

SWL-12-19

Roll No. _____ Annual 2019

Mathematics
Paper : II

(INTER PART II CLASS 12th) - (I)
OBJECTIVE

Time :30 Minutes
Marks : 20

Code : 8191

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number with marker or pen. Cutting or filling two or more circles will result in zero mark in that question.

I 1. $\lim_{\theta \rightarrow 0} \frac{\sin^2 \theta}{\theta} =$

- (A) 1 (B) $\frac{1}{2}$ (C) ∞ (D) $\frac{0}{0}$

2. Parametric equations $x = at^2$, $y = 2at$ represent

- (A) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (B) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (C) $y^2 = 4ax$ (D) $x^2 + y^2 = a^2$

3. If $y = x^2$ then dy is

- (A) $2x$ (B) $2x dx$ (C) $x^2 dx$ (D) $2x^2$

4. If $f'(c) = 0$, then $f(x)$ is minimum at $x = c$ if

- (A) $f''(c) > 0$ (B) $f''(c) < 0$ (C) $f''(c) = 0$ (D) $f''(c) < -1$

5. $\frac{d}{dx} (\cos x^3) =$

- (A) $\sin x^2$ (B) $-\sin x^2$ (C) $2x \sin x^2$ (D) $-2x \sin x^2$

6. $\frac{d}{dx} \left(\frac{a}{x} \right) =$

- (A) a (B) $\frac{1}{x}$ (C) $\frac{a}{x^2}$ (D) $-\frac{a}{x^2}$

7. The order of differential equation $x \frac{d^2 y}{dx^2} + \frac{dy}{dx} + 2 = 0$ is

- (A) 1 (B) 2 (C) 3 (D) 4

8. $\int \ln x dx =$

- (A) $x \ln x - x$ (B) $x \ln x + x$ (C) $x - x \ln x$ (D) $-x \ln x - x$

9. If $\int_1^3 f(x) dx = 5$, then $\int_3^1 f(x) dx =$

- (A) $\frac{1}{5}$ (B) $-\frac{1}{5}$ (C) -5 (D) 5

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10. $\int 3 \sin 3x dx =$
(A) $\cos 3x$ (B) $-\cos 3x$ (C) $a \sin 3x$ (D) $9 \cos 3x$
11. Slope – intercept form of line is
(A) $y - y_1 = m(x - x_1)$ (B) $\frac{x}{a} + \frac{y}{b} = 1$ (C) $y = mx + c$ (D) $x \cos \alpha + y \sin \alpha = p$
12. Slope of line AB, A(1,2), B(1,4)
(A) 0 (B) 1 (C) 2 (D) undefined
13. Distance of A (1, 1) from origin is
(A) 2 (B) $\sqrt{2}$ (C) 0 (D) 1
14. Equation of vertical line is
(A) $y = c$ (B) $y = -c$ (C) $x = c$ (D) $y = x$
15. (1, 1) is solution of
(A) $x + y < 1$ (B) $2x + y < 1$ (C) $2x - y < 1$ (D) $x - y < 1$
16. Radius of circle $x^2 + y^2 + 2gx + 2fy - c = 0$ is
(A) $\sqrt{g^2 + f^2 - c}$ (B) $\sqrt{g^2 + f^2 + c}$ (C) $\sqrt{g^2 + f^2 - c^2}$ (D) $\sqrt{g^2 + f^2 + c^2}$
17. Axis of parabola $y^2 = 4ax$ is
(A) $y = 0$ (B) $x = 0$ (C) $y = a$ (D) $x = a$
18. Eccentricity e of circle is
(A) $e < 1$ (B) $e = 1$ (C) $e > 1$ (D) $e = 0$
19. Two vectors \underline{u} and \underline{v} are perpendicular if
(A) $\underline{u} \cdot \underline{v} = 0$ (B) $\underline{u} \times \underline{v} = 0$ (C) $\underline{u} = t\underline{v}$ (D) $\underline{u} + \underline{v} = 0$
20. $2\hat{i} \times 2\hat{j} =$
(A) $4\hat{i}$ (B) 4 (C) $4\hat{k}$ (D) 0

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SLV-12-19

Roll No. _____ Annual 2019

Mathematics
Paper : II

(INTER PART II CLASS 12th)

Time : 2 : 30 Hours

SUBJECTIVE

Marks : 80

Note :- Section I is compulsory. Attempt any three Questions from section II.

Section = I

2. Write short answers to any Eight parts. (8 x 2 = 16)

- i. Express the perimeter p of a square as a function of its area A .
- ii. For the function $f(x) = -2x + 8$, find $f^{-1}(x)$.
- iii. Evaluate $\lim_{x \rightarrow 3} \frac{x-3}{\sqrt{x}-\sqrt{3}}$.
- iv. Differentiate $\frac{2x-3}{2x+1}$ w.r.t x .
- v. Differentiate $\sin^2 x$ w.r.t $\cos^4 x$.
- vi. Differentiate $(\ln x)^x$ w.r.t x .
- vii. Find $f'(x)$ if $f(x) = \frac{e^x}{e^{-x}+1}$.
- viii. Find $\frac{dy}{dx}$ if $y = x^2 \ln \sqrt{x}$.
- ix. Find y_2 if $y = \ln \left(\frac{2x+3}{3x+2} \right)$.
- x. Find $\frac{dy}{dx}$ if $y = \ln \sqrt{\frac{x^2-1}{x^2+1}}$.
- xi. Find $\frac{dy}{dx}$ if $y = \text{Cosh}^{-1}(\text{Sec}x)$ $0 \leq x \leq \pi/2$.
- xii. Find $f'(x)$ if $f(x) = \sqrt{\ln(e^{2x} + e^{-2x})}$.

3. Write short answers to any Eight parts. (8 x 2 = 16)

- i. Evaluate $\int \frac{\sqrt{y(y+1)}}{y} dy$
- ii. Evaluate $\int \frac{e^x}{e^x+3} dx$
- iii. Evaluate $\int x \ln x dx$
- iv. Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \cos t dt$
- v. Give the definition of differential equation and write an example.
- vi. Evaluate $\int (a-2x)^{\frac{2}{3}} dx$
- vii. Evaluate $\int e^x \left(\frac{1}{x} + \ln x \right) dx$
- viii. Find area bounded by $y = x^2 + 1$ and x -axis, from $x=1$ to $x=2$
- ix. Write any two properties of definite integrals.
- x. Solve the differential equation $\frac{dy}{dx} = -y$
- xi. Define objective function.
- xii. Show that the ordered pair $(1, 1)$ is a solution of the inequality $x + 2y < 6$.

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4. Write short answers to any Nine parts. (9 x 2 = 18)

- i. The points A (-5, -2) and B (5, -4) are ends of a diameter of a circle. Find the centre and radius of the circle.
- ii. Define latus rectum of parabola.
- iii. Find point of intersection of lines $3x + y + 12 = 0$ and $x + 2y - 1 = 0$.
- iv. Find whether the given point lies above or below the line (5, 8) ; $2x - 3y + 6 = 0$.
- v. Find the centre and radius of circle $5x^2 + 5y^2 + 14x + 12y - 10 = 0$
- vi. Find length of tangent drawn from the point (-5, 4) to circle $5x^2 + 5y^2 - 10x + 15y - 131 = 0$
- vii. Find focus and vertex of parabola $x^2 = 5y$
- viii. Find an equation of ellipse with foci (0,-1) and (0,-5) and major axis of length 6.
- ix. Compute the cross product $\underline{a} \times \underline{b}$ where $\underline{a} = 3\underline{i} - 2\underline{j} + \underline{k}$, $\underline{b} = \underline{i} + \underline{j}$
- x. Define cross product of two vectors.
- xi. Prove that $\underline{u} \cdot (\underline{v} \times \underline{w}) + \underline{v} \cdot (\underline{w} \times \underline{u}) + \underline{w} \cdot (\underline{u} \times \underline{v}) = 3\underline{u} \cdot (\underline{v} \times \underline{w})$.
- xii. Find direction cosines of vector \overline{PQ} where P(2,1,5) and Q = (1,3,1)
- xiii. Find volume of parallelepiped for which given vectors are three edges.
 $\underline{u} = \underline{i} - 2\underline{j} + 3\underline{k}$, $\underline{v} = 2\underline{i} - \underline{j} - \underline{k}$, $\underline{w} = \underline{j} + \underline{k}$

Section = II

Note : Attempt any three questions

(10 x 3 = 30)

5. (a) If θ is measured in radian, then prove $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$
- (b) Show that $y = x^x$ has minimum value at $x = \frac{1}{e}$.
6. (a) Evaluate $\int \sqrt{1 + \sin x} dx$, $\left(-\frac{\pi}{2} < x < \frac{\pi}{2}\right)$
- (b) Find distance between parallel lines $x + 2y - 5 = 0$, $2x + 4y = 1$ also find equation of parallel line which is lying mid way between them.
7. (a) Find the area between the x-axis and the curve $y = \sqrt{2ax - x^2}$; when $a > 0$.
- (b) Minimize $f(x, y) = 2x + y$; subject to the constraints $x + y \geq 3$; $7x + 5y \leq 35$; $x \geq 0$; $y \geq 0$
8. (a) Find a joint equation of the straight lines through the origin perpendicular to the lines represented by $x^2 + xy - 6y^2 = 0$
- (b) Show that the circles $x^2 + y^2 + 2x - 8 = 0$ and $x^2 + y^2 - 6x + 6y - 46 = 0$ touch internally.
9. (a) Find the centre, foci, eccentricity vertices and directrices of the ellipse whose equation is given $25x^2 + 9y^2 = 225$
- (b) The position vectors of the points A, B, C and D are $2\underline{i} - \underline{j} + \underline{k}$, $3\underline{i} + \underline{j}$, $2\underline{i} + 4\underline{j} - 2\underline{k}$ and $-\underline{i} - 2\underline{j} + \underline{k}$ respectively. Show that \overline{AB} is parallel to \overline{CD}