**D2BMT2301** (PAGES 2) **Reg.No..............................**

**Name: ...............................**

**SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2024**

**(Regular/Improvement/Supplementary)**

**MATHEMATICS**

**GMAT2B02T: CALCULUS AND INFINITE SERIES**

**Time: 2 ½ Hours** **Maximum Marks: 80**

**SECTION A: Answer the following questions. Each carries *two* marks.**

**(Ceiling 25 Marks)**

1. Find the inverse of the function where the domain of excludes .
2. Solve .
3. Evaluate .
4. Differentiate .
5. Evaluate the expression .
6. Show that derivative of is .
7. Express the number in terms of natural logarithms.
8. Evaluate .
9. Write the first five terms of the sequence .
10. State Squeeze Theorem for Sequences.
11. Discuss the convergence of geometric series.
12. Find the Maclaurin series of .
13. Determine the radius of convergence of .
14. Show that the series . converges and also find its sum.
15. What is an alternating series? Give an example.

**SECTION B: Answer the following questions. Each carries *five* marks.**

**(Ceiling 35 Marks)**

1. Find the area of the region between the graphs of and and the vertical lines 1 and .
2. Find the length of the graph of f(x) on
3. State and prove power rule.

**(PTO)**

1. Show that .
2. Evaluate .
3. Prove that then the sequence () converges to zero.
4. Justify the statement: Every conditionally convergent series need not be absolutely convergent.
5. Find the Taylor series for and determine its interval of convergence.

**SECTION C: Answer any *two* questions. Each carries *ten* marks.**

1. A solid has a circular base of radius 2. Parallel cross sections of the solid perpendicular to its base are equilateral triangles. What is the volume of the solid?
2. a) Show that .

b) The concentration of a certain drug (in mg/cc) in a patient’s bloodstream t hr after   
 injection is . Determine the average concentration of the drug in   
 the patient’s bloodstream over the first 4 hr after the drug is injected.

1. State and Prove ratio test for convergence of series.
2. a) State limit comparison test and hence show that the series divergent.

b) Determine whether the series converges or not.

**(2 x 10 = 20 Marks)**