

Registration No :

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Total Number of Pages : 01

M.Sc.I
FMCC702

7th Semester Regular Examination 2017-18

Measure Theory

BRANCH : M.Sc.I (MC)

Time : 3 Hours

Max Marks: 70

Q.CODE : B626

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

- Q1 Answer the following questions : (2 x 10)**
- a) Prove that every differentiable function is continuous.
 - b) Write Heine Borel Theorem
 - c) What do you mean by Hausdorff Dimension.
 - d) Find cardinality of the class of measurable functions.
 - e) Difference between Borel & Lebesgue Measurability.
 - f) What is open sets ?
 - g) What is Riemann Integrals ?
 - h) What is outer measure ?
 - i) Give examples of a Lebesgue Function
 - j) $BV[a,b]$ is a vector space prove it.
- Q2 a) Prove that continuous functions are measurable. (5)**
b) Write the four Derivatives of FA. (5)
- Q3 a) Prove that if F is Riemann integrable then F is integrable. (5)**
b) EVALUATE $\int_0^1 \frac{x \sin x}{1 + (nx)^2} dx$ from 0 to 1 (5)
- Q4 a) Show that every open set has a positive measure . (5)**
b) State and prove Fatou's Lemma. (5)
- Q5 a) State and prove Lebesgue's Monotone Convergence Theorem . (5)**
b) Prove that outer measure of an interval equal its length . (5)
- Q6 a) Show that every nonempty open set has a positive measure (5)**
b) Prove that Every non empty perfect set is uncountable. (5)
- Q7 a) Prove that continuous functions are measurable. (5)**
b) Write the four Derivatives of FA. (5)
- Q8 Write short notes on :**
- a) Lebesgue's Differentiation Theorem (5)
 - b) Functions of Bounded Variable (5)