

JK Lakshmipat University, Jaipur
Institute of Engineering and Technology
 End Term Examination, Nov-Dec 2024
 BCA (Backlog), Odd Semester, 2024-25

Roll No.

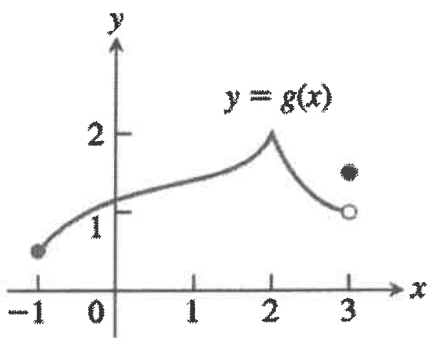
AS1111/ AS1104: Mathematics-I/Mathematics

Time: 2 hours

Max. Marks: 40

Instructions to students:

1. Do not write anything other than your roll number on the question paper.
2. Mention all the assumptions for your answers clearly.
3. Calculators are not allowed.

Q. 1	Consider the function $y = g(x)$ given in the figure. Find the following: $\lim_{x \rightarrow -1^+} g(x)$ $\lim_{x \rightarrow 2^+} g(x)$ $\lim_{x \rightarrow 2^-} g(x)$ $\lim_{x \rightarrow 3^-} g(x)$ - Is g continuous at $x = 2$?	 $\frac{3}{(CO\ 3)}$
Q. 2	Find the limit of the following functions: $\lim_{x \rightarrow \infty} \frac{3x^2 + 5x - 2}{15x^2 + 6}$ $\lim_{h \rightarrow 0} \frac{\sqrt{2+h} - \sqrt{2}}{h}$ $\lim_{x \rightarrow \pi} (\sin 2x + 1)$ $\lim_{x \rightarrow -5} \frac{x+5}{x^2 - 25}$	$\frac{4}{(CO\ 3)}$
Q. 3	Find the derivative of the following functions. $\frac{d}{dx} (\sin x + 2x)$ $\frac{d}{dx} (x)$ $\frac{d}{dx} \left(\frac{7}{x+2} \right)$ $\frac{d}{dx} (x^4 - 2x^2 - 1)$	$\frac{4}{(CO\ 3)}$
Q. 4	Compute the following integrals. $\int (2x^2 - 3x + 1) dx$ $\int \left(2x + \frac{2}{x} \right) dx$ $\int (\cos x - \sin x) dx$ $\int (e^{4x} + e^{-4x}) dx$	$\frac{4}{(CO\ 4)}$
Q. 5	Find the domain and range of the functions given below. Also, sketch the graph of the functions. $f(x) = \sin x$ $g(x) = x^2$	$\frac{5}{(CO\ 3)}$

Q. 6	Let $f(x) = 8x - 4$ and $g(x) = x^2 + 3$. Find the composition $(f \circ g)(x)$ and $(g \circ f)(x)$. Also, find $(f \circ g)(2)$ and $(g \circ f)(-1)$.	3 (CO 3)
Q. 7	Find the area under the curve $y = x$ from $x = 0$ to $x = 4$.	2 (CO 5)
Q. 8	Let $A = \{x: x \text{ is a prime number less than } 20\}$, $B = \{3,4,5,6\}$, and $C = \{x: x \in \mathbb{N} \text{ and } (x-1)(x-2)(x-5)(x-6) = 0\}$, find the following: a. $A \cup B \cup C$ b. $A \cap B \cup C$ c. $A \cup B \cap C$	3 (CO 1)
Q. 9	a. A student council has 8 members. In how many ways can a president, vice president, and secretary be chosen? b. Write the Binomial expansion of $(x + 2)^6$. c. Find the coefficient of x^3y^2 in the expansion of $(2x - y)^5$.	3 x 3 (CO 2)
Q. 10	Find the absolute maximum and minimum values of the function $f(x) = x^2 - 1, -1 \leq x \leq 2$ on the given interval.	3 (CO 5)

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