Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
End Semester Examination: Jan.2022
Faculty: Science and Technology

Program: BSc Blended **Semester: I** **SET: C**
Program (Specific): FYBSc Blended **Course Type:**
Class: FY **Max.Marks: 50**
Name of the Course: Calculus
Course Code: MTH 101 **Time: 2Hr**
Paper: I

Instructions to the candidate:

1) ***There are 3 sections in the question paper. Write each section on separate page.***
2) ***All Sections are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw a well labelled diagram wherever necessary.***

SECTION: A

Q.1. Choose the correct alternative **[10]**

1) _____ is a symbol which is used to connect two or more propositional or predicate logics.
   a) Logical connective
   b) Proposition
   c) Set
   d) Statement
2) The symbolic form of the statement "You can get good marks if and only if you study well" ____.
   a) $p \wedge q$
   b) $p \vee q$
   c) $p \rightarrow q$
   d) $p \leftrightarrow q$
3) A _____ is a collection of definite and distinguishable objects selected by means of some rule or description.
   a) set
   b) complement
   c) Graph
   d) Statistics
4) $\sim(a \wedge b) =$

a) $\sim a \wedge \sim b$
b) $\sim a \vee \sim b$
c) $\sim a \wedge b$
d) $a \vee \sim b$

5) Converse of given statement $p \rightarrow q$ is given by _____
   a) $q \rightarrow p$
   b) $\sim p \rightarrow \sim q$
   c) $\sim q \rightarrow \sim p$
   d) $p \rightarrow q$
6) Which of the following is a set builder form of given set: A={2,3, 5, 7,…}
   a) A={x/ x is an odd number}
   b) A={y/y is prime number}
   c) A={z/ z is a natural number}
   d) A={x/ x is an even number}
7) Which of the following is the derivative of $2\log(x)$
   a) $\frac{1}{x}$
   b) $\frac{1}{x^2}$
   c) $\frac{2}{x}$
   d) $\frac{2}{x^2}$
8) What is the full form of LIATE in the LIATE rule of integration by parts
   a) L-Logarithmic, I- Inverse, A- Algebraic T-Trigonometric, E- Exponential
   b) L-Logarithmic, I- Inverse, A- Arithmetic T-Trigonometric, E- Exponential
   c) L-Logarithmic, I- Inverse, A- Algebraic T-Taylor's, E- Exponential
   d) L-Logarithmic, I- Implication, A- Algebraic T-Trigonometric, E- Exponential
9) If the truth value of the statement p is True(T) and that of q is False(F) then the truth value of p→ q is
   a) T
   b) F
   c) T or F
   d) None of the above
10) The set which contains only few elements i.e. if A= {1, 4, 9, 16} then A is _____ set.
   a) Singleton set
   b) Empty set
   c) Null set
   d) Finite set

Section B

Q.2. Attempt any 10 of the following **[20]**

1) Let set A={a, b} and set B={c, d} then find the Cartesian product AxB
2) Find the derivative of a function y=x-cosx w.r.t. x

3) Construct the truth table for the statement $\sim p \vee \sim q$
4) Integrate the function y=$x^3 + 3x + 5$
5) Check whether the function f(x) = logx is one-one or not
6) Define a function, its domain and range.
7) State the D'Alembert's Ratio test
8) Draw the diagraph for the relation R={(1,1), (1, 2), (2,3), (3,2), (3,3), (3, 4), (4, 1)} on a set A={1, 2, 3, 4}
9) Write the symbolic form of the statement "If it snows tonight then I will stay at home."
10) Verify Rolle's theorem for the function f(x)=2+$(x+1)^{\frac{2}{3}}$, x$\in$ [0, 2]
11) Check whether the statement is Tautology, Contradiction or Contingency

$$p \rightarrow (p \wedge q)$$

12) For the set A={1, 2, 3, 4, 5} and B={2, 4, 6, 8} and C={1, 2, 3, 5} find A$\cup$ $B \cup C$

Section C

Q.3. Answer any 4 of the following **[20]**

1) If A= {2, 3, 4}. Write relation R=A x A (Cartesian Product) and check whether R is an equivalence relation or not. Also write the matrix of the relation R.
2) Write the symbolic form of the statement and write its converse, inverse and contrapositive. " If voltage increases then current decreases."
3) Integrate the function by parts $\int xcosx\, dx$.
4) State the two De-Morgan's laws and verify the logical equivalence of the laws by using truth tables.
5) Differentiate the function y=$\frac{e^x}{1+x^2}$ w.r.t. x.
6) Show that the function f: $R \rightarrow R$ such that f(x)=4x+3 is bijective.