

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Best of Luck

1. Find  $\frac{dy}{dx}$  if  $x^2 + y^2 - xy - 2x + 5y - 6 = 0$  at  $(1, 2)$  [5 marks]

2. (a) Find the equation of tangent & normal to the curve  $15x^3 + 5x^2y + y^3 = 1$  at  $(1, -2)$ . [5 marks]
- (b) Find the equation of tangent and normal to the ellipse  $9x^2 + 5y^2 = 40$  at the point  $(1, 2)$ . [5 marks]

3. Attempt any TWO of the following:

[12 marks]

- (a) Find the area enclosed by the curve  $y^2 = x$  and the line  $x = 4$ .
- (b) In a potentiometer circuit  $R$  is given by  $R = \frac{1}{x} - \frac{1}{x-a}$  where  $a$  is constant. Find the value of  $x$  for which  $R$  is minimum. Also find minimum value of  $R$ .
- (c) An electrical circuit containing an inductance  $L$  henries, resistance  $R$  in series with an electromotive force  $E \sin \omega t$  satisfies the equation  $L \frac{di}{dt} + Ri = E \sin \omega t$ . Find the value of the current at any time  $t$ , if initially there is no current.

4. Attempt any Four of the Following.

[16 marks]

- Evaluate:  $\int \frac{dx}{4x^2 + 6x + 4}$
- Evaluate:  $\int \frac{dx}{10 - \cos x}$
- Evaluate:  $\int x \cdot \tan^{-1}(x) dx$
- Evaluate:  $\int \frac{dx}{\cos^2 x (1 - \tan x)(4 + \tan x)}$
- Evaluate:  $\int_{\pi/6}^{\pi/3} \frac{dx}{1 + \sqrt[n]{\cot x}} dx$

## ADDITIONAL ANSWER SHEET