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Total No. of Printed Pages: [01]

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**B.Sc. (Hons Math) (Semester – 2<sup>nd</sup>)**

**ANALYSIS - II**

**Subject Code: BMAT1-206**

**Paper ID: [18131208]**

**Time: 03 Hours**

**Maximum Marks: 60**

**Instruction for candidates:**

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

**Section – A**

**(2 marks each)**

Q1. Attempt the following:

- a. State Dense set.
- b. Compute  $L(P,f)$  and  $U(P,f)$  for  $f(x) = x^2$  where  $P = \{ 0, 1/3, 2/3, 1 \}$
- c. Explain uniform continuity function..
- d. Define Open set and Perfect set
- e. State Taylor Theorem with Remainder.
- f. Determine radius of convergence of the power series:  $\sum_{n=1}^{\infty} n! x^n$
- g. Define Metric space with example
- h. Show that the series  $1 + 1/2 + 1/2^2 + \dots + 1/2^{n-1} + \dots$  converges to sum 2
- i. Explain trapezoidal rule.
- j. If  $f$  and  $g$  are R-integrable on  $[a,b]$ , then  $fg$  is also R-integrable on  $[a,b]$ . Justify

**Section – B**

**(5 marks each)**

Q2. Test for uniform convergence  $\sum_{n=1}^{\infty} f_n(x) = \sum_{n=1}^{\infty} x^{e^{-nx}}$  in  $[0,1]$

Q3. State and prove weierstrass M-test

Q4. Intersection of finite numbers of open set is an open set. Prove

Q5. State and Prove squeeze Theorem.

Q6. Show that the function represented by  $\sum_{n=1}^{\infty} \sin nx / n^3$  is differentiable for every  $x$  and

its derivative is  $\sum_{n=1}^{\infty} \cos nx / n^2$

**Section – C**

**(10 marks each)**

Q7. State and Prove Fundamental 1st and 2nd form.

Q8. State and prove Dini's Theorem.

Q9. Show that a Metric space  $X$  is connected iff the only non-empty sub sets of  $X$  which is both open and closed is  $X$  itself.