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Total No. of Questions : **9**] [Total No. of Printed Pages: **4**

(1109)

BCA UG (CBCS) RUSA Ist Semester

Examination

3595

MATHEMATICS-I

BCA-0101

Time: 3 Hours] **[Maximum Mark : 70**

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

Section-A

1. (a) If the roots of the quadratic equation $2x^2 - 3x + k = 0$ are equal, then find the value of k.

(b) The third term of an A.P. is 5 and seventh term is 9. Find its 17^{th} term. 5,5

2. (a) If $A=\begin{bmatrix}2 & 1\\ 1 & 0\end{bmatrix}$, $B=\begin{bmatrix}2 & 3\\ 1 & -1\end{bmatrix}$, verify that:
$(A+B)^2 \neq A^2 + 2AB + B^2$.

(b) Using Binomial expansion, expand $(1 + x + x^2)^3$.
5, 5

Section-B

3 .(a) Using section formula show that the points (1, 2),(3, 3), (4, 2) are not collinear.

(b) Find the perpendicular distance from the point (-1, 2) from the line $x + 3y - 4 = 0$. 5, 5

4.(a) If the area of the triangle with vertices (x, 0), (1, 1) and (0, 2) is 4 units. Then find the value of x.

(b) Find the equation of the circle passing through origin and makes intercept 3 and 2 on x-axis and y-axis, respectively. 5, 5

Section-C

5.(a) Prove that :

$$\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = 2\,\text{cosec}\,\theta$$

(b) Find the value of $\tan 105^{\circ}$. 5, 5

6.(a) Prove that :

$$(\cos 4x + \cos 2x)^2 + (\sin 4x - \sin 2x)^2 = 4\cos^2 3x$$

(b) Solve the equation : $2\sin^2\theta - 3\sin\theta + 1 = 0$ 5, 5

Section-D

7. (a) Find the derivative of e^{2x} by first principle.

(b) Find two positive numbers whose sum is 30 and the product is maximum. 5, 5

8. (a) Evaluate the integral :

$$\int \frac{logx}{x}\, dx \ (x>0)$$

(b) Find the area enclosed by the curve $f(x)= e^x$ on the x-axis and ordinates x = 0 and x = 2. 5, 5

Section-E

Compulsory Question

9. (a) (i) If n(A) = 36, n(B) = 44 and n(A ∪ B)=70. Find n(A ∩ B) ?

(ii) Are $x = \pm 2$ the solution of equations $3^{2+x} + 3^{2-x} = 82$?

(iii) Write the sum of 1st 100 numbers.

(iv) $\lfloor 5 + \lfloor 3 = \lfloor 8$? (Yes/No)

(v) Is matrix $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ is non-symmetric. (Yes/ No)

(vi) Write the relation between the slopes of two lines, when they are perpendicular to each other.

(vii) Write the equation of circle, whose diameter's end points are (a, 0) and (0, b).

(viii) If $\tan x = \frac{4}{x}$, $x \in$ IIIrd Quadrant. Find the value of $\cos x = ?$

(ix) Evaluate the integral $\int cotx\ dx = ?$

(x) If $f(x) = 3x + 5$. Find $f^{-1}(x) = ?$ $10 \times 1 = 10$

(b) (i) With the help of an example, show that $A - B = A \cap B^C$, where A and B are non-empty sets.

(ii) Obtain the equation of straight line which intersect x-axis at a distance 3 units to the right of the origin at point (3, 0) and having slope equal to 2.

(iii) Find the middle term in the expansion of $(x + 8y)^{10}$?

(iv) Find the maximum and minimum value of $f(x) = x^2 - 4x + 3 \ \forall \ x \in [0, 4]$.

(v) Evaluate the integral

$$\int \frac{1}{9-x^2}\, dx \qquad 4 \times 5 = 20$$