

XII- MATHS SLIP TEST QUESTION PAPER - 2024
SIR CV RAMAN COACHING CENTRE IDAPPADI ,
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SECTION - A (10 X 5 = 50 M)

ANSWER ANY 10 QUESTIONS

$$\left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^5 + \left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)^5 = -\sqrt{3}.$$

1. Show that

2. Find the value of

$$\left(\frac{1 + \sin \frac{\pi}{10} + i \cos \frac{\pi}{10}}{1 + \sin \frac{\pi}{10} - i \cos \frac{\pi}{10}}\right)^{10}$$

If $\omega \neq 1$ is a cube root of unity, show that

(i) $(1 - \omega + \omega^2)^6 + (1 + \omega - \omega^2)^6 = 128.$

(ii) $(1 + \omega)(1 + \omega^2)(1 + \omega^4)(1 + \omega^8) \cdots (1 + \omega^{2^{11}}) = 1.$

3.

4. Find the value of $\sum_{k=1}^8 \left(\cos \frac{2k\pi}{9} + i \sin \frac{2k\pi}{9} \right).$

4.

5. Find the non-parametric form of vector equation, and Cartesian equations of the plane passing through the points (2,2,1), (9,3,6) and perpendicular to the plane .

$$2x + 6y + 6z = 9.$$

6. Find the parametric vector, non-parametric vector and Cartesian form of the equations of the plane passing through the three non-collinear points (3,6, 2),(1, 2,6) and (6, 4, -2)

7. A particle moves along a line according to the law

$$s(t) = 2t^3 - 9t^2 + 12t - 4, \text{ where } t \geq 0.$$

- (i) At what times the particle changes direction?
 (ii) Find the total distance travelled by the particle in the first 4 seconds. (iii) Find the particle's acceleration each time the velocity is zero.

8. A ladder 17 metre long is leaning against the wall. The base of the ladder is pulled away from the wall at a rate of 5 m/s. When the base of the ladder is 8 metres from the wall, (i) how fast is the top of the ladder moving down the wall?
 (ii) at what rate, the area of the triangle formed by the ladder, wall, and the floor, is changing
9. A police jeep, approaching an orthogonal intersection from the northern direction, is chasing a speeding car that has turned and moving straight east. When the jeep is 0.6 km north of the intersection and the car is 0.8 km to the east. The police determine with a radar that the distance between them and the car is increasing at 20 km/hr. If the jeep is moving at 60 km/hr at the instant of measurement, what is the speed of the car?
10. A camera is accidentally knocked off an edge of a cliff 400 ft high. The camera falls a distance of $s = 16t^2$ in t seconds (i) How long does the camera fall before it hits the ground? (ii) What is the average velocity with which the camera falls during the last 2 seconds? (iii) What is the instantaneous velocity of the camera when it hits the ground?

11. (i) $\lim_{x \rightarrow 1^+} \left(\frac{2}{x^2 - 1} - \frac{x}{x - 1} \right)$ (iii) $\lim_{x \rightarrow 0} \left(\frac{1}{\sin x} - \frac{1}{x} \right)$, (iii)

$$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x} \right)^x$$

12.

In a newly developed city, it is estimated that the voting population (in thousands) will increase according to $V(t) = 30 + 12t^2 - t^3$, $0 \leq t \leq 8$ where t is the time in years. Find the approximate change in voters for the time change from 4 to $4\frac{1}{6}$ year.

Find Δf and df for the function f for the indicated values of $x, \Delta x$ and compare

- (i) $f(x) = x^3 - 2x^2; x = 2, \Delta x = dx = 0.5$
 13. (ii) $f(x) = x^2 + 2x + 3; x = -0.5, \Delta x = dx = 0.1$

Assuming $\log_{10} e = 0.4343$, find an approximate value of $\log_{10} 1003$.

14.

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