

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 $x^2 - x = 2$.
2. Find the sum and the product of roots of $x^2 - 9 = 0$.
3. From the quadratic equation whose roots are -2 and -3 .
4. Find the 7th term of an A.P. $1, 4, 7, \dots$
5. Define a series.
6. Write the nth term of a Geometric progression.
7. Find the sum of the series $3 + 11 + 19 + \dots$ to 16 terms.
8. Find the geometric mean between $\frac{4}{3}$ and 243.
9. Find the sum of the series $1 + \frac{1}{3} + \frac{1}{9} + \dots$ to 6 terms.
10. Expand $(2x - 3y)^4$.
11. Find the 6th term in the expansion of $(x + 3y)^{10}$.
12. Expand to three terms $\frac{1}{(1+x)^2}$.
13. Give an example of improper fraction.
14. Resolve $\frac{x^2 + 1}{(x+1)(x-1)}$ into partial fractions.
15. Write an identity equation of $\frac{2x+5}{x^2+5x+6}$
16. Convert $\frac{2\pi}{3}$ radians into degree measure.
17. Find 'r' when $\ell = 33$ cm and $\theta = 6$ radian.
18. Prove that: $(1 + \sin \theta)(1 - \sin \theta) = \frac{1}{\sec^2 \theta}$
19. Prove that: $\frac{1}{1 + \sin \theta} + \frac{1}{1 - \sin \theta} = 2 \sec^2 \theta$
20. Prove that: $\cos\left(\frac{\pi}{2} - \theta\right) = \sin \theta$
21. Prove that: $\sin(\alpha + \beta) + \sin(\alpha - \beta) = 2 \sin \alpha \cos \beta$
22. Prove that: $\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha$
23. Express as sum or difference $\cos 3\theta \cos \theta$.
24. Define law of Sines.
25. In a right angled triangle ABC, $b = 6$, $a = 35^\circ$, $r = 90^\circ$. Find side 'a'.
26. In any triangle ABC in which $b = 45$, $c = 34$, $\alpha = 52^\circ$, find 'a'.
27. A string of a flying kite is 200 meters long, and its angle of elevation is 60° . 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 × 8 = 24

- Q.2. (a)** Solve the quadratic equation by using quadratic formula $mx^2 + (1 + m)x + 1 = 0$
- (b)** Show that the roots of the equation $(mx + c)^2 = 4ax$ will be equal; is $c = \frac{a}{m}$.
- Q.3.** Find five numbers in A.P whose sum is 30 and the sum of whose squares is 190.
- Q.4.** Find the middle term in the expansion of $\left(\frac{a}{2} - \frac{b}{3}\right)^{11}$.
- Q.5. (a)** A horse moves in a circle, at one end of rope 27m long; the other end being fixed. How far does the horse move when the rope traces an angle of 70° at the center.
- (b)** If $\tan \beta = \frac{n \sin \alpha \cos \alpha}{1 - \sin^2 \alpha}$; prove that: $\tan(\alpha - \beta) = (1 - n) \tan \alpha$
- Q.6. (a)** Prove that: $\sin 3\theta = 3 \sin \theta - 4 \sin^3 \theta$
- (b)** Find the cosine of the smallest measure of an angle of a triangle with 12, 13 and 14 meters as the measure of its sides.
