

SECTION-A

(1x10=10)

Q1. If  $A = \{2,3,6\}$ ,  $B = \{1,3,7,10\}$  then find  $A - B$ .

Q2. Find the domain of the function  $\frac{x}{\sqrt{x^2 - 3x + 2}}$ .

Q3. If  $\tan 69^\circ + \tan 66^\circ - \tan 69^\circ \cdot \tan 66^\circ = 2K$ , then find  $K$

Q4. Write the coordinates of the centroid of the triangle formed by vertices  $(8,0)$ ,  $(4,6)$  and  $(0,0)$ .

Q5. Find the angle between the lines  $2x - y + 3 = 0$  and  $x + 2y + 3 = 0$

Q6. Find the equation of the circle drawn on the intercept made by the line  $2x + 3y = 6$  between the coordinate axes as diameter.

Q7. Find  $\frac{d}{dx} \{(x + |x|)|x|\}$ .

Q8. A card is drawn from an ordinary pack of 52 cards and a gambler bets that, it is a spade or an ace. What is the probability that it is a spade or an ace.

Q9. Find the variance of the data: 5, 9, 10, 12, 8, 13, 6.

Q10. Solve  $|x - 2| \geq 5$

SECTION-B

(4x12=48)

Q11. In a survey of 700 students in a college, 180 were listed as drinking limca 275 as drinking mirinda and 95 as drinking both Limca as well as Mirinda. Find how many were drinking neither Limca nor Mirinda.

OR

If  $A = \{1,2,3\}$ ,  $B = \{4,5\}$  and  $C = \{5,6\}$  verify that  $A \times (B \cup C) = (A \times B) \cup (A \times C)$ .

Q12. The Angles Of a Triangle Are In A.P. The Number Of Grades In The Least Is To The Number of Radians In The Greatest As  $40:\pi$ . Find The Angles In Degrees.

Q13. With Usual Notations If In a  $\Delta ABC$

$\frac{b+c}{11} = \frac{c+a}{12} = \frac{a+b}{13}$ , Then Prove that  $\frac{\cos A}{7} = \frac{\cos B}{19} = \frac{\cos C}{25}$

Q14. Solve for  $x$ ,  $2\sin^2 x + \sin^2 2x = 2$

OR

Solve For  $x$ ,  $4\sin x \sin 2x \sin 4x = \sin 3x$ .

Q15. Find the Equation of the Parabola with Vertex  $(2,-3)$  and Focus  $(0,5)$ .

OR

An arc is in the form of a parabola with its axis vertical. The arc is 10 m high and 5 m wide at the base. How wide is it 2m from the vertex of the parabola?

Q16. Differentiate  $e^{\sqrt{\tan x}}$  From First Principle.

Q17 Find the Limit  $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\text{Cot}x - \text{Cosec}x}{(\pi - 2x)^3}$  OR Find the Limit  $\lim_{n \rightarrow \infty} \frac{1 - 2 + 3 - 4 + 5 - 6 + \dots + (2n-1) - 2n}{\sqrt{n^2 + 1} + \sqrt{n^2 - 1}}$

Q18. A Box Contains 30 Bolts And 40 Nuts. Half Of The Bolts And Half Of The Nuts Are Rusted. If two items Are Drawn At Random, What Is The Probability That Either Both Are Rusted Or Both Are Bolts.

Q19. Find the Square Root Of  $7-24i$ .

Q20. In A Plane There Are 37 Straight Lines Of Which 13 Pass Through The Point A And 11 Pass Through The Point B. No Three Lines Pass through One Point, No Line Passes through Both Point A and B, And No Two Are Parallel .Find The Number of Points of Intersection of the Straight Lines.

Q21. The sum of n terms of two A.P's are in the ratio  $(7n+1):(4n+27)$ . Find the ratio of their 11<sup>th</sup> terms.

Q22. Using the principle of mathematical induction prove that  $2(7^n) + 3(5^n) - 5$  is divisible by 24 for all  $n \in N$

SECTION-C (6x7=42)

Q23. If  $\sin\alpha + \sin\beta = a$  and  $\cos\alpha + \cos\beta = b$  Then Prove That  $\sin(\alpha + \beta) = \frac{2ab}{a^2 + b^2}$ .

Q24. Show that  $x^2 + 4y^2 + 2x + 16y + 13 = 0$  is the equation of an ellipse.

Find its eccentricity, vertices, foci directrices of the ellipse. OR

The Foci of a Hyperbola coincide with the Foci of Ellipse  $\frac{x^2}{25} + \frac{y^2}{9} = 1$ . Find The Equation of the Hyperbola, If It's Eccentricity Is 2.

Q25. Find the mean deviation from the mean of the following distribution.

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No of students	2	3	8	14	8	3	2

Q26. Find The Modulus And Argument Of The Complex Number  $\frac{i-1}{\cos \frac{\pi}{3} + i \sin \frac{\pi}{3}}$  And Convert It In The Polar Form.

OR

Solve the equation  $x^2 + \left(\frac{ax}{x+a}\right)^2 = 3a^2, x \neq -a$ .

Q27. Find the sum to n terms of the series  $\frac{1}{1.2.3} + \frac{1}{2.3.4} + \frac{1}{3.4.5} + \dots + \frac{1}{n(n+1)(n+2)}$

Q28. (a) Find the middle term in the expansion of  $\left(\frac{2x}{3} - \frac{3}{2x}\right)^{20}$

(b) Find the 4<sup>th</sup> term from the end in the expansion of  $\left(\frac{4x}{5} - \frac{5}{2x}\right)^9$

Q29. Prove that  $\sin 6^\circ \sin 42^\circ \sin 66^\circ \sin 78^\circ = \frac{1}{16}$