Reg. No.

I Semester B.C.A. 4 Degree Examination, March/April - 2023
MATHEMATICS - I
(Repeaters)

Time : 3 Hours   **Maximum Marks : 80**

SECTION - A

Answer **All** of the following questions.   **(10×2=20)**

1. a) Express $\dfrac{3-4i}{3+4i}$ in the form $x+iy$.

 b) Simplify $\dfrac{[\cos\theta + i\sin\theta]^{10}}{[\cos 2\theta - i\sin 2\theta]^{-2}}$

 c) Find 15th term of the sequence $5, 25, 125, \ldots\ldots$

 d) Find the A.M and G.M of $4, 6$

 e) If α and β are the roots of the equation $2x^2 - 4x + 3 = 0$, Find $\alpha + \beta$

 f) Expand using binomial theorem $(a+b)^4$

 g) Prove that $\tan A + \cot A = \sec A.\text{cosec } A$

 h) Find the unit vector in the direction of the vector $\bar{a} = 2i - j + 2k$.

 i) Find the distance of the point $(2,-5)$ from origin.

 j) Find the co-ordinates of the point which divides the line joining point $(1,3)$ and $(2,7)$ in the ratio $3:4$ internally.

SECTION - B

Answer any **FOUR** of the following.   **(4×5=20)**

2. Find the conjugate of the complex number and expand it in the form $a+ib$, $z = \dfrac{1+3i}{1-3i} + \dfrac{2-i}{2+i}$.

3. The third term of G.P is 12 and seventh term is 192, find the sum of 9 terms.

4. Find the 8th term in the expansion of $\left(2x^3 - \dfrac{y}{3}\right)^9$.

5. In any triangle ABC, prove that $2\left[bc\cos A + ca\cos B + ab\cos c\right] = a^2 + b^2 + c^2$

6. Find the equation of straight line passing through $(-1, 5)$ and having slope $\dfrac{2}{7}$.

SECTION - C

Answer any **FOUR** of the following.   (4×10=40)

7. a) Simplify $\dfrac{(\cos 3\theta + i\sin 3\theta)^5 (\cos 4\theta - i\sin 4\theta)^4}{(\cos 2\theta + i\sin \theta)^3 (\cos \theta - i\sin \theta)^3}$

    b) Express $\left(\dfrac{2+i}{3+i}\right)^2$ in the form $x + iy$

8. a) Find the sum of 7+77+777+..... to n terms.

    b) Insert five geometric mean between 3 and 192.

9. a) Find the middle term in the expansion of $\left(\dfrac{x}{4} - \dfrac{4}{x}\right)^{14}$

    b) If α and β are the roots of $3x^2 + 5x + 1 = 0$ find the value of $\dfrac{1}{\alpha} + \dfrac{1}{\beta}$

10. a) Find the area of parallelogram whose adjoint sides are $\vec{a} = 3i + 2j + k$ and $5i + 3j - 4k$.

    b) Prove that $\sqrt{\dfrac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$.

11. a) Show that the points $(2,-4), (4,-2), (7,1)$ are collinear.

    b) Find the point of intersection of the lines $2x + 3y + 7 = 0$ and $3x - 5y + 1 = 0$.