Program : M.A./M.Sc. (Mathematics)
M.A./M.Sc. (Previous) Question Bank-2015
Paper Code:MT-02
Section-A (Very Short Answer type Questions)

1. Tell that canter set is countable or uncountable?

Ans. Uncountable

2. Write the measure of a singleton set.

Ans. 0

3. Let A and B are two measureable sets. Are the sets $A \bigcup B$ and A^C measurable?

Ans. Yes, $A \bigcup B$ and A^C are measurable.

4. A continuous function defined on a measurable set is always measurable. What about its converse?

Ans. Its converse isn't true.

5. Let A and B be any two disjoint measurable subsets of the measurable set E and let f be a bounded measurable function (L-integrable) on E. Then, what is the value of the integral $\int_E f(x)\,dx$?

Ans. $\int_E f(x)\,dx = \int_A f(x)\,dx + \int_B f(x)\,dx$

6. Write the statement of Vitali's theorem.

Ans. P.N. – 123, theorem 15

7. Write an example of second countable space.

Ans. P.N.187

8. Give two examples of Normal space.

Ans. (i) Every discrete space is normal.

(ii) Every indiscrete space is normal.

Section-B (Short Answer Type Questions)

1. Prove that Normality is a topological property.

Ans. P.N. 214, Theorem – 20

2. Show that every closed subspace of a locally compact space is locally compact.

Ans. P.N.-228, Theorem-13

3. Let C be any non-empty family of subsets of a set X. Then, prove that there exists a filter base on X containing C iff C has FIP.

Ans. P.N. – 286, Theorem-9

4. Write and prove Alexander subbase lemma.

Ans. P.N. – 267, Theorem-15

5. Prove that the property of a space being regular is hereditary property.

Ans. P.No. – 210 , Theorem – 16

6. Prove that a second countable space is always first countable space, but converse is not true.

Ans. P.N.- 187, Theorem-7

7. If a sequence $\langle f_n \rangle$ in L_2 converges in norm to a function f in L_2 then it is a Cauchy-sequence. Prove it.

Ans. P.N- 129, Theorem-22

8. Show that a continuous function defined on a measurable set is always measurable. However its converse is n't true.

Ans. P.N. 52 (Theorem-4)

Section-C (Long Answer Type Questions)

1. (i) Prove that a topological space X is Hausdorff space iff every convergent filter on X has a unique limit.

(ii) Show that continuous image of a connected space is connected.

Ans. P.N. – 289

2. Prove that a topological space is Hausdorff iff every net in the space converge to at most one point.

Ans. P.N.- 280 (Theorem-4)

3. Show that the space L^p is complete for $p \geq 1$.

Ans. P.N.-154 (Theorem-8)

4. Let $\langle f_n \rangle$ be a sequence of measurable functions defined on a measurable set E, that converge pointwise to a function f defined on E. Prove that f is measurable function, then?

Ans. P.N.-63 (Theorem-15)