

FIRST REVISION TEST - 2024

B

Standard XII

Reg.No.

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MATHEMATICS

Time : 3.00 hrs

Part - I

Marks : 90

20 x 1 = 20

I. Choose the correct answer:

- If $A^T A^{-1}$ is symmetric, then $A^2 =$
 - A^{-1}
 - A^T
 - $(A^{-1})^2$
 - $(A^T)^2$
- In the case of Cramer's rule which of the following are correct?
 - $\Delta = 0$
 - $\Delta \neq 0$
 - the system has unique solution
 - the system has infinity infinitely many solutions
 - (i) and (iv)
 - (ii) and (iii)
 - all
 - none
- If $\frac{z-1}{z+1}$ is purely imaginary, then $|Z|$ is
 - $\frac{1}{2}$
 - 2
 - 1
 - 3
- If the direction cosines of a line are $\frac{1}{c}, \frac{1}{c}, \frac{1}{c}$ then
 - $c = \pm\sqrt{3}$
 - $c = \pm 3$
 - $c > 0$
 - $0 < c < 1$
- Integrating factor of the differential equation $\frac{dy}{dx} = \frac{x+y+1}{x+1}$ is
 - $\frac{1}{x+1}$
 - $x+1$
 - $\frac{1}{\sqrt{x+1}}$
 - $\sqrt{x+1}$
- The tangent to the curve $y^2 - xy + 9 = 0$ is vertical when
 - $y = 0$
 - $y = \pm\sqrt{3}$
 - $y = \frac{1}{2}$
 - $y = \pm 3$
- The number of positive zeros of the polynomial $\sum_{r=0}^n nC_r (-1)^r x^r$ is
 - n
 - 0
 - $< n$
 - r
- The volume of solid of revolution of the region bounded by $y^2 = x(a-x)$ about x axis
 - πa^3
 - $\frac{\pi a^3}{4}$
 - $\frac{\pi a^3}{5}$
 - $\frac{\pi a^3}{6}$
- Rolle's theorem is applicable only when
 - $f'(x) \neq 0$
 - $f'(x) < 0$
 - $f'(x) > 0$
 - $f'(x) = 0$
- Linear approximation for $g(x) = \cos x$ at $x = \frac{\pi}{2}$ is
 - $x - \frac{\pi}{2}$
 - $x + \frac{\pi}{2}$
 - $-x + \frac{\pi}{2}$
 - $-x - \frac{\pi}{2}$
- A binary operation on a set S is a function from
 - $S \rightarrow S$
 - $(S \times S) \rightarrow S$
 - $S \rightarrow (S \times S)$
 - $(S \times S) \rightarrow (S \times S)$

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XII Maths

12. If a compound statement involves 3 simple statements then the number of rows in the truth table is
 a) 9 b) 8 c) 6 d) 3
13. A random variable X has binomial distribution with $n = 25$ and $p = 0.8$ then standard deviation of X is
 a) 4 b) 3 c) 6 d) 2
14. The product of the n^{th} roots of unity is
 a) $(-1)^n$ b) 1 c) $(-1)^{n-1}$ d) 0
15. $\int_0^a \frac{f(x)}{f(x)+f(a-x)} dx =$
 a) 0 b) a c) $\frac{a}{2}$ d) 2a
16. For the parabola $(x-h)^2 = -4a(y-k)$, the equation of the directrix is
 a) $y = k$ b) $x = k + a$ c) $y = a$ d) $y = k + a$
17. If $X \sim B(n, p)$ then
 a) $\mu = np, \sigma^2 = np(1-p)$ b) $\mu = nq, \sigma = np(1-p)$
 c) $\mu = np, \sigma = np(1-p)$ d) $\mu = npq, \sigma = npq$
18. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + \hat{j}$, $\vec{c} = \hat{i}$ and $(\vec{a} \times \vec{b}) \times \vec{c} = \lambda \vec{a} + \mu \vec{b}$, then the value $\lambda + \mu$ is
 a) 0 b) 6 c) 1 d) 3
19. $\cos(\cos^{-1}x) = x$ if
 a) $|x| < 1$ b) $|x| \leq 1$ c) $|x| \geq 1$ d) $|x| = 0$
20. Identify the incorrect statement.
 a) $\text{Re}(Z) \leq |Z|$ b) $|Z|^2 = 1 \Rightarrow \frac{1}{Z} = \bar{Z}$
 c) $||Z_1| - |Z_2|| \geq |Z_1 + Z_2|$ d) $|Z^n| = |Z|^n$

Part - II

II. Answer any 7 questions. (Q.No.30 is compulsory)

7 x 2 = 14

21. If A is a symmetric matrix, prove that adj A is also symmetric.
22. If $\left(\frac{1-i}{1+i}\right)^{100} = a + ib$, find the values of a and b.
23. If $x^2 + 2(k+2)x + 9k = 0$ has equal roots, Find k.
24. Find the principal solution of $\sqrt{3} \sec x = -2$
25. Evaluate: $\int_0^1 x^3(1-x^4) dx$
26. Show that $y = mx + \frac{7}{m}$, $m \neq 0$ is a solution of the differential equation $xy' + 7\frac{1}{y} - y = 0$
27. The probability function of X is given by $f(x) = \begin{cases} kxe^{-2x} & \text{for } x > 0 \\ 0 & \text{for } x \leq 0 \end{cases}$
 Find the value of k.

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43. a) Find the equation of the circle passes through the points (0, 0), (-2, 1) and (-3, 2)

(OR)

- b) Find the probability mass function $f(x)$ of the discrete random variable X whose cumulative distribution function $F(X)$ is given by

$$F(x) = \begin{cases} 0 & , -\infty < x < -2 \\ 0.25 & , -2 \leq x < -1 \\ 0.60 & , -1 \leq x < 0 \\ 0.90 & , 0 \leq x < 1 \\ 1 & , 1 \leq x < \infty \end{cases}$$

Also find (i) $P(X < 0)$ and (ii) $P(X \geq -1)$

44. a) Find the foot of the perpendicular drawn from the point (5,4,2) to the line

$$\frac{x+1}{2} = \frac{y-3}{3} = \frac{z-1}{-1}$$

Also find the equation of the perpendicular.

(OR)

- b) If $z = x + iy$ and $\arg\left(\frac{z-i}{z+2}\right) = \frac{\pi}{4}$, show that $x^2 + y^2 + 3x - 3y + 2 = 0$

45. a) Using vector method, prove that $\cos(\alpha - \beta) = \cos\alpha \cos\beta + \sin\alpha \sin\beta$

(OR)

- b) If $f(x, y) = \cos(x^2 - 3xy)$, find f_x, f_y and show that $f_{xy} = f_{yx}$

46. a) A tank contains 1000 litres of water in which 100 grams of salt is dissolved. Brine (Brine is a high-concentration solution of salt [usually sodium chloride] in water) runs in a rate of 10 litres per minute and each litre contains 5 grams of dissolved salt. The mixture of the tank is kept uniform by stirring. Brine runs out at 10 litres per minute. Find the amount of salt at any time t .

(OR)

- b) Verify

(i) Closure property (ii) Commutative property

(iii) Associative property (iv) Existence of identity and

(v) Existence of inverse for the operation X_{11} on a subset $A = \{1, 3, 4, 5, 9\}$ of the set of remainders $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

47. a) A metal box with a square base and vertical sides is to contain 1024 cm^3 of water. The material for the top and bottom costs ₹5 per cm^2 and the material for the sides costs ₹2.50 per cm^2 . Find the least cost of the box.

(OR)

- b) Solve: $(1 + y^2) + \left(x - e^{\tan^{-1} y}\right) \frac{dy}{dx} = 0$
