



RAN - 1803000201030132

RAN-1803000201030132**B.Sc. Sem-I Examination****March / April - 2019****Mathematics Paper : MCS - 102
Calculus - I****Time: 2 Hours]****[Total Marks: 50****સૂચના : / Instructions**

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the details of signs on your answer book

Name of the Examination:

☛ **B.Sc. Sem-I**

Name of the Subject :

☛ **Mathematics Paper : MCS - 102 Calculus - I**Subject Code No.: **1803000201030132**

Seat No.:

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Student's Signature

- (1) All questions are compulsory.
- (2) Figures to the right indicate full marks of corresponding question.
- (3) Follow usual notations.
- (4) Use of non-programmable scientific calculator is allowed.

Q-1] Answer the following questions:**[10]**

- 1] Find domain of $f(x) = \frac{2x}{2x+7}$
- 2] Define Bijective function.
- 3] Show that the function $f(x) = |x|$ is not derivable at $x = 0$.
- 4] Write the nth derivative formula of $\sin(ax + b)$
- 5] Integrate a^{5x} with respect to x .

Q-2] Answer any two of the following:**[10]**

- 1] Define Equal functions, If $f: \mathbb{R} \rightarrow \mathbb{R}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = 3x^2 - 2x$ and $g(x) = x^3$ for all $x \in \{0,1,2\}$ then prove that $f=g$.
- 2] Define many one function. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be given by $f(x) = x^3 + 1$. Prove that f is one to one.

3] For $f(x) = \frac{(2x^2 + |x|)}{x}$; $x \in \mathbb{R} - \{0\}$ then prove that $\lim_{x \rightarrow 0-0} f(x) = -1$

and $\lim_{x \rightarrow 0+0} f(x) = 1$

4] Define composition of functions. If $f: \mathbb{R} \rightarrow \mathbb{R}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ are defined by $f(x) = x + 2$ for all x in \mathbb{R} and $g(x) = x^2$ for all x in \mathbb{R} then find $g \circ f$ and $f \circ g$. Check whether $f \circ g = g \circ f$.

Q-3] Answer any two of the following: [10]

1] Examine the continuity of the function defined by

$$f(x) = \begin{cases} 1 + x; & x \leq 2 \\ 5 - x; & x > 2 \end{cases} \text{ at point } x = 2$$

2] Obtain: $\lim_{x \rightarrow 2} \frac{x^2 - 4}{(x - 2)^2(x + 7)}$ when x tends to $2, -7, +\infty, -\infty$

3] Evaluate: $\lim_{x \rightarrow \infty} \sqrt{x}(\sqrt{x+2} - \sqrt{x})$

4] Examine the continuity of the function $f(x) = |x| + |x - 1|$ at $x = 0$ and 1 .

Q-4] Answer any two of the following: [10]

1] Obtain n th derivative of $1/(ax+b)^m$

2] Find the n th derivative of $\log(x^2 - a^2)$

3] Find the derivative of $\cos \sqrt{x^2 + 3x + 4}$

4] Find the n th derivative of $y = \frac{2x + 1}{(x - 1)(2x - 1)}$

Q-5] Answer any two of the following: [10]

1] Evaluate: $\int_0^1 x^2 e^{5x} dx$

2] Evaluate: $\int_0^2 \sqrt{3x + 4} dx$

3] Evaluate: $\int x \log x dx$

4] Obtain $\int \frac{(1-x)^3}{x} dx$ where $x \neq 0$