

SAVITRIBAI PHULE PUNE UNIVERCITY
Progressive Education Society's
~ Modern college of Arts, Science & Commerce, Ganeshkhind,
Pune 411016 (Autonomous)
B.Sc. Blended program

(A degree of Savitribai Phule Pune University equivalent to the degree of University of Melbourne)

As per National Education policy (NEP)
End Semester Examination: October 2023

Program: B.Sc. Blended	Semester I	Set A
Program(Specific): B.Sc. Blended (Chemistry)		Course Type: Core
Class: F.Y.B.Sc. Blended		Max. Marks: 30
Name of the Course: Calculus		
course code: MTH101		
Paper No: I		Time: 2 Hours

Note:

- 1) All question as compulsory.
 - 2) Figures to the right corner indicate full marks.
 - 3) Use of scientific calculators is allowed.
 - 4) Draw a well labelled diagram wherever necessary.
 - 5) Use only Blank or blue ink/ball/gel pens for writing.
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Q.1] Select the correct option. (Any 5 out of 6) [1M × 5 = 5M]

- 1) Geometric Mean (G.M.) of the numbers 4 and 16 are _____.
 - a) 12
 - b) 14
 - c) 16
 - d) 18.

- 2) Negation of the following statement is $\forall x(x^2 > x) =$ _____.
 - a) $\exists x(x^2 = x)$
 - b) $\forall x(x^2 < x)$
 - c) $\exists x(x^2 \leq x)$
 - d) $\exists x(x^2 < x)$.

- 3) $\lim_{x \rightarrow 0}(x^3 - 2x - 3) =$ _____.
 - a) 2
 - b) 3
 - c) -3
 - d) -2. ‘

- 4) Derivative of a function a^x is _____.
 - a) $a^x \log x$
 - b) $a^x \log a$

c) $x^a \log x$

d) $x^a \log a$.

5) $\int_0^1 x^3 dx = \text{---}$.

a) $\frac{2}{4}$

b) $\frac{1}{4}$

c) 3

d) 5.

6) $\int (2 - 3x)^5 dx = \text{---}$.

a) $-\frac{1}{18}(2 - 3x)^6 + C$

b) $(2 - 3x)^6 + C$

c) $5(2 - 3x)^6 + C$

d) $5(3x - 2)^4 + C$.

Q.2] Answer in brief.(Any 5 out of 6)

[2M × 5 = 10M]

1) Determine whether the following propositions are Tautology, Contradiction and Contingency $(p \vee q) \rightarrow \sim p$.

2) Translate the following statement into symbolic form.

For any value x, there is some value y such that $xy = 1$.

3) For x_n given by the following formulas, establish either the convergence or the divergence of the sequence

$$x_n = \frac{2n^2+3}{n^2+1}.$$

4) Let $A = \{a,b,c\}$, $B = \{1,2,3,4\}$ find $A \times B$, $B \times A$, $A \cup B$, $A \cap B$.

5) Let $f : \mathbf{R} \rightarrow \mathbf{R}$ and $g : \mathbf{R} \rightarrow \mathbf{R}$ be define as $f(x) = x^2$ and $g(x) = 2x + 3$ find gof and fog .

6) Differentiate the following function with respect to x,

$$y = e^{\tan x}.$$

Q.3] Answer in detail.(Any 3 out of 5)

[3M × 5 = 15M]

1) Test the validity of argument by direct method.

"If it rains then I carry umbrella. If it shines then I do not need a sweater. Either it rains or it shines. I do need a sweater. Hence I carry an Umbrella."

2) Differentiate the following function with respect to x,

$$y = \log_3(\log_5 x).$$

3) Evaluate $\int_0^{\frac{\pi}{2}} \cos^3 x dx$.

4) Find the area of the region bounded by the curve $y^2 = 9x$ and $x^2 = 9y$.

5) Let X be the set of all lines in a plane, then determine whether the relation R defined as "for $x, y \in X$, xRy iff x is perpendicular to y " is an equivalence relation? Is R a partial order relation?.
