

**G.V.M.'s G.G.P.R. College of Commerce and Economics**  
**Farmagudi, Ponda – Goa.**  
**B.C.A. CBCS Semester-I Supplementary Examination, November 2023**  
**CORE COURSE**  
**CAC-103 BASIC MATHEMATICS**

Duration – 2 hours

Marks-60

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**Instructions:** 1) Question 1-6 are compulsory.  
2) Figures to the right indicate full marks

**Q1] A) Fill in the blanks. (5x1=5)**

1. Two non zero vectors  $\vec{a}_1$  and  $\vec{a}_2$  are perpendicular to each other iff \_\_\_\_\_.
2. The radian measure corresponding to the degree measure  $180^\circ$  is \_\_\_\_\_.
3. If all the diagonal elements of a diagonal matrix are 1, then the diagonal matrix is called \_\_\_\_\_.
4. If  $A = (-2,3,5)$  and  $B = (1,2,3)$  then  $\vec{AB} =$ \_\_\_\_\_.
5. If 3,7,11,15,19,... is an A.P. then the value of 'd' is \_\_\_\_\_.

**B) Answer the following questions. (5x1=5)**

1. If  $f(x) = \frac{x+2}{x-1}$ . Show that  $f(f(x)) = x$ .
2. Find 15<sup>th</sup> term of an A.P. 6, 11, 16, 21,....
3. Find GCD of 45 and 34.
4. Find the slope of the line joining (1,2) and (3,4).
5. If  $x^{q+16} = x^{20}$ . Find q.

**Q2) Answer the following questions. (10)**

A) If  $f(x) = 4x^2 - 6x + 2$ . Find  $f\left(\frac{1}{2}\right)$  and  $f(3)$ . (02)

B) Using trigonometry prove the following identity.  
 $\sin 3x = 3\sin x - 4\sin^3 x$ . (03)

**P.T.O.**

C) Evaluate  $\lim_{x \rightarrow 1} \frac{2x^2 - 7x + 5}{x - 1}$  (05)

**Q3) Answer the following questions. (10)**

A) If  $\vec{a} = 2\hat{i} + 3\hat{j} + 6\hat{k}$  and  $\vec{b} = 3\hat{i} - 6\hat{j} + 2\hat{k}$  then find  $\vec{a} \times \vec{b}$ . (02)

B) Show that the three points whose position vectors are  $A = (-2, 3, 5)$ ,  
 $B = (1, 2, 3)$ ,  $C = (7, 0, -1)$  are collinear. (03)

C) Use De Moivre's Theorem to prove that  $\sin 3\theta = 3\cos^2\theta\sin\theta - \sin^3\theta$   
and  $\cos 3\theta = \cos^3\theta - 3\cos\theta\sin^2\theta$ . (05)

**Q4) Answer the following questions. (10)**

A) Solve the following equation and also state the nature of roots.  
 $x^2 - 5x + 6 = 0$ . (02)

B) Find 'y' if the distance between  $A = (-2, 5)$  and  $B = (3, y)$  is  
13 units. (03)

C) If  $a^2 + b^2 = 7ab$ , prove that  $\log_{\frac{1}{3}}(a + b) = \frac{1}{2}(\log a + \log b)$ . (05)

**Q5) Answer the following questions. (10)**

A) Find the equation of line passing through the point (4,1) and having  
slope  $m = 3$ . (02)

B) If the sum of the first 20 terms of an A.P. is 610 and the first term is 2,  
find the common difference. (03)

C) If  $A = \begin{bmatrix} 2 & 4 & 6 \\ 1 & 1 & 2 \\ 3 & -5 & 0 \end{bmatrix}$ . Find the matrix  $A^2 - 5A + 3I$ . (05)

**Q6) Answer the following questions. (10)**

A) If  $Z_1 = 7 + 2i$  and  $Z_2 = 6 - 3i$ . Find  $Z_1Z_2$ . (02)

B) Find the volume of the sphere whose surface area is  $154\text{cm}^2$ .  $\left(\pi = \frac{22}{7}\right)$  (03)

C) Solve the following system of equations using Cramer's rule.

$4x - 3y = 5$  and  $3x - 5y = 1$ . (05)

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