DAE/IA-2017/08 FIRST YEAR

MATH-123 APPLIED MATHEMATICS – I

COMMON WITH BIO MEDICAL, COMPUTER, COMPUTER INFORMATION, ELECTRICAL, ELECTRONICS, FOOD, FOOD PROCESSING & PRESERVATION, INFORMATION & COMMUNICATION, INSTRUMENT, INSTRUMENTATION, MECHATRONICS AND TELECOMMUNICATION TECHNOLOGIES.

PAPER 'A' (Subjective)

Time: 2:30 Hours **SECTION – I** **Marks: 60**

Q.1: Write short answer to any Eighteen (18) questions: - $18 \times 2 = 36$

1. Solve the equation by factorization $3x^2 + 5x = 2$
2. Discuss the nature of the roots of the equation $x^2 + x + 1 = 0$
3. For what value of k the sum of the roots of $3x^2 + kx + 5 = 0$ may be equal to the product of roots.
4. Form the quadratic equation whose roots are $3\sqrt{5}, -3\sqrt{5}$
5. Find the sum and the Product of the roots in the equation $x^2 - 9 = 0$
6. Expand $\left(\frac{x}{y} + \frac{y}{x}\right)^4$ by Binomial theorem.
7. Find the 7th term in the expansion of $\left(x - \frac{1}{x}\right)^9$.
8. Expand $(1 + 2x)^{-2}$ to three terms.
9. Which will be the middle term/terms in the expansion of $\left(x + \frac{3}{x}\right)^{15}$
10. Convert $42°36'12''$ into radian measure.
11. Find the length of arc cut off on a circle of radius 3cm by a central angle of 2 radians.
12. Prove that $\cos 30° \cos 60° - \sin 30° \sin 60° = 0$.
13. If $\sin\theta = 3/8$, and the terminal side of the angle lies in the second quadrant, find the remaining trigonometric ratios of θ.
14. Prove that $\tan(45° + \theta)\tan(45° - \theta) = 1$
15. Express $\sin x \cos 2x - \sin 2x \cos x$ as single term.
16. If $\sin\theta = 4/5$ and the terminal side of 'θ' lies in 1st quadrant, find $\cos\frac{\theta}{2}$.
17. Express $\sin 5\theta - \sin\theta$ as product.
18. Define laws of cosines.
19. In right triangle ABC, b = 6, α = 35º, γ = 90º, Find side 'a'.
20. The sides of a triangle are 16m, 20m and 33m respectively. Find its greatest angle.
21. In any triangle ABC in which $b = 45$, $\alpha = 52°$, $c = 34$ find 'a'.
22. A minaret stands on the horizontal ground. A man on the ground, 100m from the minaret, find the angle of elevation of the top of the minaret to be 60º. Find its height.
23. Find the unit vector along the vector $4i - 3j - 5k$
24. if $\vec{a} = 2i + 3j + 4k$, $\vec{b} = i - j + k$, find the magnitude of $3\vec{a} - \vec{b}$.
25. Find $(\vec{a} + \vec{b}).(\vec{a} - \vec{b})$ if $\vec{a} = 2i + 2j + 3k$, $\vec{b} = 2i - j + k$.
26. Find a vector whose magnitude is 2 and is parallel to $5i + 3j + 2k$.
27. Simplify the phasor $\frac{-9 + j4}{8 - j3}$ and write the result in Rectangular form.

SECTION – II

Note: Attempt any three (03) questions. $3 \times 8 = 24$

Q.2: Solve by using Quadratic formula $mx^2 + (1+m)x + 1 = 0$.

Q.3: Find the term independent of x in the expansion of $\left(2x^2 + \frac{1}{x}\right)^9$.

Q.4: Prove that $(\cos ec\theta - \cot\theta)^2 = \frac{1-\cos\theta}{1+\cos\theta}$.

Q.5: If $\cos A = \frac{1}{5}$ and $\cos B = \frac{1}{2}$, where A and B be acute angles, find the value of $\cos(A-B)$.

Q.6: If $\vec{a} = 2i - j + k$ and $\vec{b} = 3i + 4j - k$, Find the sine of the angle between $\vec{a}$ and $\vec{b}$ and unit vector perpendicular to each.

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