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 $x^2 - 3x - 18 = 0$ by quadratic formula.

2. Discuss the nature of the roots of the equation $2x^2 - 7x + 3 = 0$.

3. For what value of k, the sum of roots of $3x^2 + kx + 5 = 0$ may be equal to the product of roots.

4. Find the 7th term of an A.P. $1 , 4 , 7 , . . .$

5. Find the sum of the series 3 + 11 + 19 + … to 16 terms.

6. Find the 6th term in G.P. $1, 3^3, 3^6, . . .$

7. Find the geometric mean between $\frac{4}{3}$ and 243.

8. Write the formula of sum of the first 'n' terms of a geometric sequence.

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

10. Expand $\left(\frac{x}{2} - \frac{2}{y} \right)^4$ by using binomial theorem.

11. Calculate $\left(1.04 \right)^5$ by binomial theorem upto two decimal places.

12. Expand $\frac{1}{\left(1 + x \right)^2}$ to three terms.

13. Find the 6th term in the expansion of $\left(x + 3y \right)^{10}$.

14. Define proper fraction and give one example.

15. Resolve $\frac{1}{x^2 - x}$ into partial fractions.

16. Convert $12°40'$ into radian measure.

17. Find 'x' if $\tan^2 45° - \cos^2 60° = x \sin 45° \cos 45° \tan 60°$

18. Find the length of arc cut off on a circle of radius 3cm by a central angle of 2 radians.

19. Show that: $\cot^4 \theta + \cot^2 \theta = \cos ec^4 \theta - \cos ec^2 \theta$

20. Prove that: $\sin \left(-\theta \right) = -\sin \theta$

21. Show that: $\cos \left(\alpha + \beta \right) - \cos \left(\alpha - \beta \right) = -2 \sin \alpha \sin \beta$

22. Express $\cos \left(a + b \right) \cos \left(a - b \right) - \sin \left(a + b \right) \sin \left(a - b \right)$ as single term.

23. Express the sum $\cos 12\theta - \cos 4\theta$ as product.

24. Given that, $\gamma = 90º$, $\alpha = 35º$, a = 5, find angle β.

25. Define angle of elevation.

26. In any triangle ABC in which a = 16, b = 17, $\gamma = 25º$, find 'c'.

27. A minaret stands on a horizontal ground. A man on the ground 100m from the minaret, the angle of elevation of the top of the minaret to be 60º. Find its height.

Available online @ https://mathbaba.com

SECTION – II

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

Q.2. **(a)**   Show that the roots of the equation $(mx + c)^2 = 4ax$ will be equal if $c = \dfrac{a}{m}$.

(b)   If α, β are the roots of $ax^2 + bx + c = 0$, find the value of $\alpha^3 + \beta^3$.

Q.3. **(a)**   The A.M of two positive integral numbers exceeds their positive G.M by 2 and their sum is 20. Find the numbers.

(b)   Sum the series 51 + 50 + 49 + … + 21.

Q.4. **(a)**   Find the term involving x^5 in the expansion of $\left(2x^2 - \dfrac{3}{x} \right)^{10}$.

(b)   Resolve $\dfrac{1}{(x+1)(x^2-1)}$ into partial fractions.

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

(b)   Prove that: $\cos 3\theta = 4\cos^3\theta - 3\cos\theta$

Q.6. **(a)**   Show that: $\cos 20° + \cos 100° + \cos 140° = 0$

(b)   A man 18dm tall observes that the angle of elevation of the top of a tree at a distance of 12m from the man is 32º. What is the height of the tree?

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