

All Question are compulsory, section A comprises of 4 questions of one mark each, section B comprises of 8 questions of two mark each, section c comprises of 11 questions of four mark each, section D comprises of 6 questions of six mark each.

Q.N1. Write in set builder form

$$A = \{ 3, 9, 27, 81, 243 \}$$

Q.N2. If $(x-2/3, y-1/3) = (1/5, 2/3)$ Find x and y

Q.N3. Find value of i^{-47}

Q.N4. Find value of $\tan(-19\frac{\pi}{3})$

Q.N5. Find radian measure of $-47^\circ 30'$

ii) Find degree measure of -4 radian

Q.N6. Solve $24x < 100$ for

- i) Natural numbers ii) integers

Q.N7. Find General Solution of $\cos 4x = \cos 2x$

Q.N8. Find Domain and Range of $\sqrt{64 - x^2}$

Q.N9. Draw Venn Diagram of following :-

- 1) $(A \cup B)$ 2) $(A \cap B)$

Q.N. 10. Solve $x^2 + x + 1 = 0$

Q.N. 11. If the straight line $y = mx + b$ passes through the point $(2, 4)$ and $(-3, 6)$ find the value of m and b .

Q.N. 12. Show that three points $(5, 1)$, $(1, -1)$, $(11, 4)$ are collinear. Also find the equation of the line containing them.

Q.N13. Find value of $\sin 18^\circ$

Q.N. 14 prove by using principle of mathematical induction.

$$3^{2n+2} - 8n - 9 \text{ is divisible by } 8.$$

Q.N.15. $\sin x + \sin 3x + \sin 5x + \sin 7x = 4 \cos x \cos 2x \sin 4x$

Q.N.16. prove the following by using the principle of mathematical induction
 $1 \cdot 2 \cdot 3 + 2 \cdot 3 \cdot 4 + 3 \cdot 4 \cdot 5 + \dots + n(n+1)(n+2) = \frac{n(n+1)(n+2)(n+3)}{4}$

Q.N.17. Convert the $\frac{1+i}{2-i}$ in to polar form

Q.N.18. Find principal and general solution of following

i). $\sec^2 2x = 1 - \tan 2x$ ii). $\cot x = -\frac{1}{\sqrt{3}}$

Q.N.19 solve the equation $x^2 - (3\sqrt{2} - 2i)x - 6\sqrt{2}i = 0$

Q.N.20. In a survey of 350 students 150 likes cycling, 175 likes yoga and 45 likes both cycling and yoga how many students likes neither cycling nor yoga. Why exercise is important for every one?

Q.N.21. If $(x+iy)^3 = u+iv$ prove that $u/x + v/y = 4(x^2 - y^2)$

Q.N.22. Prove that $\frac{\sin 4x - \sin 2x}{\cos 4x - \cos 2x} = -\cot 3x$ ii) $(\cos x + \cos y)^2 + \sin x - \sin y = 4 \cos^2 \frac{x+y}{2}$

Q.N.23. The vertices of triangle PQR are P(2,1), Q(-2,3), and R(4,5). Find equation of median through the vertex R.

Q.N.24. In a survey it was found 21 people liked product A, 26 liked product B and 29 liked product C. If 14 liked product A and B, 12 people liked product C and A, 14 liked product B and C and 8 liked all the three products. Find

i) How many liked product C only. ii.) How many like at most two product.

Q.N.25. Solve system of inequalities graphically

$$3x+2y \leq 24 \quad x+2y \leq 16, \quad x+y \leq 10 \quad x \geq 0, \quad y \geq 0$$

Q.N.26. Prove that $\tan 4x = \frac{4 \tan x (1 - \tan^2 x)}{1 - 6 \tan^2 x + \tan^4 x}$

Q.N.27. Find equation of the line passing through the points (-3, 10) and the sum of its intercepts on the axis is 8.

Q.N.28. If α and β are different complex numbers with $|\beta| = 1$ then find $\left| \frac{\beta - \alpha}{1 - \bar{\alpha}\beta} \right|$

Q.N.29. Find $\sin x/2, \cos x/2, \tan x/2$ if $\sin x = 1/4$ where $\frac{\pi}{2} < x < \pi$.