

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

Retest-End Term Examination (Regular), January 2022
BCA, Semester I

Roll No.....

AS1104: MATHEMATICS

Time: 3 hours

Max. Marks: 30

Instructions to students:

1. Do not write anything other than your roll number on the question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow charts wherever required is an integral part of the answer.

Q.1A	Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{0, 3, 6\}$. Find i) $A \cup B$. ii) $A \cap B$. iii) $A - B$. iv) $B - A$	02
Q.1B	Let $A = \{1, 2, 3\}$ and $B = \{e, f\}$. Find i) $A \times B$ and ii) $B \times A$. State whether these two sets are same or not.	02
Q.1C	What can be said about the power set of empty set, $P(\phi)$?	01
Q.2A	State whether the function, $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = 10 - 7x$ is one-one, onto or bijective. Justify your answer.	02
Q.2B	Given $f(x) = \frac{4x+3}{6x-4}$, find $f \circ f(x)$. Also, state the domain of f .	02
Q.2C	Is the relation, $R = \{(3, 4), (3, 6), (4, 3), (4, 5), (6, 3), (5, 4)\}$ on the set $B = \{3, 4, 5, 6\}$ symmetric? Justify your answer.	01
Q.3A	Check the continuity of the following function at $x = 1$. $f(x) = \begin{cases} x + 1, & x < 1 \\ 3, & x = 1 \\ 3x - 1, & x > 1 \end{cases}$	02
Q.3B	Find the following limits: i. $\lim_{x \rightarrow 0} \frac{\sin(10x)}{\sin(5x)}$ ii. $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x + 4}$	03
Q.3C	Differentiate the following functions: i. $f(x) = \cos^2(x + 1)$ ii. $f(x) = x^2 + 1 + \frac{1}{x^2}$	03
Q.4A	Find the rate of change of the volume of a ball with respect to its radius r . How fast is the volume changing with respect to the radius when the radius is 3 cm?	03
Q.4B	Find the slope of tangent to the curve $y = x + \frac{1}{x}$ at $x = 1$.	02

Q.4C	Find the approximate value of $f(1.02)$, where $f(x) = 4x^2 + 3x + 2$.	02
Q.5A	Compute the following integrals: i. $\int (1 - \cot x + \operatorname{cosec}^2 x) dx$ ii. $\int \frac{x^6 + x^4 - 1}{x^4} dx$ iii. $\int_0^{\frac{\pi}{2}} \sin(2x) dx$	05