13150

Mathematics Time: 30 Minutes

## (INTER PART II)-419-(IV) <u>Code: 8198</u>

PAPER: II

GROUP:II Marks: 20

OBJECTIVE

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. Use marker or pen to fill the circles. Cutting or filling of two or more circles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank.

1- 1- The centre of the circle  $x^2 + y^2 - 6x + 4y + 13 = 0$  is

- (A) (3, 2)
- (B) (3, -2)
- (C) (2, 3)
- (D) (-2, -3)

2- If  $\alpha$ ,  $\beta$ ,  $\gamma$  be the direction angles of a vector then  $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma =$ 

- (A) 2
- (B) 0

(C) -1

(D) 1

3- The perpendicular distance of the line 12x + 5y = 7 from the origin is

- (A)  $\frac{7}{13}$
- (B)  $\frac{13}{7}$
- (C) 13

(D)  $\frac{1}{13}$ 

4- \int \tan^2 x dx is equal to

- (A)  $\tan x + x + c$
- (B)  $\tan x x + c$
- (C)  $2 \tan x + c$
- (D)  $2 \tan x + x + c$

 $\int \cot x \, dx =$ 

- (A)  $\csc^2 x + c$
- (B)  $-\csc^2 x + c$
- (C)  $\ln \sin x + c$
- (D) ln cos x + c

6- If  $y = \frac{1}{x^2}$  then  $\frac{dy}{dx}$  at x = -1

- · (A) 3
- (B)  $\frac{1}{3}$
- (C)
- (D)  $\frac{1}{2}$

7- If  $f(x) = \frac{1}{x^2}$  (x \neq 0), then fof (x) is

- (A) x4
- (B)  $x^2$
- (C)
- (D)  $\frac{1}{x^4}$

8- Angle between the vectors 4i+2j-k and -i+j-2k is

- (A) 30°
- (B) 45
- (C) 90°
- (D) 60°

9- (1, 0) is the solution of the inequality

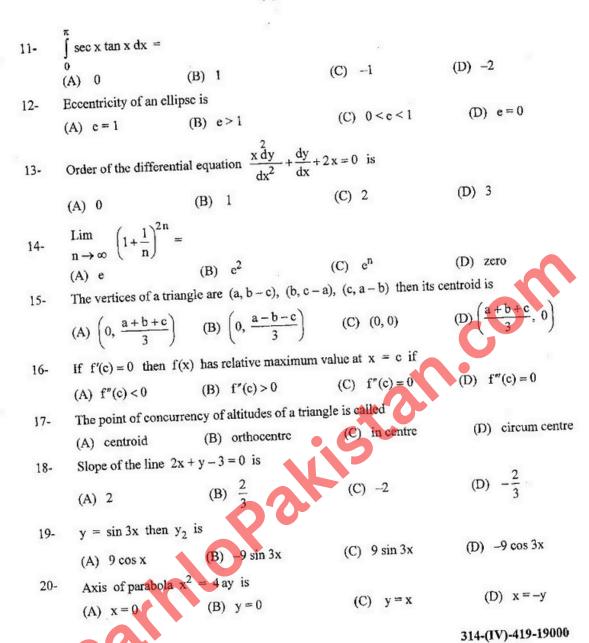
- (A) 7x + 2y < 8
- (B) x = 3y < 1
- (C) 10x + 5y < 6
- (D) -3x + 5y > 2

10-  $\frac{d}{dx} (\ell n 2x)$ 

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

(Turn over)

Cry-6-12-19



F-1

Cny-12-G2-19

CROUP:H Marks: 80

### SUBJECTIVE

Note: Section I is compulsory. Attempt any three (3) questions from Section II.

### SECTION I

Write short answers to any EIGHT questions:

i- Define implicit function.

ii- If 
$$f(x) = 2x + 1$$
 and  $g(x) = \frac{3}{x-1}$ ,  $x \ne 1$ , find  $f(x) = \frac{3}{x-1}$ .

iii- Evaluate 
$$\lim_{x \to -1} \frac{x^3 - x}{x+1}$$
 by using algebraic technique.

iv- Find 
$$\frac{dy}{dx}$$
 if  $y = (x-5)(3-x)$ 

v- Find 
$$\frac{dy}{dx}$$
 if  $xy + y^2 = 2$ 

vi- Differentiate sin x w. r. t. cot x

vii- Find 
$$\frac{dy}{dx}$$
 if  $y = \frac{x}{\ell nx}$   
viii- Define the stationary point.

ix- Find 
$$\frac{dy}{dx}$$
 if  $y = e^{-2x} \sin 2x$ 

x- Differentiate 
$$\cot^{-1} \frac{x}{a}$$
 w. r. t x

xi- Find 
$$y_2$$
 if  $y = \sqrt{x} + \frac{1}{\sqrt{x}}$ 

xii- Find the extreme values for 
$$f(x) = 5x^2 - 6x + 2$$

# Write short answers to any EIGHT questions:

i- Using differentials find 
$$\frac{dx}{dy}$$
 if  $x^2 + 2y^2 = 16$ 

ii- Define first order differential equation.

iv- Evaluate 
$$\int \frac{\sqrt{2}}{\sin x + \cos x} dx$$

v- Evaluate 
$$\int \sin^{-1} x \, dx$$

vi- Evaluate 
$$\int \frac{e^x(1+x)}{(2+x)^2} dx$$

vii- Evaluate 
$$\int_{\underline{\pi}}^{3} \cos t \, dt$$

viii- Find the area between x-axis and curve 
$$y = \sin 2x$$
 from  $x = 0$  to  $x = \frac{\pi}{3}$ 

ix- Solve the differential equation 
$$\frac{x^2+1}{y+1} = \frac{x}{y} \frac{dy}{dx}$$
  $(x,y>0)$ 

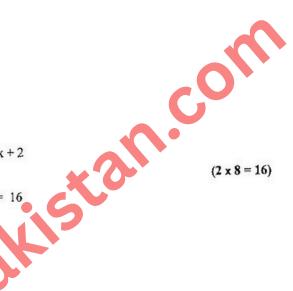
x- Evaluate 
$$\int x^2 \ell n x dx$$

xii- Graph the solution set of linear inequality 
$$3y-4 \le 0$$
 in xy-plane.

Guy - 12 - G2-19

(Turn over)

 $(2 \times 8 = 16)$ 





الو شمانوالم

## 4. Write short answers to any NINE questions:

 $(2 \times 9 = 18)$ 

- i- Find the point that divides the join of A(-6, 3) and B(5, -2) in the ratio 2:3 internally.
- ii- A point P(5, 3) is in xy-coordinates system. Axes are rotated through angle  $45^{\circ}$ . Find the new point P(X, Y)
- iii- Find an equation of line passing through (2, 3), having slope -1.
- iv- Find the point of intersection of the lines x + 4y 12 = 0 and x 3y + 3 = 0
- v- Find the centre and radius of the circle  $4x^2 + 4y^2 8x + 12y 25 = 0$
- vi- Determine the length of tangent drawn from point (-5, 4) to the circle  $5x^2 + 5y^2 10x + 15y 131 = 0$
- vii- Find the focus and directrix of the parabola  $x^2 = 4 (y 1)$
- viii- Find the centre and eccentricity of the ellipse  $\frac{(2x-1)^2}{16} + \frac{(y+2)^2}{16} = 1$
- ix- Define scalar product of two vectors.
- x- Find a vector of length 5 in the direction opposite to that of  $\underline{\mathbf{y}} = \hat{\mathbf{i}} 2\hat{\mathbf{j}} + 3\hat{\mathbf{k}}$
- xi- Find a vector perpendicular to the plane containing vectors  $\underline{\mathbf{a}} = 2\hat{\mathbf{i}} 6\hat{\mathbf{j}} 3\hat{\mathbf{k}}$ ,  $\underline{\mathbf{b}} = 4\hat{\mathbf{i}} + 3\hat{\mathbf{j}} \hat{\mathbf{k}}$
- xii. A force  $\underline{F} = 2\hat{i} + \hat{j} 3\hat{k}$  is acting at a point A(1, -2, 1). Find the moment of  $\underline{F}$  about point B(2, 0, -2)
- xiii- What are direction angles of a vector?

#### SECTION II

- 5- (a) If  $f(x) = \begin{cases} \frac{\sqrt{2x+5} \sqrt{x+7}}{x-2} & \text{, } x \neq 2 \\ K & \text{, } x = 2 \end{cases}$  Find value of K so that f(x) is continuous at x = 2
  - **(b)** Find  $\frac{dy}{dx}$  if  $y = \frac{\sqrt{a+x} + \sqrt{a-x}}{\sqrt{a+x} \sqrt{a-x}}$ ,  $x \neq 0$
- 6- (a) Evaluate  $\int \frac{1+4x}{(x-3)(x^2+4)} dx$  5
  - (b) If (4, -2), (-2, 4) and (5, 5) are vertices of a triangle, find the co-ordinates of its 'Incentre'.
- 7- (a) Evaluate  $\int_{0}^{\frac{\pi}{4}} \frac{\cos\theta + \sin\theta}{2\cos^2\theta} d\theta$ 
  - (b) Graph the solution region and find the corner points of  $3x + 2y \ge 6$ ;  $x + y \le 4$ ;  $x \ge 0$ ,  $y \ge 0$
- 8- (a) Show that the line 2x + 3y 13 = 0 is tangent to the circle  $x^2 + y^2 + 6x 4y = 0$  5
  - (b) Prove that the angle in a semi-circle is a right angle.
- 9- (a) Show that an equation of parabola with focus at  $(a\cos\alpha, a\sin\alpha)$  and directrix at  $x\cos\alpha + y\sin\alpha + a = 0$  is  $(x\sin\alpha y\cos\alpha)^2 = 4a(x\cos\alpha + y\sin\alpha)$ 
  - (b) Find the volume of the tetrahydron whose vertices are A(2, 1, 8), B(3, 2, 9), C(2, 1, 4), D(3, 3, 10)

    314-419-19000

Gruy - 12 - G2 - 19