

Ts12M

Tenkasi District
Common Second Mid Term Test - 2023



24-11-2023

Standard 12
MATHEMATICS

Time: 1.30 Hrs.

Marks: 45

10×1=10**I. Answer all the questions.**

- 1) The point of inflection of the curve $y = (x-1)^3$ is
 a) (0, 0) b) (0, 1) c) (1, 0) d) (1, 1)
- 2) If $w(x, y) = x^y, x > 0$ then $\frac{\partial w}{\partial x}$ is equal to
 a) $x^y \log x$ b) yx^{y-1} c) $y \log x$ d) $x \log y$
- 3) One of the closest points on the curve $x^2 - y^2 = 4$ to the point (6, 0) is
 a) (2, 0) b) $(\sqrt{5}, 1)$ c) $(3, \sqrt{5})$ d) $(\sqrt{13}, -\sqrt{3})$
- 4) The percentage error of fifth root of 31 is approximately how many times the percentage error in 31?
 a) $\frac{1}{31}$ b) $\frac{1}{5}$ c) 5 d) 31
- 5) Linear approximation for $g(x) = \cos x$ at $x = \frac{\pi}{2}$ is
 a) $x + \frac{\pi}{2}$ b) $-x + \frac{\pi}{2}$ c) $x - \frac{\pi}{2}$ d) $-x - \frac{\pi}{2}$
- 6) If $\int_0^a \frac{1}{4+x^2} dx = \frac{\pi}{8}$ then a is
 a) 4 b) 1 c) 3 d) 2
- 7) The volume of solid of revolution of the region of the region bounded by $y^2 = x(a-x)$ about x axis is
 a) πa^3 b) $\frac{\pi a^3}{4}$ c) $\frac{\pi a^3}{5}$ d) $\frac{\pi a^3}{6}$
- 8) The value of $\int_{-1}^2 |x| dx$ is
 a) $\frac{1}{2}$ b) $\frac{3}{2}$ c) $\frac{5}{2}$ d) $\frac{7}{2}$
- 9) The solution of the differential equation $2x \frac{dy}{dx} - y = 3$ represents
 a) straight lines b) circles c) parabola d) ellipse
- 10) The degree and order of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^{\frac{1}{3}} + x^{\frac{1}{4}} = 0$ are respectively
 a) 2, 3 b) 3, 2 c) (2, 6) d) (2, 4)

II. Answer any 4 questions. Question No. 15 is compulsory:**4×2=8**

- 11) Show that
- $x^2 + y^2 = r^2$
- where r is a constant is a solution of the differential

equation $\frac{dy}{dx} = -\frac{x}{y}$

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12) Determine the order and degree (if exists) of the differential equations

$$\frac{d^2y}{dx^2} = xy + \cos\left(\frac{dy}{dx}\right)$$

13) Evaluate: $\int_0^{\infty} x^5 e^{-3x} dx$

14) A sphere is made of ice having radius 10 cm. Its radius decreases from 10 cm to 9.8 cm. find approximation for the change in the volume.

15) $f(x, y) = 3x^2 + y^2 + 5x + 2$ calculate $\frac{\partial f}{\partial y}$ at $(1, -2)$ **III. Answer any 4 questions. Qn.No. 20 is compulsory:****4×3=12**16) Find the local extremum of the function $f(x) = x^4 + 32x$ 17) Assuming $\log_{10} e = 0.4343$ find an approximate value of $\log_{10} 1003$ 18) $U(x, y, z) = x^2 - xy + 3 \sin z$, $x, y, z \in \mathbb{R}$ find the linear approximation for U at $(2, -1, 0)$ 19) Evaluate: $\int_0^{\pi/2} \frac{dx}{5 + 4 \sin^2 x}$ 20) Evaluate: $\int_0^{\pi/4} \sin^6 2x dx$

SIVAKUMAR. M.

Sri Ram Mathric HSS

Vallam. 627 809

Tenkasi Dist.

IV. Answer the questions:**3×5=15**21) Find the dimensions of the largest rectangle that can be inscribed in a semi circle of radius r cm.**(OR)**Find the differential equation corresponding to the family of curves represented by the equation $y = Ae^{8x} + Be^{-8x}$ where A & B are arbitrary constants.22) If $u = \sin^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$ show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u$ **(OR)**Evaluate $\int_{\pi/8}^{3\pi/8} \frac{1}{1 + \sqrt{\tan x}} dx$ using properties of integration.23) $u(x, y, z) = xyz$, $x = e^{-t}$, $y = e^{-t} \cos t$, $z = \sin t$, $t \in \mathbb{R}$ find $\frac{du}{dt}$.**(OR)**Find the area of the region bounded by the parabola $y^2 = x$ & the line $y = x - 2$
