

MATHEMATICS : XII-STD: VOLUME - 2 (FULL)

I CHOOSE THE CORRECT ANSWER. (20x1=20)

1. The tangent to the curve $y^2 - xy + 9 = 0$ is vertical form
 1) $y=0$ 2) $y = \pm\sqrt{3}$ 3) $y = \frac{1}{2}$ 4) $y = \pm 3$.
2. The minimum value of the function $|3-x|+9$ is
 1) 0 2) 3 3) 6 4) 9.
3. The point of the inflection of the curve $y = (x-1)^3$ is
 1) (0,0) 2) (0,1) 3) (1,0) 4) (1,1).
4. If $u(x,y) = e^{x^2+y^2}$, then $\frac{\partial u}{\partial x}$ is equal to.
 1) $e^{x^2+y^2}$ 2) $2xu$ 3) x^2u 4) y^2u .
5. The approximate change in the volume V of a cube of a side x meters caused by increasing the side 1% is
 1) $0.3x dx \text{ m}^3$ 2) $0.03x \text{ m}^3$ 3) $0.03x^2 \text{ m}^3$ 4) $0.03x^3 \text{ m}^3$.
- 6) Linear approximation for $g(x) = \cos x$ at $x = \pi/2$ is
 1) $x + \pi/2$ 2) $-x + \pi/2$ 3) $x - \pi/2$ 4) $-x - \pi/2$.
7. The Value of $\int_1^2 |x| dx$; 1) $\frac{1}{2}$ 2) $\frac{3}{2}$ 3) $\frac{5}{2}$ 4) $\frac{7}{2}$
8. If $f(x) = \int_0^x t \cdot \cos t dt$, then $df/dx =$
 1) $\cos x - x \sin x$ 2) $\sin x + x \cos x$ 3) $x \cos x$ 4) $x \sin x$.
9. The Value of $\int_0^{\pi} \sin^4 x dx$ is. 1) $3\pi/10$ 2) $3\pi/8$ 3) $3\pi/4$ 4) $3\pi/2$
10. The Value of $\int_0^1 (\sin^{-1} x)^2 dx$ is.
 1) $\pi^2/4 - 1$ 2) $\pi^2/4 + 2$ 3) $\pi^2/4 + 1$ 4) $\pi^2/4 - 2$.
- 11) The order and degree of the differential Eqn $y'' + (y')^{1/3} + x^{1/4} = 0$ are respectively,
 1) 2,3 2) 3,3 3) 2,6 4) 2,4.
- 12) The solution of $dy/dx + p(x)y = 0$

TEST) Time: 3 Hrs MARKS: 90.

- 1) $y = ce^{\int p dx}$ 2) $y = ce^{-\int p dx}$ 3) $x = ce^{\int p dy}$ 4) $x = ce^{-\int p dy}$
13. The solution of the differential eqn $\frac{dy}{dx} = \frac{y/x + \phi(y/x)}{\phi'(y/x)}$ is 1) $x\phi(y/x) = k$ 2) $\phi(y/x) = kx$
 3) $y\phi(y/x) = k$, 4) $\phi(y/x) = ky$.
14. If the solution of the differential eqn $\frac{dy}{dx} = \frac{ax+b}{2y+f}$ represent a circle, then the value of c .
 1) 2 2) -2 3) 1 4) -1.
15. A random variable x has binomial distribution with $n = 25, p = 0.8$ then standard deviation of x is
 1) 6 2) 4 3) 3 4) 2.
16. If $P(X=0) = 1 - P(X=1)$, If $E(X) = 3 \text{Var}(X)$, then $P(X=0)$
 1) $2/3$ 2) $2/5$ 3) $1/5$ 4) $1/3$.
17. Let x have a Bernoulli distribution with mean 0.4 then the variance of $(2x-3)$ is
 1) 0.24 2) 0.48 3) 0.6 4) 0.96.
18. Subtraction is not a binary operation in
 1) \mathbb{R} 2) \mathbb{Z} 3) \mathbb{N} 4) \mathbb{Q} .
19. In the set \mathbb{Q} def $a \odot b = a + b + ab$. For what value of y , $3 \odot (y \odot 5) = 7$?
 1) $y = 2/3$ 2) $y = -2/3$ 3) $y = -3/2$ 4) $y = 4$.
20. The last column of the truth table was $\sim(p \vee \sim q)$
 the no. of final outcomes of the truth value F are
 1) 1 2) 2 3) 3 4) 4.

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II ANSWER 7 QUESTIONS : Q.NO: 30 IS COMPULSORY

21. Solve: $\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{\sqrt{1-x^2}}$ (7x2=14)
22. If $f(x,y) = x^3 - 3x^2 + y^2 + 5x + 6$ then find f_x at (1,-2).
23. Find the mean of the distribution $f(x) = \begin{cases} 3e^{-3x}, & 0 < x < \infty \\ 0, & \text{otherwise} \end{cases}$
24. Find the Equation of tangent to the Curve $y = x^2 - x^4$ at (1,0).
25. Evaluate: $\int_0^{\pi/2} (\sin^2 x + \cos^4 x) dx$.
26. $A = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ be a boolean Matrices. Find $A \cup B$, $A \cap B$.
27. Find $P \rightarrow (\sim q \vee r)$ using truth table.
28. Evaluate: $\int_0^{\infty} x^5 e^{-3x} dx$
29. Find the Values of Interval by Rolle's thm $f(x) = x - \frac{1}{x}$, $x \in [\frac{1}{2}, 2]$.
30. Find the diff. Equ for the family of all straight lines passing through the origin.

III ANSWER 7 QUESTIONS: Q.NO: 40 COMPULSORY.

31. Evaluate: $\lim_{x \rightarrow \infty} \frac{2x^2 - 3}{x^2 - 5x + 3}$. (7x3=21)
32. The mean and Variance of a binomial variate 2 p 1.5. Find $P(X=0)$.
33. Find the Absolute extrema: $f(x) = 6x^{\frac{4}{3}} - 3x^{\frac{1}{3}}$ $[-1, 1]$.
34. Evaluate: $\int_2^3 \frac{\sqrt{x}}{\sqrt{5-x} + \sqrt{x}} dx$.
35. Solve the diff. Equ. $(e^y + 1) \cos x dx + e^y \sin x dy = 0$.
36. If the radius of the sphere, with radius 10cm, has to decrease by 0.1 cm approximately. how much will its volume decrease?
37. Let $*$ be defined on \mathbb{R} by $(a * b) = a + b + ab - 7$. if $*$ binary on \mathbb{R} ? If so find $3 * (-\frac{7}{15})$.
38. If $u(x,y) = \frac{x^2 + y^2}{\sqrt{x^2 + y^2}}$. prove that $x \cdot \frac{\partial u}{\partial x} + y \cdot \frac{\partial u}{\partial y} = \frac{3}{2} u$.
39. Solve: $x \frac{dy}{dx} + y = x \log x$.
40. Show that $\sim (P \leftrightarrow Q) \equiv P \leftrightarrow \sim Q$.

- IV ANSWER ALL QUESTIONS (7x5=35)**
41. a) If the curves $ax^2+by^2=1$ and $cx^2+dy^2=1$ intersect each other orthogonally, then $\frac{1}{a}-\frac{1}{b}=\frac{1}{c}-\frac{1}{d}$. (OR)
 b) Show that area of the region bounded by $3x-2y+6=0$, $x=-3$, $x=1$ and x axis, is $1\frac{1}{2}$.
42. a) If $V(x,y) = \log\left(\frac{x^2+y^2}{x+y}\right)$, prove that $x\frac{\partial V}{\partial x} + y\frac{\partial V}{\partial y} = 1$. (OR)
 b) For the function $f(x) = 4x^3 + 3x^2 - 6x + 1$. Find point of inflection.
43. a) Evaluate: $\int_{\pi/8}^{3\pi/8} \frac{1}{1+\sqrt{\tan x}} dx$ (OR)
 b) The rate of increase in the No. of bacteria in a certain bacteria culture is proportional to the number present. Given that the number triples in 5 hrs, find how many bacteria will be present after 10 hrs.
44. a) A random variable X has the following p.m.f.
- | | | | | | | | | |
|----------|-----|------|------|------|------|-------|-------|--|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | |
| $P(X=x)$ | k | $3k$ | $5k$ | $7k$ | $9k$ | $11k$ | $13k$ | |
- i) Find k . ii) Evaluate $P(X \leq 4)$, $P(X \geq 5)$, iii) $P(3 < X < 6)$. (OR)
 b) Find the Volume of a Sphere when rotating a circle with radius a .
45. a) Prove that $P \rightarrow Q \equiv (P \wedge Q) \vee (\neg P \wedge \neg Q)$. (OR)
 b) Solve $(1+2e^{x/y}) dx + 2e^{x/y} \cdot (1-x/y) dy = 0$.
46. a) If $w(x,y) = xy + \sin(xy)$, then prove that $\frac{\partial^2 w}{\partial y \partial x} = \frac{\partial^2 w}{\partial x \partial y}$. (OR)
 b) Prove that among all the rectangles of the given perimeter, the square has the maximum Area.
47. a) If $X \sim B(n,p)$ such that $4P(X=4) = P(X=2)$ and $n=6$. Find the distribution, Mean and Standard deviation. (OR)
 b) Verify i) closure ii) commutative iii) Associative, iv) Identity v) inverse for the operation \times_{11} on a subset $A = \{1, 3, 4, 5, 9\}$ of the set of remainders $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$.