Vidya Vikas Mandal's
Shree Damodar College of Commerce & Economics, Margao-Goa
FY BCA Semester-I(Repeat), Semester End Examination, November 2023
Basic Mathematics (CAC-103)

Duration: 2 Hours   **Max Marks: 60**

Instructions: 1) Figures to the right indicate Full Marks.
2) All Questions are compulsory.
3) Use of non-programmable calculator is allowed.

Q.1A.State whether the following statements are true or false. Justify (5x1= 05 marks)

a) The lcm of 5 and 25 is 25 .
b) Characteristic of 348.3 is -2 .
c) 5 is a complex number as well as real number.
d) $90°$ is equal to $\frac{\pi}{2}$ radians.
e) If $\vec{a}.\vec{b} = 0$ then the two vectors $\vec{a}$ and $\vec{b}$ are parallel to each other.

Q.1B. Answer the following questions.   **(5x1= 05 marks)**

a) Convert 150 degrees to radians.
b) Write the prime factorisation of 1250.
c) Simplify $\log_3 2 \times \log_2 3$.
d) Find the reciprocal of a complex number 5 - i as a complex number.
e) Find the slope and y-intercept of the line $3x - 5y + 6 = 0$.

Q.2. Answer the following.   **10 marks**

a) Write the nature of roots of the quadratic equation $5x^2 - 2x + 3 = 0$.   (2)
b) Simplify $\log_2 3 \, \log_3 4 \, \log_4 5 \, \log_5 4$.   (3)
c) The diameter of a cone is 21m and its slant height is 18m. (Take $\pi = \frac{22}{7}$) Find
   i)Curved surface area of cone
   ii)Volume of cone   (5)

Q.3. Answer the following   **10 marks**

a) Find which term of the A.P. 2,4,6 …is 178 .   (2)
b) The ratio of profit of a product of a firm in two consecutive years is 3: 2 respectively. The ratio of their loss of some product is 5: 9. Profit of second-year is Rs 45000 and the loss of first-year is Rs 25000. Find the difference in profit and loss in both years together.   (3)
c) Solve using cramer's rule $2x + 5y = 12$, $x + 3y = 7$.   (5)

Q.4. Answer the following.   **10 marks**

a) Find whether the two vectors $\vec{a} = 10\,i + 10\,j + 2\,k$ and $\vec{b} = 2\,i - 3\,j + 5\,k$ are perpendicular to each other.   (2)
b) Express $\dfrac{10-2i}{6+i}$ in the form a + bi   (3)
c) Write the equation of circle having centre (2, -1) and which passes through (3 , 6) . Find also the coordinates of the points in which the circle cuts the x-axis.   (5)

Q.5. Answer the following.   **10 marks**

a) If $\vec{a} = 3\hat{i} - 3\hat{j} + \hat{k}$ and $\vec{b} = 4\hat{i} + 9\hat{j} + 2\hat{k}$ find $\vec{a}.\vec{b}$.   (2)
b) Find the sum and difference of complex numbers $(-2 + 7i)$ and $(-5 - 6i)$.   (3)
c) Give an example of a 3 x 3 Diagonal matrix. Find the values of x and y which

satisfy the relation $\begin{bmatrix} 1 & x & y \\ 2 & 3 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 6 & 2 \\ 4 & -2 & 6 \end{bmatrix} = \begin{bmatrix} 3 & 5 & 4 \\ 6 & 1 & 10 \end{bmatrix}$ (5)

Q.6. Answer the following.   **10 marks**

a) Show that $\sec A - \tan A = \dfrac{\cos A}{1+\sin A}$.   (2)
b) Find which term of the A.P. 3, 15, 27, 39 … will be 132 more than its 54th term.   (3)
c) Determine the value of constant a so that the given function is continuous

$$
\begin{aligned}
F(x) &= 3x+8 && \text{if } x \le 2 \\
     &= x^4 - 2 && \text{if } x > 2
\end{aligned}
$$

If $g(x) = x^2 - 3$ and $f(x) = 6x+1$ then find $f(g(x))$ and $g(f(fx))$ (5)