Extra Notes Added

2nd VOLUME TEST
12th Standard
Maths

Date : 31-Dec-22

Reg.No. :

Exam Time : 00:03:00 Hrs

Total Marks : 90

20 x 1 = 20

1) If a particle moves in a straight line according to s = t³-6t²-15t, the time interval during which the velocity is negative and acceleration is positive is _____

(a) $2 < t < 5$ (b) $2 \leq t \leq 5$ (c) $t \geq 2$ (d) $t \leq 2$

2) The least value of a when f f(x) = x² + ax + 1 is increasing on (1, 2) is _____

(a) -2   (b) 2   (c) 1   (d) -1

3) If the curves y = 2eˣ and y = ae⁻ˣ intersect orthogonally, then a = _____

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) 2   (d) $2e^2$

4) $\lim_{x \to 0^x} \frac{a^x - b^x}{c^x - d^x}$ is _____

(a) ∞ (b) 0   (c) $\log \frac{ab}{cd}$ (d) $\frac{\log\left(\frac{a}{b}\right)}{\log\left(\frac{c}{d}\right)}$

5) If u = log $\sqrt{x^2 + y^2}$, then $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}$ is _____

(a) $\sqrt{x^2 + y^2}$ (b) 0   (c) u   (d) 2u

6) If u = yˣ then $\frac{\partial u}{\partial y}$ = ...

(a) xyˣ⁻¹   (b) yxʸ⁻¹   (c) 0   (d) 1

7) If $f(x) = \frac{x-1}{x+1}$ then its differential is given by _____

(a) $\frac{2}{(x+1)^2} dx$ (b) $-\frac{2}{(x+1)^2} dx$ (c) $\frac{x}{(x+1)^2} dx$ (d) $\frac{-x}{(x+1)^2} dx$

8) The percentage error in the 11ᵗʰ root of the number 28 is approximately times _____ the percentage error in 28.

(a) $\frac{1}{28}$ (b) $\frac{1}{11}$ (c) 11   (d) 28

9) $\int_1^{\sqrt{3}} \frac{dx}{1+x^2}$ is _____

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{12}$ (d) $-\frac{\pi}{6}$

10) $\int_{-1}^{1} x \, dx$ = ...

(a) -1   (b) 1   (c) 0   (d) 2

11) The differential equation of all circles with centre at the orgin is _____

(a) xdy + ydx = 0   (b) xdy - ydx = 0   (c) c) xdxy + ydy = 0   (d) xdx - ydy = 0

12) The differential equation of the family of parabolas y² = 4ax is _____

(a) $2y = x \left(\frac{dy}{dx}\right)$ (b) $y = 2x \left(\frac{dy}{dx}\right)$ (c) $y = 2x^2 \left(\frac{dy}{dx}\right)$ (d) $y^2 = 2x \left(\frac{dy}{dx}\right)$

13) The I.F of y log y $\frac{dx}{dy} + x - log \, y = 0$ is _____

(a) log(log y)   (b) log y   (c) $\frac{1}{\log y}$ (d) $\frac{1}{\log(\log y)}$

14) The population p of a certain bacteria decreases at a rate proportional to the population p. The differential equation corresponding to the above statement is _____.

(a) $\frac{dp}{dt} = \frac{k}{p}$ (b) $\frac{dp}{dt} = kt$ (c) $\frac{dp}{dt} = kp$ (d) $\frac{dp}{dt} = -kp$

15) If F(x) is the probability distribution function, then $F\left(-\infty\right)$ is _____

(a) 1   (b) 2   (c) ∞ (d) 0

16) If F(x) is a distribution function of a random variable then the false statement is _____

(a) $F(\infty) = 1$ (b) $F(-\infty) = -1$ (c) $F'(x) = f(x)$ (d) $0 < F(x) < 1$

17) For a Bernouli distribution

(a) $\sigma = \sqrt{npq}$ (b) $mean = \mu$ (c) $\mu = p$ (d) $\sigma^2 = pq$

18) The identity element of $\left\{ \begin{pmatrix} x & x \\ x & x \end{pmatrix} \right\}$ |x ∈ R, x ≠ 0} under matrix multiplication is _____

(a) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (b) $\begin{pmatrix} \frac{1}{4x} & \frac{1}{4x} \\ \frac{1}{4x} & \frac{1}{4x} \end{pmatrix}$ (c) $\begin{pmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix}$ (d) $\begin{pmatrix} \frac{1}{2x} & \frac{1}{2x} \\ \frac{1}{2x} & \frac{1}{2x} \end{pmatrix}$

19) '+' is not a binary operation on _____

(a) ~   (b) z   (c) c   (d) Q- {0}

20) ln Z, we define a * b = a + b + 1. The identity element with respect to * is _____

(a) 1   (b) 0   (c) -1   (d) 2

answer the seven question 10th compulsory   7x 2 = 14

21) Verify Rolle 's Theorem for $f(x) = |x - 1|, O \leq x \leq 2$

22) Find the rate of change of the area of a circle with respect to its radius. How fast is the area changing with respect to the radius when the radius is 3 cm?

23) A circular template has a radius of 10 cm ($\pm$ 0.02). Determine the possible error in calculating the area of the templates.

24) Evaluate $\int_0^1 \left(\frac{e^{5logx} - e^{4logx}}{e^{3logx} - e^{2logx}} \right)$

25) If $\int_0^\infty \frac{x^2 dx}{(x^2+a^2)(x^2+b^2)(x^2+c^2)} = \frac{\pi}{2(a+b)(b+c)(c+a)}$ then find $\int_0^\infty \frac{dx}{(x^2+4)(x^2+9)}$

26) Evaluate $\int_0^1 \frac{|x|}{x} dx$

27) Determine the order and degree of $\dfrac{\left[1 + \left(\frac{dy}{dx} \right)^2 \right]^{\frac{3}{2}}}{\frac{d^2 y}{dx^2}} = k$

28) Suppose X is a binomial variate X ~ B(5, p) and P(X = 2) = P(X = 3), then find p.

29) In an algebraic structure the identity element (if exists) must be unique.

30) Let * be a binary operation on set Q of rational numbers defind as $a * b = \frac{ab}{8}$. Write the identity for *, if any.

answer the seven question 10th compulsory   7 x 3 = 21

31) Verify Rolle's theorem for f(x)=ex sinx, $0 \leq x \leq \pi$

32) Find the rate of change of volume of a sphere with respect to its surface area when the radius is 2 cm. r - radius, V - Volume, S - Surface area

33) Using differentials find the approximate value of tan 46° if it is given that 1^0 = 0.01745 radians

34) Find the approximate value of $\sqrt[5]{31}$

35) Evaluate $\int_3^6 \frac{\sqrt{x}}{\sqrt{9-x}+\sqrt{x}} dx$

36) Evaluate $\int_0^1 \log\left(\frac{1}{x} - 1 \right) dx$

37) Find the D.E of all circles in the first quadrant which touch the co-ordinate axes.

38) Verify that y = A cos 2x - B sin 2x is the general solution of the differential equation $\frac{d^2 y}{dx^2} + 4y = 0$

39) 20% of the bolts produced in a factory are found to be defective. Find the probability that in a sample of 10 bolts chosen at random, exactly 2 will be defective using binomial distribution.

40) State and prove Uniqueness of Inverse

answer the six question 11th compulsory   7x 5 = 35

41) Gas is escaping from a spherical balloon at the rate of 900 cm^3/sec. How fast is the surface area and radius of the balloon shrinking when the radius of the balloon is 30 cm?

42) Sketch the curve y² = 2x³

43) Find the approximate value of $\sqrt[3]{1.02} + \sqrt{1.02}$

44) If u = $\sec^{-1}\left(\frac{x^3 - y^3}{x+y} \right)$ show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial x} = 2 \cot u$

45) Find the volume of the solid generated by the revolution of the loop of the curve x = t² y = t - $\frac{t^3}{3}$ about x-axis.

46) Find the area bounded by the curve y = x^3 and the line y = x.

47) A population grows at the rate of 2% per year. How long does it take for the population to double?

48) In a culture of bacteria the rate of increase is proportional to the number present. It is found that the number doubles in 4 hours, how many may be expected at the end of the 12 hours?

49) The probability function of a random variable X is f(x) = $Ce^{-|x|}, -\infty < x < \infty$. Find the value of C and also find the mean and variance for the random variable.

50) Using the equivalence property , show that $p \leftrightarrow q \equiv (p \wedge q)_v (\neg p \wedge \neg q)$

51) Let A = N × N and let * be a binary operation on A defined by $(a, b) * (c, d) = (a + c, b + d)$. Show that
(i) (A, *) is associative,
(ii) (A, *) is commutative,
(iii) identity element of (A, *) does not exist.

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