ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

FOR GOD AND COUNTRY

SOLUTIONS OF WORKSHEET-30

SUBJECT – MATHEMATICS

Final - Term

Chapter: Calculus **Class: XII**

Topic: Miscellaneous **Date: 21.01.2021**

Choose the correct option **(1 x 15=15)**

1. $\int_0^{\pi} \sin 3x \sin 5x \, dx = ?$

   a) $\frac{\pi}{4}$ **b) 0** **c) 1** **d) None of these**

2. $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\cos x}}{\sqrt{\cos x}+\sqrt{\sin x}} dx$ = ?

   a) $\frac{\pi}{2}$, b) $\frac{\pi}{4}$, c) $\frac{\pi}{8}$, d) None of these.

3. $\int_2^3 \frac{\sqrt{x}}{\sqrt{x}+\sqrt{5-x}} dx$ = ?

   a) $\frac{3}{8}$, b) $\frac{1}{8}$, c) $\frac{1}{2}$, d) None of these.

4. $\frac{d^3y}{dx^3} + y = \sqrt[3]{1 + \frac{dy}{dx}}$ **is a differential equation of degree –**

a. 1
b. 2
c. 3
d. 4

5. **The degree of the differential equation** $\left(\frac{d^2y}{dx^2}\right)^2 + \frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^4 + \frac{dy}{dx} + y = 6x^3$ **is –**

a. 4
b. 3
c. 2
d. 1

6. **In the linear differential equation of the form** $\frac{dx}{dy} + Px = Q$ **,** Q **is –**

a. A constant.
b. Function of x.
c. A constant or a function of y.
d. Function of both x & y.

7. **The integrating factor of the differential equation** $\frac{dy}{dx} + Py = Q$ **, is –**

a. e^x
b. e^{Px}
c. $e^{\int P dx}$
d. $e^{\int P dy}$

8. Which of the statement(s) is/are true ?

i. $f(x) = x^3$ *is decreasing in* $(-\infty, \infty)$
ii. $f(x) = x^4$ *is increasing in* $(-\infty, 0)$

a) Only i. is true.
b) Only ii. is true.
c) Both i. and ii. are true.
d) Both are false.

9. If the slopes of the tangent and normal to the curve $y = f(x)$ at (x, y) be $\frac{dy}{dx}$ and m respectively , then $m = ?$

a) $-\frac{dy}{dx}$

b) $\frac{dx}{dy}$

c) $-\frac{dx}{dy}$

d) $None\ of\ these.$

10. If the tangent to the continuous curve $y = f(x) at\ P(a, b)$ is parallel to x-axis, then the equation of the tangent at P is –

a) $y = b$

b) $y = a$

c) $y = -b$

d) $y = -a$

11. The slope of the tangent to the rectangular hyperbola $xy = c^2$ at $(ct, \frac{c}{t})$ is –

a) $-\frac{1}{t}$

b) $-\frac{1}{t^2}$

c) $\frac{1}{t}$

d) $\frac{1}{t^2}$

12. The minimum value of the function $f(x) = x^2 - x + 2$ is ?

a) 4 ; b) 1 ; c) 7 ; d) None of these.

13. **The area bounded by the straight lines $2x = 3y, x = 3, x = 5$ and x-axis (in square unit) is –**

a) 16
b) 8
c) 4
d) $\frac{16}{3}$

14. **In an LPP , the decision variables can take ?**

a) Any real values
b) Any integer values
c) Any natural numbers
d) Any non-negative real values

15. An infeasible LPP has ?

a) A unique solution
b) No solution
c) Many solutions
d) None of these.

Prepared by :-

Mr. Sukumar Mandal (SkM)