

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSC
BRANCH: MATHEMATICS AND COMPUTING

SEMESTER : VII
SESSION : MO/2022

SUBJECT: MA401 REAL ANALYSIS AND MEASURE THEORY

TIME: 3:00 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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- Q.1(a) If f is monotonic on $[a,b]$, then prove that the set of discontinuities of f is countable [5]
Q.1(b) If f is monotonic on $[a,b]$, then prove that f is of bounded variation on $[a,b]$. [5]
- Q.2(a) If f is R-S integrable, and c is any constant, prove that cf is also R-S integrable. [5]
Q.2(b) State and prove first mean value theorem on R-S integrations. [5]
- Q.3 Prove that the outer measure of an interval is its length. [10]
- Q.4(a) Define characteristic function on a measurable set and describe its properties. [5]
Q.4(b) Prove that the sum and product of two simple functions are simple as the maximum and the minimum. [5]
- Q.5 State and prove the bounded convergence theorem. [10]

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