Roll No LHR-G1-12-18 (To be filled in by the candidate)

(Academic Sessions 2014 – 2016 to 2016 – 2018)

MATHEMATICS 218-(INTER PART – II) Time Allowed : 30 Minutes

Q.PAPER – II (Objective Type) GROUP – I Maximum Marks : 20

PAPER CODE = 8197

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 $y = \sqrt{1-x^2}$, $0 < x < 1$ *then* $\frac{dy}{dx} =$: (A) $\sqrt{x^2-1}$ (B) $\frac{1}{\sqrt{1-x^2}}$ (C) $\frac{x}{\sqrt{1-x^2}}$ (D) $\frac{-x}{\sqrt{1-x^2}}$
2	$\int 3^x dx =$: (A) $3^x + c$ (B) $3^x \ell n\, 3 + c$ (C) $\frac{3^x}{\ell n\, 3} + c$ (D) $3\, \ell n\, 3^x + c$
3	$\int_0^{\frac{\pi}{2}} \cos x\, dx =$: (A) 0 (B) 1 (C) 2 (D) 3
4	If $f(x)$ has second derivative at " c " such that $f'(c) = 0$ *and* $f''(c) < 0$ then " c " is a point of : (A) Maxima (B) Minima (C) Zero point (D) Point of inflection
5	If $y = e^{\sin x}$, then $\frac{dy}{dx} =$: (A) $e^{\sin x}$ (B) $e^{\sin x} \cos x$ (C) $e^{\sin x} + \cos x$ (D) $-e^{\sin x} \cos x$
6	$\cosh^2 x - \sinh^2 x =$: (A) 1 (B) -1 (C) 0 (D) 2
7	$\frac{d}{dx} \sin^{-1} x =$: (A) $\frac{1}{\sqrt{1+x^2}}$ (B) $\cos^{-1} x$ (C) $\frac{1}{\sqrt{1-x^2}}$ (D) $\frac{1}{\sqrt{1-x}}$
8	$\int \frac{1}{f(x)} \times f'(x)\, dx =$: (A) $\ell nx + c$ (B) $\ell n[f'(x) + c]$ (C) $\frac{1}{f(x)} + c$ (D) $\ell n\lvert f(x)\rvert + c$
9	The order of the differential equation $\frac{d^2y}{dx^2} - \frac{dy}{dx} + 2x = 0$ is : (A) 2 (B) 1 (C) 0 (D) 3

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L-HR-G1-12-19 (2)

1-10	Let $f(x) = x^2 + \cos x$, *then* $f(x)$ *is* : (A) Odd function (B) Constant function (C) Even function (D) Neither even nor odd
11	The centroid of a triangle divides each median in ratio : (A) 2 : 1 (B) 1 : 2 (C) 2 : 3 (D) 1 : 1
12	The straight line $y = mx + c$ is tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ if : (A) $c^2 = a^2 m^2 - b^2$ (B) $c^2 = b^2 m^2 + a^2$ (C) $c^2 = b^2 m^2 - a^2$ (D) $c^2 = a^2 m^2 + b^2$
13	The perpendicular distance of line $3x + 4y - 10 = 0$ from the origin is : (A) 0 (B) 1 (C) $\frac{1}{2}$ (D) 2
14	Axis of the parabola $x^2 = 4ay$ is : (A) $y = 0$ (B) $x = 0$ (C) $x = y$ (D) $x = 1$
15	If α is the inclination of the line ℓ then $\frac{x - x_1}{\cos\alpha} = \frac{y - y_1}{\sin\alpha} = r$ (say) is called : (A) Point slope form (B) Normal form (C) Symmetric form (D) Intercept form
16	The direction cosines of y-axis are : (A) (0, 1, 0) (B) (1, 0, 0) (C) (0, 0, 1) (D) (0, 0, 0)
17	If α is the inclination of a line "ℓ" then it must be true that : (A) $0 \le \alpha < \frac{\pi}{2}$ (B) $\frac{\pi}{2} \le \alpha < \pi$ (C) $0 \le \alpha < \pi$ (D) $0 \le \alpha < 2\pi$
18	The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents a circle with centre : (A) $(-g, -f)$ (B) $(-f, +g)$ (C) (f, g) (D) (0, 0)
19	Length of the vector $2\underline{i} - \underline{j} - 2\underline{k}$ is : (A) 2 (B) 4 (C) 3 (D) 5
20	The feasible solution which maximizes or minimizes the objective function is called : (A) Exact solution (B) Optimal solution (C) Final solution (D) Objective solution

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

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MATHEMATICS 218-(INTER PART – II) Time Allowed : 2.30 hours

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

SECTION – I

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

(i) State sandwitch theorem.

(ii) Express the area " A " of a circle as a function of its circumference " C ".

(iii) If $f(x) = \begin{cases} x+2 & , x \le -1 \\ c+2 & , x > -1 \end{cases}$, find " c " so that $\lim_{x \to -1} f(x)$ exists

(iv) Define differentiation.

(v) Differentiate $\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2$ *w.r.t* x

(vi) Find $\frac{dy}{dx}$ if $xy + y^2 = 0$

(vii) Find $\frac{dy}{dx}$ if $y = x \cos y$

(viii) Prove that $\frac{d}{dx}(\cos^{-1} x) = \frac{-1}{\sqrt{1-x^2}}$, $x \in (-1,1)$

(ix) Find $\frac{dy}{dx}$ if $y = x e^{\sin x}$

(x) Define power series.

(xi) Find extreme values for $f(x) = x^2 - x - 2$

(xii) Find $\frac{dy}{dx}$ if $y = \sin h^{-1}\left(\frac{x}{2}\right)$

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

(i) Find $\frac{dy}{dx}$ using differentials if $xy - \log_e x = c$

(ii) Evaluate the integral $\int \frac{x}{x+2} . dx$

(iii) Evaluate the integral $\int \frac{1}{a^2 - x^2} . dx$

(iv) Evaluate the integral $\int x \sin x \cos x \, dx$

(v) Evaluate the integral $\int x^2 e^{ax} . dx$

(vi) Evaluate the integral $\int e^{3x} \left(\frac{3\sin x - \cos x}{\sin^2 x}\right) dx$

(vii) Prove that $\int_a^b f(x).dx = -\int_a^b f(x).dx$

(viii) Evaluate the definite integral $\int_0^3 \frac{dx}{x^2 + 9}$

(ix) Find the area bounded by cos function from $x = -\frac{\pi}{2}$ to $x = \frac{\pi}{2}$

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(Turn Over)

3. (x) Solve the differential equation $\sin y \operatorname{cosec} x \frac{dy}{dx} = 1$

(xi) Define optimal solution and feasible solution.

(xii) Graph the region indicated by $4x - 3y \leq 12$, $x \geq -\frac{3}{2}$

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

(i) Show that the points A (3 , 1) , B (– 2 , – 3) and C (2 , 2) are vertices of an isosceles triangle.

(ii) Find an equation of a line through the points (– 2 , 1) and (6 , – 4)

(iii) Find an equation of the line bisecting the first and third quadrants.

(iv) Find an equation of the line with x-intercept : – 3 and y – intercept : 4

(v) Convert $2x - 4y + 11 = 0$ into slope intercept form.

(vi) Write an equation of the parabola with focus (– 1 , 0) , vertex (– 1 , 2)

(vii) Find the focus and directrix of the parabola $y = 6x^2 - 1$

(viii) Find an equation of the ellipse with centre (0 , 0) , focus (0 , – 3) , vertex (0 , 4)

(ix) Find the eccentricity and directrices of the ellipse whose equation is $25x^2 + 9y^2 = 225$

(x) Define unit vector.

(xi) Find a unit vector in the direction of the vector $\underline{v} = \frac{1}{2}\underline{i} + \frac{\sqrt{3}}{2}\underline{j}$

(xii) Find a vector whose magnitude is '4' and is parallel to $2\underline{i} - 3\underline{j} + 6\underline{k}$

(xiii) Find a 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.

SECTION – II

Note : Attempt any THREE questions.

5. (a) If $f(x) = \begin{cases} \dfrac{\sqrt{2x+5} - \sqrt{x+7}}{x-2} , & x \neq 2 \\ k , & x = 2 \end{cases}$ 5

Find value of k so that f is continuous at $x = 2$

(b) Show that $y = x^x$ has maximum value at $x = \frac{1}{e}$ 5

6. (a) Evaluate $\int e^{2x} \cos 3x \, dx$ 5

(b) The three points A (7 , – 1) , B (– 2 , 2) and C (1 , 4) are consecutive vertices of a parallelogram, find the fourth vertex. 5

7. (a) Find the area bounded by the curve $y = x^3 - 4x$ and x-axis. 5

(b) Minimize $z = 2x + y$ subject to the constraints 5

$x + y \geq 3$, $7x + 5y \leq 35$, $x \geq 0$, $y \geq 0$

8. (a) Find the condition that the line $y = mx + c$ touches the circle $x^2 + y^2 = a^2$ at a single point. 5

(b) Find x so that points A (1 , – 1 , 0) , B (– 2 , 2 , 1) and C (0 , 2 , x) form triangle with right angle at C. 5

9. (a) Find the centre, foci, eccentricity, vertices and equations of directices of $\frac{y^2}{4} - x^2 = 1$ 5

(b) Find volume of the tetrahedron with the vertices A (2, 1, 8) , B (3, 2, 9) , C (2, 1, 4) and D (3, 3, 10) 5

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