

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 × 2 = 36

1. Solve the quadratic equation: $x^2 + 7x + 12 = 0$
2. Find the sum and product of the roots of the equation $9x^2 + 6x + 1 = 0$.
3. Form the quadratic equation whose roots are $-2 + \sqrt{3}$, $-2 - \sqrt{3}$.
4. Define a sequence.
5. Find the 7th term of A.P., in which the first term is 7 and the common difference is -3.
6. Write the formula to find the sum of 'n' terms of an arithmetic progression.
7. Find the A.M between $\sqrt{5} - 4$ and $\sqrt{5} + 4$.
8. Write down the geometric sequence in which the 1st term is 2 and second term is -6 and $n = 5$.
9. Find the Geometric mean between 8 and 72.
10. Expand $\left(x + \frac{1}{x}\right)^4$.
11. Find the 7th term in the expansion of $\left(x - \frac{1}{x}\right)^9$.
12. Expand to three terms, $(1 + 2x)^{-2}$.
13. Define an example of proper fraction.
14. Resolve into partial fractions $\frac{2x}{(x-2)(x+5)}$.
15. Write identity equation of $\frac{x-5}{(x+1)(x^2+3)}$.
16. Convert 120° into radians measure.
17. What is the length of an arc of a circle of radius 5 cm whose central angle is 140° .
18. Prove that: $\tan^2 30^\circ + \tan^2 45^\circ + \tan^2 60^\circ = \frac{13}{3}$
19. Prove that: $\cos^4 \theta - \sin^4 \theta = 1 - 2\sin^2 \theta$
20. Prove that: $\sin\left(\frac{\pi}{2} - \theta\right) = \cos \theta$
21. Show that: $\cos(\alpha + \beta) - \cos(\alpha - \beta) = -2\sin \alpha \sin \beta$
22. Prove that: $\tan(45^\circ + \theta) \tan(45^\circ - \theta) = 1$
23. Find $\cos \theta$, if $\sin \theta = \frac{7}{25}$ and angle θ is an acute angle.
24. Define the laws of cosines.
25. The sides of a triangle are 16, 20 and 33 meters respectively. Find its greatest angle.
26. In any triangle ABC in which $a = 16$, $b = 17$, $\gamma = 25^\circ$, find 'c'.
27. In any triangle ABC if $a = 3$, $b = 7$, $\beta = 85^\circ$ find α .

SECTION - II

Note: Attempt any three (03) questions.

 $3 \times 8 = 24$

Q.2. (a) Solve the equation $\frac{1}{x+1} + \frac{1}{x+2} + \frac{1}{x+3} = \frac{3}{x}$ by using quadratic formula.

(b) For what value of k the roots of the equation $x^2 + 2(k-2)x - 8k = 0$ are equal.

Q.3. (a) The 9th term of an A.P is 30 and the 17th term is 50. Find the first three terms.

(b) Sum the series: $5 + 3 + 1 - 1 - \dots$ to 10 terms.

Q.4. Find the term independent of x in the expansion of $\left(2x^2 + \frac{1}{x}\right)^9$.

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

(b) Show that: $\sqrt{3}\cos\theta - \sin\theta = 2\cos(\theta + 30^\circ)$

Q.6. (a) Prove that: $\cos 3\theta = 4\cos^3\theta - 3\cos\theta$

(b) Solve the triangle ABC with given data: $c = 4$, $\alpha = 70^\circ$, $\gamma = 42^\circ$.
