

### Section-B

**Note:** Solve any SIX of the following questions. Each question carries 05 marks:

- Q.2 Find the limit of  $\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{1 - \cos 3x}$
- Q.3 If  $f(x) = (\tan^{-1} x)^{\cos x + \sin x}$  find  $f(x)$ .
- Q.4 Find the equation of a line through the intersection of the lines  $5x - 6y = 1$ ,  $3x + 2y + 5 = 0$  and perpendicular to  $5y - 3x - 11 = 0$
- Q.5 Find the extreme value of the function  $f$  given by  $f(x) = x(x-1)(x-2)$  for all  $x \in \mathbb{R}$ .
- Q.6 Evaluate  $\int \frac{3x+2}{x-1} dx$
- Q.7 Find the equation of the circle having  $(-5, 6)$  and  $(3, -4)$  the end points of a diameter.
- Q.8 Find the equation of the tangent and normal to the hyperbola  $2x^2 - 3y^2 = 1$  and at the point  $(\sqrt{2}, 1)$
- Q.9 The  $x$ -intercept of a line is the reciprocal of its  $y$ -intercept, The line passes through  $(2, -1)$ . Find its equation.
- Q.10 If a function, given by  $y = f(x)$ ,  $\sqrt{x^2 + y^2} = \ln(x^2 - y^2)$  find  $dy/dx$ , where if exist.

### Section-C

**Note:** Solve any TWO of the following question.

- Q.11 (a) If  $y = \tan 2x$ , find  $dy/dx$  from definition.  
(b) Evaluate  $[2i + 3j - l, 3k, j]$
- Q.12 (a) The measure of the angle form a line  $l_1$  with slope  $-1/2$  to a line  $l_2$  is  $3\pi/4$ . Find the slope of  $l_2$ .  
(b) Find  $\int x^2 e^x dx$ ,
- Q.13 (a) If  $y = f(x) = ae^x - be^{2x} + ce^{3x}$  for all  $x \in \mathbb{R}$  wher  $a, b, c \in \mathbb{R}$ , show that  
$$\frac{d^2 y}{dx^2} - 6 \frac{dy}{dx} + 11y = 0$$
  
(b) Find  $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2 - 4}}{(x^2 + 1)^{1/3}}$