

Note: Time allowed for Section-B and Section-C is 2 Hours and 40 minutes.

SECTION-B

Q2: Answer any TEN parts. Each part carries FIVE marks.

- 1) Find the inverse function of $f(x) = \frac{3x+1}{5}$
- 2) Evaluate $\lim_{\theta \rightarrow 0} \frac{\tan \theta - \sin \theta}{\sin^3 \theta}$
- 3) Use first principal rule to determine the derivative of $f(x) = 5x^2 - 3x$?
- 4) Find $\frac{dy}{dx}$ by using any suitable rule of differentiation $y = x^2 e^{\sin(x)}$
- 5) If $f(x) = \ln(4x+7)$, find $f^{iv}(x)$.
- 6) Evaluate $\lim_{x \rightarrow 0} \left[\frac{\sin(3t)}{3t} \hat{i} + \ln(2+t) \hat{j} \right]$

7) Find the Maclaurin series expansion for the function $f(x) = \sin^2 x$.

8) Evaluate $\int x^2 \cos x dx$

9) Use the integration by parts to evaluate $\int x^2 \cos x dx$

10) Find the centroid of the triangle ABC whose vertices are A(3,5), B(4,6) and C(3,-1).

11) Find the equation of parabola with vertex (-3,4) and passes through (5,11) and its line of symmetry is horizontal.

12) If $f(x,y) = x^2y + xy^2$, then find f_x and f_y .

13) Solve the initial value problem $\frac{dy}{dx} = \frac{1}{x^2}, y(2) = 0$

SECTION-C

Note: Attempt any THREE questions. All questions carry equal marks.

Q3: (a) Find $\frac{dy}{dx}$ if $y = \left(\frac{2x-5}{x-4} \right)^4$

(b) Find the angle θ from the line $2x+4y-10=0$ to the line $5x-3y+1=0$

Q4: (a) Find the equation of tangent to the circle $x^2+y^2=9$ which makes an angle of 60° with x-axis?

(b) Find the critical value of $f(x) = \frac{x^2}{x-2}$

Q5: (a) Find the $\int_{\frac{\pi}{2}}^{\pi} \cos\left(\frac{x}{2} + \pi\right) dx$

(b) Find an equation of a circle which passes through the points (1,2), (3,-4) and (5,-6).

Q6: (a) Solve the differential equation $x \frac{dy}{dx} = x + y$

(b) Find the equation of hyperbola with vertices are at (5,0) and (-5,0) and one focus at (-7,0).