Roll No.

(2111)

Total No. of Questions: 9] [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 $4^{1+x} + 4^{1-x} = 10$.

The sum of three numbers in A.P. is 24 and the product is 440. Find the numbers. $5 \times 2 = 10$

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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 $f(A) = 0$.

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. $5 \times 2 = 10$

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Section-C

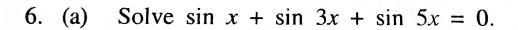
5/ (a) Prove that:

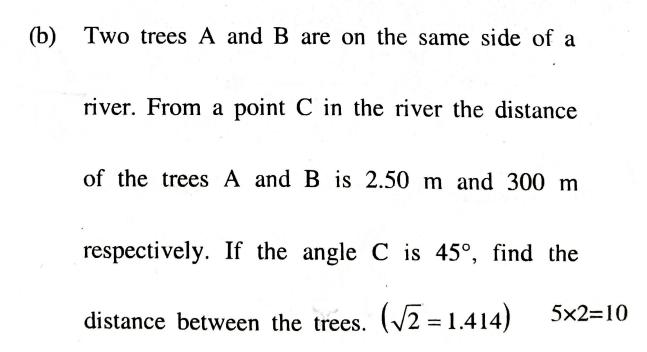
$$\frac{\tan\theta - \cot\theta}{\sin\theta\cos\theta} = \sec^2\theta - \csc^2\theta$$

(b) Find the value of:

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

 $5 \times 2 = 10$





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(3)

Turn Over

Section-D

7. (a) Evaluate the limit:

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

(b) Differentiate:

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

$$5 \times 2 = 10$$

8. (a) Integrate:

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

$$\frac{f'(x)}{f(x)}$$

(b) Evaluate:

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

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Section-E

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(Compulsory Question)

- 9. (A) (i) Write the solution set of $x^2 + x + 2 = 0$ in roaster 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:

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

- (vii) Find the complement of the angle 67°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.

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(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:

$$\lim_{h \to 0} \frac{(x+h)^m - x^m}{h} = mx^{m-1}$$

$$4 \times 5 = 20$$