Roll No:_____ DAE/AIA-2019/09

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 Marks: 60

SECTION-I

Q. 1 Write short answers to any Eighteen (18) questions. **18x2=36**

1. Solve the equation $x^2 - x = 2$
2. Solve the equation $(2x + 3)(x + 1) = 1$ by factorization.
3. For what value of K the roots of the equation $2x^2 + 5x + k = 0$ are equal.
4. Form the quadratic equation whose roots are $i\sqrt{3}, -i\sqrt{3}$
5. Find the sum and the product of the roots of equation $5x^2 + x - 7 = 0$.
6. Expand $(x + y)^4$ by binomial theorem.
7. Find the 7^{th} term in the expansion of $(x - \frac{1}{x})^9$
8. Expand $\frac{1}{\sqrt{1+x}}$ upto three terms.
9. Calculate $(1.04)^5$ by binomial theorem upto two decimal places.
10. Write the general term in binomial expansion $(a + b)^n$
11. Find the missing element l, r, θ when $r = 620m, \theta = 32^o$
12. Prove that $4\ tan60^o\ tan30^o \tan 45^o\ Sin30^o\ Cos60^o = 1$
13. Prove that $(1 + Sin\theta)(1 - Sin\theta) = \frac{1}{Sec^2\theta}$
14. Prove that $Cos2\alpha = Cos^2\alpha - Sin^2\alpha$
15. Find the value of $Sin15^o$, without using calculator.
16. Prove that $(Sin\theta - Cos\theta)^2 = 1 - Sin2\theta$
17. Express $2\ Sin3\theta\ Cos\theta$ as sums or difference.
18. Prove that $Tan(45^o - \theta) = \frac{1-tan\theta}{1+tan\theta}$
19. In any triangle ABC if a = 5, c = 6 $\alpha = 45^o$ Find γ
20. Write the law of sines.
21. In any triangle ABC, in which b = 45, c = 34, $\alpha = 52^o$ Find a.
22. How far is a man from the foot of tower 150 meters high, if the measure of angle of elevation of its top as observed by him is $40^o\ 30'$
23. If vectors $3\underline{i} + \underline{j} - \underline{k}$ and $\lambda\underline{i} - 4\underline{j} + 4\underline{k}$ are parallel, find the value of λ.
24. Find $\bar{a} \times \bar{b}$ if $\bar{a} = 2\underline{i} + 3\underline{j} + 4\underline{k}, \bar{b} = \underline{i} - \underline{j} + \underline{k}$.
25. Find x so that $\bar{a}$ and $\bar{b}$ are perpendicular $\bar{a} = 2\underline{i} + 4\underline{j} - 7\underline{k}$ and $\bar{b} = 2\underline{i} + 6\underline{j} + x\underline{k}$.
26. Find the unit vector along vector $4\underline{i} - 3\underline{j} - 5\underline{k}$.
27. Find the magnitude and direction cosines of the vector $3\underline{i} + 7\underline{j} - 4\underline{k}$.

SECTION-II

Note: Attempt any three (03) questions. **3x8=24**

Q. 2 **a)** Solve the equation $\frac{a}{ax-1} + \frac{b}{bx-1} = a + b$ by factorization.

b) For what value of K the roots of given equation are equal $x^2 + 3\ (k + 1)x + 4k + 5 = 0$

Q. 3 Find the term involving x^5 in the expansion of $(2x^2 - \frac{3}{x})^{10}$

Q. 4 **a)** If $Sin\theta = \frac{2}{3}$ and the terminal side of the angle lies in the second quadrant, find the remaining trigonometric ratios of θ.

b) Prove that $(Cosec\theta - Cot\theta)^2 = \frac{1-Cos\theta}{1+Cos\theta}$

Q. 5 **a)** If $Sin\alpha = \frac{4}{5}$ and $Sin\beta = \frac{12}{13}$, both α and β are in the 1st quadrant find $Sin(\alpha - \beta)$.

b) Express $sin3\theta + Sin5\theta + Sin7\theta + Sin9\theta$ as a product.

Q. 6 **a)** If $\bar{a} = 3\underline{i} - \underline{j} - 4\underline{k}$, $\bar{b} = -2\underline{i} + 4\underline{j} - 3\underline{k}$ *and* $\bar{c} = \underline{i} + 2\underline{j} - \underline{k}$ Find the unit vector parallel to $3\bar{a} - 2\bar{b} + 4\bar{c}$.

b) Find the cosine of the angle between the vectors $\bar{a} = 4\underline{i} + 2\underline{j} - \underline{k}$, $\bar{b} = 2\underline{i} + 4\underline{j} - \underline{k}$.