

Total No. of Questions : 9]
(1107)

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**B.C.A. UG (CBCS) RUSA Ist Semester
Examination**

3836

**MATHEMATICS-I
BCA-101**

Time : 3 Hours] [Maximum Marks : { Regular = 70
ICDEOL = 100

Note :- Attempt five questions in all by selecting *one* question from each Section A, B, C and D. Section E is compulsory. All questions carry equal marks.

Section-A

1. (a) Solve the equation :

$$x^2 + 12x + 35 = 0$$

- (b) If $A = \{1, 2, 3\}$, $B = \{4, 5, 6\}$, $C = \{7, 8, 9\}$,
then verify that :

(i) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

(ii) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

CA-580

(1)

Turn Over

Handwritten calculations:

$$\begin{array}{r} -12 \div 2 = -6 \\ 12 \div 2 = 6 \\ 2 \div 2 = 1 \\ -12 \div 2 = -6 \\ 2 \div 2 = 1 \end{array}$$
$$\begin{array}{r} -16 \div 2 = -8 \\ 2 \div 2 = 1 \end{array}$$

2. (a) Find the common difference and write the next four terms of the arithmetic progression

$$-1, \frac{1}{4}, \frac{3}{2}, \dots$$

- (b) If :

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 2 & 3 & 4 \\ 4 & 5 & 6 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix},$$

find $3A - 4B$.

Section-B

3. (a) What point on the y-axis is equidistant from (7, 6) and (-3, 4) ?

- (b) Find the magnitude of area of the triangle whose vertices are (3, 8), (-4, 2) and (5, -1).

4. (a) Find the equation of the straight line passing through the point (4, 3) with slope 2.

- (b) Find the equation of the circle passing through the points (0, 0), (2, 0) and (0, 4).

Section-C

5. (a) Prove that :

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

- (b) Prove that :

$$\cos 24^\circ + \cos 55^\circ + \cos 125^\circ + \cos 204^\circ + \cos 300^\circ = \frac{1}{2}$$

$90^\circ - 65^\circ$ $2 \times 150^\circ - 60^\circ$

6. (a) Prove that :

$$\sin^4 \theta + \cos^4 \theta = 1 - 2 \sin^2 \theta \cos^2 \theta$$

- (b) Prove that :

$$\sin 75^\circ - \sin 15^\circ = \cos 105^\circ + \cos 15^\circ$$

$\sin(90^\circ - 15^\circ) - \sin(15^\circ)$ $\cos(90^\circ + 15^\circ) + \cos(15^\circ)$

Section-D

7. (a) Define function, its domain and range. Find the

domain and range of $f(x) = \frac{1}{x-1}$.

- (b) Differentiate w.r.t. x , $f(x) = \frac{2x+3}{x+2}$.

8. (a) Find the maximum and minimum values of the function $f(x) = x^2 - 6x + 60$.

- (b) Integrate :

$$\int_0^1 (2+x)(3-5x) dx$$

Section-E

9. (i) If $A = \{2, 3, 4, 5\}$, $B = \{4, 5, 6, 7\}$, find $A \cup B$ and $A \cap B$.
- (ii) Find the domain of $f(x) = \sqrt{x+3}$.
- (iii) Write the equation of a straight line passing through origin and has slope = 2.
- (iv) If a matrix has 12 elements, what are the possible orders it can have ? What if it has 5 elements ?
- (v) The elements of the main diagonal of a skew symmetric matrix are[.....]
- (vi) Discuss the continuity of the following function at the indicated point :

$$f(x) = \begin{cases} \frac{|x|}{x} & , \quad x \neq 0 \\ 0 & , \quad x = 0 \end{cases}$$

at $x = 0$.

- (vii) Find the coordinates of the point that divides the segment from $P(-7, 2)$ to $Q(-1, -1)$ in the ratio $4 : -1$.
- (viii) Find the sum of 23 terms of the series :

16, 11, 6,