Date: 06/05/2022
Exam: P1SEM2

Time: 60 Min
Max Marks: 30

SECTION –A (20 M)

Choose the correct answer from the given options for each question given below and each carries 2 marks.

1. $\lim_{x\to 4} \frac{x^3-4x^2-x+4}{x^2-3x-4} =$

   A. -3 B. -4 C. 3 D. 4

2. $\lim_{x\to 0} \frac{\sqrt{1+x}-1}{x} =$

   A. $\frac{1}{2}$ B. 0 C. 1 D. 2

3. $\lim_{x\to 0} \frac{3sinx-sin3x}{x^3} =$

   A. -4 B. 4 C. 1 D. 0

4. $\lim_{x\to \infty} \left(x-\sqrt{x^2+x}\right) =$

   A. $-\frac{1}{2}$ B. $\frac{1}{2}$ C. 0 D. 1

5. $\lim_{x\to 0} \frac{(1-e^x)sinx}{x^2+x^3} =$

   A. -1 B. 0 C. 1 D. 2

6. If $f: \boldsymbol{R} \longrightarrow \boldsymbol{R}$ defined by

$$f(x) = \begin{cases} \frac{1+3x^2-cos2x}{x^2}, & x \neq 0 \\ k & x = 0 \end{cases}$$

Is continuous at $x = 0$, then $k =$

A. 0 B. 1 C. 5 D. 4

7. If $x = a(cos\theta + \theta sin\theta), y = a(sin\theta - \theta cos\theta)$ then $\frac{dy}{dx} =$

A. $tan\left(\frac{\theta}{2}\right)$ B. $cot\left(\frac{\theta}{2}\right)$ C. $cot\theta$ D. $tan\,\theta$

8. If $y = tan^3(5x - 3)$ then $\frac{dy}{dx} =$

A. $3\,tan^2(5x-3)\,sec^2(5x-3)$ B. $15\,tan^2(5x-3)\,sec^2(5x-3)$

C. $5\,tan^2(5x-3)\,sec^2(5x-3)$ D. $15\,tan^2(5x-3)\,sec(5x-3)$

9. If $y = 1 + xe^y$ then $\frac{dy}{dx} =$

A. $\frac{e^y}{1+e^y}$ B. $\frac{1+xe^y}{e^y}$ C. $\frac{e^y}{1+xe^y}$ D. $\frac{e^y}{1-xe^y}$

10. The derivative of $sin^{-1}(3x - 4x^3)$ with respect to $Tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$ is

A. 0 B. 3 C. 2 D. 1

Section B $(2 \times 5 = 10\ M)$

Answer any *TWO* of the following questions

11. If $y = x^{tanx} + (sinx)^{cosx}$ then find $\frac{dy}{dx}$.

12. If $y = ae^{-bx}cos(cx + d)$then prove that $y'' + 2by' + (b^2 + c^2)y = 0$

13. If $y = \sqrt{\frac{(x-3)(x^2+4)}{3x^2+4x+5}}$, then find $\frac{dy}{dx}$.

14. Find the real constants a, b so that the function f given by

$$f(x) = \begin{cases} sinx\ , & x \leq 0 \\ x^2 + a\ , & 0 < x < 1 \\ bx + 3\ , & 1 \leq x \leq 3 \\ -3\ , & x > 3 \end{cases}$$

Is continuous on $\boldsymbol{R}$.