Roll No _____ (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 $\lim_{x\to 0} \frac{\sqrt{x+a}-\sqrt{a}}{x} = \frac{1}{2\sqrt{a}}$

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

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

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

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

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

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

(x) Find $\frac{dy}{dx}$ *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 $(\frac{\pi}{2}, \pi)$

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

(i) What is differential coefficient?

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

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

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

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

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

(vii) Evaluate $\int \frac{5x+8}{(x+3)(2x-1)}\,dx$ 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 $\int_{-2}^{1} [3f(x) - 2g(x)]\,dx$

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