WEBSITE QUESTIONS

CLASS : FYBSC MATHEMATICS PAPER I SEMESTER II APRIL'2021

CALCULUS II USMT 201

Q 1	The function f(x) = $\begin{cases} \sin\left(\frac{\pi x}{2}\right), & x<1 \\ \lvert 2x-3\rvert [x], & x \geq 1 \end{cases}$ (A) Is continuous at x = 1 (B) Is differentiable at x = 1 © Is continuous but not differentiable at x = 1 (d) Differentiable but not continuous at x=1	
Q2	$\lim_{x \longrightarrow e} \lceil x \rceil =$ (a) e (b) 2.718 (c) 3 (d) Doesn't exist.	
3	Consider the following statements: (i) $\lim_{x \longrightarrow a} f(x) = L \Longrightarrow f(a) = L.$ (ii) $\lim_{x \longrightarrow a} f(x) = L \Longrightarrow f(a)$ is a real number. (a) Only (i) is true. (c) Either (i) or (ii) is true. (b) Only (ii) is true. (d) Neither (i) nor (ii) is true.	
4	The function defined by $f(x) = \begin{cases} 1 & \text{if } x \in \mathbb{Q}, \\ -1 & \text{if } x \in \mathbb{R} \setminus \mathbb{Q} \end{cases}$ is continuous —— (a) at every rational number only. (c) at every irrational number only. (b) only at 0 (d) Nowhere.	
5	Which of the following function has a removable discontinuity at $x = 2$? (a) $\frac{\cos(x-2)}{x-2}$ (b) $\frac{x+2}{x-2}$ (c) $\frac{1}{\log(x-2)}$ (d) $\frac{x^2-x-2}{x-2}$	
6	If $\lim_{x \longrightarrow 6} f(x) = 8$ and $\lim_{x \longrightarrow 6} g(x) = -9$ then $\lim_{x \longrightarrow 6} \frac{7\sqrt[3]{f(x)} - 6g(x)}{7+g(x)} =$ (a) 20 (b) -55 (c) -34 (d) -41	

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7	Suppose $g(x) \leq f(x) \leq h(x)$ for all values of x. If $g(x) = -x^2 - 1, h(x) = \cos 3x$ then $\lim_{x \longrightarrow 0} f(x) =$ (a) 1 (b) -1 (c) 0 (d) can not be determined.	
8	Let $f(x) = \begin{cases} cx^2 + 2x & \text{if } x < 2 \\ 2x + 4 & \text{if } x \geq 2 \end{cases}$. For what value of the constant c is the function f continuous on $\mathbb{R}$? (a) 4 (b) 2 (c) 0 (d) 1	
9	Which of the following functions is differentiable at $x = 0$? (a) $\lvert x \rvert$ (b) $f(x) = \begin{cases} x \sin\left(\frac{1}{x}\right) & \text{if } x \neq 0, \\ 0 & \text{if } x = 0. \end{cases}$ (c) $x^{\frac{1}{3}}$ (d) $f(x) = \begin{cases} x^2 & \text{if } x \in \mathbb{Q}, \\ 0 & \text{if } x \notin \mathbb{Q}. \end{cases}$	
10	$f : \mathbb{R} \longrightarrow \mathbb{R}$ is a differentiable function where the tangent to the graph of $f(x)$ at $x = 2$ is $y = x + 1$, then (a) $f(2) = 1, f'(2) = 1$. (b) $f(2) = 1, f'(2) = 0$. (c) $f(2) = 3, f'(2) = 1$. (d) $f(2) = 3, f'(2) = 0$.	
11	**Let** $f(x) = \begin{cases} x^2 - 1 & \text{if } x \neq 1, \\ 4 & \text{if } x = 1. \end{cases}$ **Which of the following statements, I, II, and III, are true?** **I.** $\lim_{x \to 1} f(x)$ **exists** **II.** $f(1)$ **exists** **III.** f **is continuous at** $x = 1$ **(A) only I (B) only II (C) I and II (D) none of them**	
12	Let $f(x) = \max\{x, x^3\}$, for all $x \in \mathbb{R}$ then the number of points where f is not differentiable are (a) 0. (b) 1. (c) 2. (d) 3.	

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13	Let $f, g : \mathbb{R} \longrightarrow \mathbb{R}$ be differentiable functions. If $h(x) = f(g(x))$ and $f(-2) = 8, f'(-2) = 4, f'(5) = 3, g(5) = -2, g'(5) = 6$ then $h'(5) =$ (a) 12 (b) 24 (c) 8 (d) -16	
14	If h is the inverse function of f and if $f(x) = \frac{1}{x}$ then $h'(3) =$ (a) -9. (b) $-\frac{1}{9}$. (c) $\frac{1}{9}$. (d) 9.	
15	If $y = \sin(3x + 5)$ then y_{16} is (a) $3^{16}\cos(3x + 5)$ (b) $3^{16}\sin(3x + 5)$ (c) $3^{15}\sin(3x + 5)$ (d) None of these	
16	If y = cos (ax+b) , where a,b in R, then y_n = (a) a^nsin(ax+b + $n\pi/2$) (b) a^n cos(ax+b + $n\pi/2$) (c) a^nsin(ax+b + $n\pi$) (d) a^n cos(ax+b + $n\pi$))	
17	If x = cos θ, y = sinθ then dy /dx = (a) $\tan^3\theta$ (b) tan θ (c) − tan θ (d) cot θ	
18	f(x) = log x is (a) Concave upwards always (b) Concave downwards always (c) Concave upward only x>0 (d) Concave downward for x > 0	
19	The n th Taylor polynomial of cos x around 0 is given by (a) $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \cdots + \frac{(-1)^{(k-1)}x^{2k-1}}{(2k-1)!}$ where n = 2k or n = 2k − 1· (b) $1+x - \frac{x^3}{3!} + \frac{x^5}{5!} - \cdots + \frac{(-1)^{(k-1)}x^{2k-1}}{(2k-1)!}$ where n = 2k or n = 2k − 1· (c) $x + \frac{x^3}{3!} - \frac{x^5}{5!} - \cdots + \frac{(-1)^{(k-1)}x^{2k-1}}{(2k-1)!}$ where n = 2k or n = 2k − 1· (d) $1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \cdots + \frac{(-1)^{(k)}x^{2k}}{(2k)!}$ where n = 2k or n = 2k − 1·	

20	The value of $\lim_{x\to 0} \frac{1-sin3x}{x} =$ (a) 1 (b) -1 (c) 9/2 (d) 0	
	Ans : (b)	
21	$f(x) = x^2 - 12x + 1$ has local minima at (a) x =6 (b) x=-6 (c) x=0 (d) x= -1	
	Ans : (a)	
22	The value of c $\in(0, 2)$ for $f(x) = x^2 - 2x$ by Rolle's theorem (a) 1 (b) -1 (c) 0 (a) Does not exists	
	Ans : (a)	