DAE/IA-2016/06 FIRST YEAR

MATH-113 APPLIED MATHEMATICS – I

COMMON WITH AUTO-MOBILE & DIESEL, AUTO & FARM MACHINERY, AUTOMATION, ARCHITECTURE, CAST METAL & FOUNDRY, CHEMICAL, CIVIL, CMT, DIE & MOULD, FOUNDRY & PATTERN MAKING, FOOTWEAR, GLASS & CERAMICS HEAT VENTILATION, AIR CONDITIONING & REFRIGERATION, LEATHER, LAND & MINE SURVEYING, MINING, MECHANICAL, METALLURGY & WELDING, MECHATRONICS, PRECISION MECHANICAL & INSTRUMENT, PGA, PETROLEUM, PETROCHEMICAL, QUANTITY SURVEY, RAC, SUGAR, TEXTILE SPINNING, TEXTILE DYEING & PRINTING & TEXTILE WEAVING 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 quadratic equation $x(x+7) = (2x-1)(x+4)$ by factorization.

2. Prove that the roots of the equation $(a+b)x^2 - ax - b = 0$ are rational.

3. Form the quadratic equation whose roots are $i\sqrt{3},$ and $-i\sqrt{3}$.

4. Define common difference.

5. Write the formula to find the sum of n term of an arithmetic sequences.

6. Find the 7th term of A.P., in which the first term is 7 and the common difference is -3.

7. Find the sum of the series $1 + \frac{1}{3} + \frac{1}{9} + \ldots$ to 6 terms.

8. Find the geometric mean between 8 and 72.

9. Find the sum of infinite geometric series in which $a = 128$ and $r = -1/2$.

10. Expand $(2x - 3y)^4$ by using binomial theorem.

11. Calculate $(1.02)^{10}$ by Binomial Theorem up to two decimal places.

12. Expand $\frac{1}{\sqrt{1+x}}$ up to three terms.

13. Find the 5th term in the expansion of $\left(2x - \frac{x^2}{4}\right)^7$.

14. Resolve $\frac{2x}{(x-2)(x+5)}$ into partial fractions.

15. Write an identity equation of $\frac{2x+5}{x^2+5x+6}$.

16. Convert $\frac{\pi}{2}$ rad into degree measure.

17. Prove that $\tan^2 30° + \tan^2 45° + \tan^2 60° = \frac{13}{3}$

18. If a minute hand of a clock is 10cm long, how for does the tip of the hand moves in 30 minutes?

19. Prove that $(1+\sin\theta)(1-\sin\theta) = \frac{1}{\sec^2\theta}$.

20. Prove that $\tan(-\theta) = -\tan\theta$.

21. Prove that $\sin\left(\theta + \frac{\pi}{6}\right) + \cos\left(\theta + \frac{\pi}{3}\right) = \cos\theta$.

22. Express $\sin x \cos 2x - \sin 2x \cos x$ as single term.

23. Express $2\cos 5\theta \sin 3\theta$ as sum or difference.

24. Define the law of sine.

25. In right triangle ABC, γ = 90º, a = 5, c = 13, then find the value of angle α.

26. In any triangle ABC in which $b = 45,\ \alpha = 52°,\ c = 34$ find 'a'.

27. A string of a flying kite is 200m long, and its angle of elevation is 60º. Find the height of the kite above the ground taking the string to be fully stretched.

SECTION – II

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

Q.2: (a) Solve the equation $x^2 + (m-n)x - 2(m-n)^2 = 0$ by using quadratic formula.

(b) If the roots of the equation $px^2 + qx + q = 0$ are α and β, prove that $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} + \sqrt{\frac{q}{p}} = 0$.

Q.3: (a) If 5, 8 are two A.M's between a and b, find a and b.

(b) How many terms of the series $5 + 7 + 9 + \ldots$ amount to 192 ?

Q.4: (a) Find the constant term in the expansion of $\left(x^2 - \frac{1}{x}\right)^9$.

(b) Resolve $\frac{1}{x^3+1}$ into partial fractions.

Q.5: (a) Prove that $(\sec\theta - \tan\theta)^2 = \frac{1-\sin\theta}{1+\sin\theta}$.

(b) Prove that $\frac{\sin 3\theta}{\cos\theta} + \frac{\cos 3\theta}{\sin\theta} = 2\cot 2\theta$.

Q.6: (a) Express $\sin 3\theta + \sin 5\theta + \sin 7\theta + \sin 9\theta$ as a product.

(b) Find the angle of largest measure in the triangle ABC where a = 224, b = 380, c = 340.

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