LHR-G1-12-19

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 – I Maximum Marks : 20

PAPER CODE = 8195

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	If $y = e^{2x}$ then $y_2 =$: (A) e^{2x} (B) $2e^{2x}$ (C) $4e^{2x}$ (D) $16e^{2x}$
2	$\int a^x dx =$: (A) $\frac{\ell na}{a^x} + c$ (B) $\frac{a^x}{\ell na} + c$ (C) $\frac{1}{a^x \ell na} + c$ (D) $a^x \ell na + c$
3	$f(x) = ax + b, a \neq 0$ is : (A) Trigonometric function (B) Linear function (C) Cubic function (D) Quadratic function
4	$\int_0^{\frac{\pi}{2}} \cos x \, dx =$: (A) $\frac{\pi}{2}$ (B) 0 (C) -1 (D) 1
5	$\lim_{n \to +\infty} \left(1 + \frac{1}{n}\right)^{\frac{n}{2}} =$: (A) e^{-1} (B) e^2 (C) $e^{\frac{1}{2}}$ (D) e^3
6	Differential of y is denoted by : (A) $\frac{dy}{dx}$ (B) dy (C) dx (D) dy'
7	If $f(x) = \cos x$ then $f'(\pi) =$: (A) 1 (B) 0 (C) -1 (D) 2
8	The value of $\frac{dy}{dx} = \frac{-2}{x^3}$ at $x = -1$ is : (A) 4 (B) 5 (C) -2 (D) 2
9	Order of the differential equation $\frac{x d^2y}{dx^2} + \frac{dy}{dx} - 2x = 0$ is : (A) 1 (B) 2 (C) 3 (D) 4

(Turn Over)

Roll No LHR-G1-12-19 (To be filled in by the candidate)

(Academic Sessions 2015 – 2017 to 2017 – 2019)

MATHEMATICS 219-(INTER PART – II) Time Allowed : 2.30 hours

PAPER – II (Essay Type) GROUP – I Maximum Marks : 80

SECTION – I

2. Write short answers to any EIGHT (8) questions : **16**

(i) Define explicit function.

(ii) Determine whether the function $f(x)=x\sqrt{x^2+5}$ is even or odd.

(iii) Prove that $\lim\limits_{x\to 0}\dfrac{\sqrt{x+a}-\sqrt{a}}{x}=\dfrac{1}{2\sqrt{a}}$

(iv) If $y=\sqrt{x}-\dfrac{1}{\sqrt{x}}$, find $\dfrac{dy}{dx}$

(v) Find $\dfrac{dy}{dx}$ if $x^2+y^2=4$

(vi) Prove that $\dfrac{d}{dx}(\tan^{-1}x)=\dfrac{1}{1+x^2}$

(vii) Differentiate $\sin^{-1}\sqrt{1-x^2}$ *w.r.t.* 'x'

(viii) Differentiate $y=a^{\sqrt{x}}$

(ix) Prove that $\dfrac{d}{dx}(\cosh x)=\sinh x$

(x) Find $\dfrac{dy}{dx}$ *if* $y=(x+1)^x$

(xi) Define decreasing function. Give an example.

(xii) Determine $f(x)=\cos x$ is increasing or decreasing in the interval $(\dfrac{\pi}{2},\pi)$

3. Write short answers to any EIGHT (8) questions : **16**

(i) What is differential coefficient?

(ii) Evaluate $\int\dfrac{e^{2x}+e^x}{e^x}\,dx$

(iii) Integrate by substitution $\int\dfrac{-2x}{\sqrt{4-x^2}}\,dx$

(iv) Find the integral $\int\dfrac{\cos x}{\sin x\,\ell n(\sin x)}\,dx$

(v) Evaluate integral by parts $\int x.\sin x\,dx$

(vi) Find indefinite integral $\int a^{ax}\left[a\sec^{-1}x+\dfrac{1}{x\sqrt{x^2-1}}\right]dx$

(vii) Evaluate $\int\dfrac{5x+8}{(x+3)(2x-1)}\,dx$ using partial fraction.

(viii) Define definite integral.

(ix) Calculate the integral $\int_0^{\frac{\pi}{4}}\sec x(\sec x+\tan x)\,dx$

(x) If $\int_{-2}^{1}f(x)dx=5$, $\int_{-2}^{1}g(x)dx=4$, then evaluate $\int_{-2}^{1}[3f(x)-2g(x)]\,dx$

(Turn Over)

3. (xi) If a non-vertical line divides a plane into two, then write the name that two planes?

(xii) Graph the inequality $x+3y>6$

4. Write short answers to any NINE (9) questions : **18**

(i) Find coordinates of the point that divide the join of A (– 6 , 3) and B (5 , – 2) in the ratio 2 : 3 internally.

(ii) Show that the triangle with vertices A (1 , 1) , B (4 , 5) and C (12 , – 5) is right triangle.

(iii) Find an equation of the line through (– 4 , – 6) and perpendicular to the line having slope $\frac{-3}{2}$.

(iv) Define trapezium.

(v) Define parabola.

(vi) Check the position of the point (5, 6) with respect to the circle $2x^2+2y^2+12x-8y+1=0$

(vii) Find eccentricity of the ellipse $x^2+4y^2=16$

(viii) Find an equation of hyperbola if its foci (0 , ± 9) and directrices y = ± 4

(ix) If $\overrightarrow{AB}=\overrightarrow{CD}$, find coordinates of point A. If B, C, D are (1 , 2) , (– 2 , 5) , (4 , 11)

(x) Write direction cosine of $\overrightarrow{PQ}$, if P (2 , 1 , 5) Q (1 , 3 , 1).

(xi) Show that vectors $3\underline{i}-2\underline{j}+\underline{k}$, $\underline{i}-3\underline{j}+5\underline{k}$ and $2\underline{i}+\underline{j}-4\underline{k}$ form a right triangle.

(xii) Find unit vector perpendicular to the plane of $\underline{a}$ and $\underline{b}$ if $\underline{a}=-\underline{i}-\underline{j}-\underline{k}$, $\underline{b}=2\underline{i}-3\underline{j}+4\underline{k}$.

(xiii) A force $\underline{F}=7\underline{i}+4\underline{j}-3\underline{k}$ is applied at P (1 , – 2 , 3). Find its moment about the point Q (2 , 1 , 1)

SECTION – II

Note : Attempt any THREE questions.

5. (a) Find the values of 'm' and 'n' so that $f(x)=\begin{cases} mx & \text{if } x<3 \\ n & \text{if } x=3 \\ -2x+9 & \text{if } x>3 \end{cases}$ is continuous at $x=3$ 5

(b) If $y=e^x.\sin x$, then prove that $\frac{d^2y}{dx^2}-2\frac{dy}{dx}+2y=0$ 5

6. (a) Evaluate $\int\frac{\sqrt{2}}{\sin x+\cos x}dx$ 5

(b) Find an equation of the perpendicular bisector of the segment joining the points A (3 , 5) and B (9 , 8) 5

7. (a) Solve the differential equation $\left(x^2-yx^2\right)\frac{dy}{dx}+y^2+xy^2=0$ 5

(b) Graph the solution region of the following system of linear inequalities and find the corner points : $x+y\le 5$, $-2x+y\le 2$, $y\ge 0$ 5

8. (a) Find the lines represented by each of the following and also find measure of the angle between the m $x^2+2xy\sec\alpha+y^2=0$ 5

(b) Find the coordinates of the points of intersection of the line $2x+y+5=0$ and the circle $x^2+y^2+2x-9=0$. Also find the length of intercepted chord. 5

9. (a) Find equation of parabola with elements directrix : $x=-2$, focus $(2,2)$ 5

(b) Prove that $\sin(\alpha-\beta)=\sin\alpha.\cos\beta-\cos\alpha\sin\beta$ by method of vectors. 5

LHR-G2-12-19

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) $\ell n\lvert\sec x\rvert + c$ (B) $\ell n\lvert\operatorname{cosec} x\rvert + c$ (C) $\ell n\lvert\sin x\rvert + c$ (D) $\ell n\lvert\cot x\rvert + c$
3	$\int \frac{e^x}{e^x+3} dx =$: (A) $\ell n(e^x+3)+c$ (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)

LHR-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) $(1,5)$

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

(i) Find the coordinates of the point that divides the join of A (– 6 , 3) and B (5 , – 2) internally in ratio 2 : 3.

(ii) Find the slope and inclination of the line joining the points A (– 2 , 4) and B (5 , 11)

(iii) By means of slopes show that points A (– 1 , – 3) , B (1 , 5) and C (2 , 9) are collinear.

(iv) Find equation of the line through (– 4 , 7) and parallel to the line $2x - 7y + 4 = 0$

(v) Find equation of circle with centre at (5 , – 2) and radius 4.

(vi) Find focus and vertex of the parabola $y^2 = -8(x-3)$

(vii) Find equation of tangent to the parabola $x^2 = 16y$ at the point whose abscissa is 8.

(viii) Find foci and vertices of the ellipse $25x^2 + 9y^2 = 225$

(ix) Find the angle between the vectors $\underline{u} = 2\underline{i} - \underline{j} + \underline{k}$ and $\underline{v} = -\underline{i} + \underline{j}$

(x) Find scalar α so that the vectors $2\underline{i} + \alpha\underline{j} + 5\underline{k}$ and $3\underline{i} + \underline{j} + \alpha\underline{k}$ are perpendicular.

(xi) If $\underline{v}$ is a vector for which $\underline{v}.\underline{i} = 0$, $\underline{v}.\underline{j} = 0$, $\underline{v}.\underline{k} = 0$ find $\underline{v}$

(xii) Prove that $\underline{a} \times (\underline{b} + \underline{c}) + \underline{b} \times (\underline{c} + \underline{a}) + \underline{c} \times (\underline{a} + \underline{b}) = 0$

(xiii) Find the value of α so that $\alpha\underline{i} + \underline{j}$, $\underline{i} + \underline{j} + 3\underline{k}$ *and* $2\underline{i} + \underline{j} - 2\underline{k}$ are coplanar.

SECTION – II

Note : Attempt any THREE questions.

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

discuss continuity at $x = 2$ and $x = -2$ 5

(b) If $y = e^x \sin x$, show that $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0$ 5

6. (a) Integrate $\int \frac{12}{x^3 + 8} dx$ 5

(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. 5

7. (a) Evaluate the definite integral $\int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \frac{\cos x}{\sin x (2 + \sin x)} dx$ 5

(b) Minimize $z = 2x + y$ subject to the constraints

$x + y \ge 3$, $7x + 5y \le 35$, $x \ge 0$, $y \ge 0$ 5

8. (a) Find equation of the line through the point (2 , – 9)and intersection of the lines

$2x + 5y - 8 = 0$

$3x - 4y - 6 = 0$ 5

(b) Show that the circles $x^2 + y^2 + 2x - 2y - 7 = 0$ and $x^2 + y^2 - 6x + 4y + 9 = 0$ touch externally. 5

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

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