$\frac{3x}{7x^2 + 8} \text{ w.r.t. } x.$$

$$5 \times 2 = 10$$

8. (a) Integrate :

$$\int \frac{2x+1}{(x+1)(x-2)} dx$$

(b) Evaluate :

$$\int_1^2 \frac{x^2}{dx-1} dx$$

$$5 \times 2 = 10$$

C-571

(4)

Section-E

(Compulsory Question)

9. (A) (i) Write the solution set of $x^2 + x + 2 = 0$ in roster form.

(ii) Without solving the equation $3x^2 - 7x + 2 = 0$, find the sum and the product of its roots.

(iii) Find the 17th and 20th terms in the sequence whose n^{th} term is $a_n = 4n - 3$.

(iv) Insert 3 geometric means between 2 and 32.

(v) If a matrix has 8 elements, what are the possible orders it can have ?

(vi) Without expanding show that :

$$\begin{vmatrix} 5 & 15 & 3 \\ 7 & 21 & 5 \\ 8 & 24 & -7 \end{vmatrix} = 0.$$

C-571

(5)

Turn Over

(vii) Find the complement of the angle $67^{\circ}30'$.

(viii) Show that the triangle whose vertices are $(8, 2)$, $(5, -3)$ and $(0, 0)$ is an isosceles triangle.

(ix) Write the equation of the line with slope 3 and y intercept -5 .

(x) Evaluate :

$$\int \sec x (\sec x + \tan x) dx \qquad 1 \times 10 = 10$$

(B) (i) If α, β are roots of $x^2 - 2x + 3 = 0$, form an equation whose roots are $\alpha + 2$, $\beta + 2$.

(ii) Find the term independent of x in the expansion of $\left(2x - \frac{1}{x}\right)^{10}$. Also find its value.

C-571

(6)

(iii) Without expanding show that :

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a).$$

(iv) Show that the lines : $5x - 3y - 1 = 0$, $2x + 3y - 23 = 0$, $42x + 21y - 257 = 0$ are concurrent. Also find the point of concurrence.

(v) Prove that :

$$\lim_{h \rightarrow 0} \frac{(x+h)^m - x^m}{h} = mx^{m-1} \qquad 4 \times 5 = 20$$

C-571

(7)