

Extra Notes Added

x

## 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  $s = t^3 - 6t^2 - 15t$ , 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  $f(x) = x^2 + ax + 1$  is increasing on  $(1, 2)$  is \_\_\_\_\_
- (a) -2 (b) 2 (c) 1 (d) -1
- 3) If the curves  $y = 2e^x$  and  $y = ae^{-x}$  intersect orthogonally, then  $a =$  \_\_\_\_\_
- (a)  $\frac{1}{2}$  (b)  $-\frac{1}{2}$  (c) 2 (d)  $2e^2$
- 4)  $\lim_{x \rightarrow 0^+} \frac{a^x - b^x}{c^x - d^x}$  is \_\_\_\_\_
- (a)  $\infty$  (b) 0 (c)  $\log \frac{ab}{cd}$  (d)  $\frac{\log(\frac{a}{b})}{\log(\frac{c}{d})}$
- 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  $u = y^x$  then  $\frac{\partial u}{\partial y} =$  \_\_\_\_\_
- (a)  $xy^{x-1}$  (b)  $yx^{y-1}$  (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 11<sup>th</sup> 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 origin is \_\_\_\_\_
- (a)  $x dy + y dx = 0$  (b)  $x dy - y dx = 0$  (c)  $c x dy + y dx = 0$  (d)  $x dx - y dy = 0$
- 12) The differential equation of the family of parabolas  $y^2 = 4ax$  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  $F(-\infty)$  is \_\_\_\_\_
- (a) 1 (b) 2 (c)  $\infty$  (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 Bernoulli distribution

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

18) The identity element of  $\left\{ \begin{pmatrix} x & x \\ x & x \end{pmatrix} \mid x \in \mathbb{R}, x \neq 0 \right\}$  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)  $\sim$  (b)  $z$  (c)  $c$  (d)  $Q - \{0\}$

20) In  $Z$ , 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  $f(x) = |x - 1|$ ,  $0 \leq x \leq 2$

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  $\int_0^1 \left( \frac{e^{5 \log x} - e^{4 \log x}}{e^{3 \log x} - e^{2 \log x}} \right) dx$

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  $\frac{\left[ 1 + \left( \frac{dy}{dx} \right)^2 \right]^{\frac{3}{2}}}{\frac{d^2y}{dx^2}} = k$

28) Suppose X is a binomial variate  $X \sim B(5, p)$  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 defined 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  $f(x) = \sin x$ ,  $0 \leq x \leq \pi$

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  $\tan 46^\circ$  if it is given that  $1^\circ = 0.01745$  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  $\frac{d^2y}{dx^2} + 4y = 0$

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  $900 \text{ cm}^3/\text{sec}$ . 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  $y^2 = 2x^3$

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  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 2 \cot u$

45) Find the volume of the solid generated by the revolution of the loop of the curve  $x = t^2$ ,  $y = t - \frac{t^3}{3}$  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  $p \leftrightarrow q \equiv (p \wedge q) \vee (\neg p \wedge \neg q)$

51) Let  $A = N \times N$  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.

\*\*\*\*\*

[www.Padasalai.Net](http://www.Padasalai.Net)