B.Sc. DEGREE EXAMINATION, APRIL 2018.

III YEAR V SEMESTER

Core Major - Paper X - REAL ANALYSIS

Time : 3 Hours Max. Marks : 75

SECTION A – (10 × 2 = 20 marks)

Answer any *TEN* questions

1. What is a one to one function? Give an example of a function which is not one to one.
2. What is an oscillating sequence? Give an example.
3. Find limsup of the sequence {(-1)n}, *n* is in *I.*
4. Is the series convergent or divergent?
5. Define a metric space.
6. Define a monotone function on R.
7. When do we say that a set is an open set in a metric space?
8. Define dense subset of a metric space. Give an example.
9. Define Riemann integrable function on [a,b].
10. Find the derivative of .
11. Give an example of a absolutely convergent sequence.
12. What is a set of measure zero?

SECTION B – (5 × 5 = 25 marks)

Answer any *FIVE* questions

1. Prove that a non-decreasing sequence which is bounded above is convergent.
2. Prove that the series  converges and diverges.
3. Show that Euclidean n – space is a metric space.
4. Show that the intersection of any number of closed sets is closed in a metric space.
5. State and prove Rolle’s theorem.
6. Let be a sequence of nonnegative real numbers and then prove that.
7. State and prove Law of the mean.

[P.T.O.]

SECTION C – (3 × 10 = 30 marks)

Answer any *THREE* questions

1. Prove that [0,1] is uncountable.
2. Show that a convergent sequence must be a Cauchy sequence and conversely.
3. Prove that the set of all bounded sequence of real numbers is a metric space.
4. Show that (i) the set R1 and (ii) the set of all irrationals are of second category.
5. Let *f* be a bounded function on [a,b]. Then *f* is Riemann integrable if and only if *f* is continuous at almost every point in [a,b].