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LHR-02-12-19

Roll No _____ (To be filled in by the candidate)

(Academic Sessions 2015 – 2017 to 2017 – 2019)

MATHEMATICS

219-(INTER PART – II)

Time Allowed : 30 Minutes

Q.PAPER – II (Objective Type)

GROUP – II

Maximum Marks : 20

PAPER CODE = 8198

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	$\frac{d}{dx}(\sqrt{x}) = :$ (A) $\sqrt{x}$ (B) $\frac{1}{\sqrt{x}}$ (C) $\frac{1}{2x}$ (D) $\frac{1}{2\sqrt{x}}$
2	$\int \tan x dx = :$ (A) $\ln \sec x + c$ (B) $\ln \operatorname{cosec} x + c$ (C) $\ln \sin x + c$ (D) $\ln \cot x + c$
3	$\int \frac{e^x}{e^x + 3} dx = :$ (A) $\ln(e^x + 3) + c$ (B) $e^{2x} + c$ (C) $e^0 + c$ (D) $e^{2x} + 3 + c$
4	$\frac{d}{dx}(\cos x^2) = :$ (A) $2x \sin x^2$ (B) $-2x \sin x^2$ (C) $2 \cos x$ (D) $-2 \sin x$
5	If $y = \sin^{-1} \frac{x}{a}$, then $\sin y = :$ (A) $\cos y$ (B) $\cos x$ (C) $\frac{x}{a}$ (D) $\frac{y}{a}$
6	The function $y = 27 + x^2$ is a / an : (A) Constant function (B) Even function (C) Implicit function (D) Explicit function
7	A function $f(x)$ has relative maximum at $x = c$, if $f'(c) = 0$ and : (A) $f''(c) > 0$ (B) $f''(c) < 0$ (C) $f''(c) = 0$ (D) $f'(c) \neq 0$
8	$\int \sec^2 x dx = :$ (A) $\cot x + c$ (B) $\tan x + c$ (C) $2 \sec x + c$ (D) $\frac{1}{\cos^2 x} + c$
9	$\int_{-\pi}^{\pi} \sin x dx = :$ (A) 2π (B) 0 (C) 1 (D) $\cos \pi$

(Turn Over)

LTIR-GR-12-1¹ (2)

1-10	If $f(x) = 2x + 1$, then $f^{-1}(x) = ?$: (A) $2x - 1$ (B) $1 - 2x$ (C) $x - \frac{1}{2}$ (D) $\frac{x - 1}{2}$
11	y-intercept of the line $2x - y - 4 = 0$ is : (A) 2 (B) -2 (C) 4 (D) -4
12	An angle in the semi circle is of measure : (A) 30° (B) 60° (C) 90° (D) 180°
13	The perpendicular distance of a line $5x + 12y = 7$ from origin is : (A) $\frac{1}{13}$ (B) $\frac{13}{7}$ (C) $\frac{7}{13}$ (D) -7
14	Equation of latus-rectum of parabola $y^2 = 4ax$ is : (A) $x = -a$ (B) $y = -a$ (C) $x = a$ (D) $y = a$
15	The mid point of line segment joining A $(-8, 3)$, B $(2, -1)$ is : (A) $(-6, 2)$ (B) $(10, 4)$ (C) $(-3, 1)$ (D) $(-16, -3)$
16	The triple scalar product of vectors, calculates the volume of : (A) Triangle (B) Parallelogram (C) Tetrahedron (D) Parallelepiped
17	The equation of line $\frac{x}{b} + \frac{y}{a} = 1$ is in : (A) Normal form (B) Intercept form (C) Point-slope form (D) Two-points form
18	The radius of circle $x^2 + y^2 = 5$ is : (A) 25 (B) $\sqrt{5}$ (C) 5 (D) $(0, 0)$
19	Non-zero vector $\underline{a}$ and $\underline{b}$ are parallel if $\underline{a} \times \underline{b} =$: (A) 0 (B) 1 (C) -1 (D) (a, b)
20	The solution of the inequality $x + 2y < 6$ is : (A) $(1, 1)$ (B) $(1, 3)$ (C) $(1, 4)$ (D) $(1, 5)$

174-219-II-(Objective Type)- 7625 (8198)

4. Write short answers to any NINE (9) questions :

- Find the coordinates of the point that divides the join of A (- 6 , 3) and B (5 , - 2) internally in ratio 2 : 3.
- Find the slope and inclination of the line joining the points A (- 2 , 4) and B (5 , 11)
- By means of slopes show that points A (- 1 , - 3) , B (1 , 5) and C (2 , 9) are collinear.
- Find equation of the line through (- 4 , 7) and parallel to the line $2x - 7y + 4 = 0$
- Find equation of circle with centre at (5 , - 2) and radius 4.
- Find focus and vertex of the parabola $y^2 = -8(x-3)$
- Find equation of tangent to the parabola $x^2 = 16y$ at the point whose abscissa is 8.
- Find foci and vertices of the ellipse $25x^2 + 9y^2 = 225$
- Find the angle between the vectors $\underline{u} = 2\hat{i} - \hat{j} + \hat{k}$ and $\underline{v} = -\hat{i} + \hat{j}$
- Find scalar α so that the vectors $2\hat{i} + \alpha\hat{j} + 5\hat{k}$ and $3\hat{i} + \hat{j} + \alpha\hat{k}$ are perpendicular.
- If $\underline{v}$ is a vector for which $\underline{v} \cdot \hat{i} = 0$, $\underline{v} \cdot \hat{j} = 0$, $\underline{v} \cdot \hat{k} = 0$ find $\underline{v}$
- Prove that $\underline{a} \times (\underline{b} + \underline{c}) + \underline{b} \times (\underline{c} + \underline{a}) + \underline{c} \times (\underline{a} + \underline{b}) = 0$
- Find the value of α so that $\alpha\hat{i} + \hat{j}$, $\hat{i} + \hat{j} + 3\hat{k}$ and $2\hat{i} + \hat{j} - 2\hat{k}$ are coplanar.

SECTION - II

Note : Attempt any THREE questions.

5. (a) If $f(x) = \begin{cases} 3x & \text{if } x \leq -2 \\ x^2 - 1 & \text{if } -2 < x < 2 \\ 3 & \text{if } x \geq 2 \end{cases}$

discuss continuity at $x = 2$ and $x = -2$

(b) If $y = e^x \sin x$, show that $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0$

6. (a) Integrate $\int \frac{12}{x^3 + 8} dx$

(b) Find equations of two parallel lines, perpendicular to $2x - y + 3 = 0$ such that the product of the x- and y-intercepts of each is 3.

7. (a) Evaluate the definite integral $\int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \frac{\cos x}{\sin x (2 + \sin x)} dx$

(b) Minimize $z = 2x + y$ subject to the constraints $x + y \geq 3$, $7x + 5y \leq 35$, $x \geq 0$, $y \geq 0$

8. (a) Find equation of the line through the point (2 , - 9) and intersection of the lines $2x + 5y - 8 = 0$ $3x - 4y - 6 = 0$

(b) Show that the circles $x^2 + y^2 + 2x - 2y - 7 = 0$ and $x^2 + y^2 - 6x + 4y + 9 = 0$ touch externally.

9. (a) Find an equation of the ellipse having foci (± 5 , 0) and passing through the point $\left(\frac{2}{3} , \sqrt{3} \right)$

(b) A particle acted upon by constant forces $4\hat{i} + \hat{j} - 3\hat{k}$ and $3\hat{i} - \hat{j} - \hat{k}$ is displaced from A (1 , 2 , 3) to B (5 , 4 , 1). Find the work done.