(iv) Why are net and filters called generalized sequence ? Discuss.

(v) Is power set of a set is filter ? Discuss.

(vi) State stone-cach compactification theorem.

(vii) Define evaluation function.

(viii) State fundamental theorem of algebra.

2 × 8 = 16

Roll No. ....

74453

M.Sc. Mathematics 2nd Semester Examination – May, 2016

TOPOLOGY - II

Paper : MM - 423

Time : Three Hours] *[Maximum Marks : 80*

Before answering the question, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Section. Question No. 9 from section **V** is ***compulsory***.

SECTION – I

1. (a) Prove that a topological space X is regular if and only if for every point $x \in X$ and open set G containing x, there exists an open set G^* such that $x \in G$ and $C(G^*) \subseteq G$. 6

(b) State and prove Tietz extension Theorem. 10

2. (a) Is subspace of completely regular space completely regular ? Justify your answer. 8

(b) Show that complete normality is a topological property. 8

SECTION – II

3. (a) Show that a topological space in Hausdorff if and only if limits of all nets in it are unique. 8

(b) Define cluster point of a net. Show that X is compact if and only if every net in X has a cluster point in X. 8

4. (a) Let A be any non void family of subsets of a set X. Show that there exists a filter on X containing A if and only if A has finite intersection property. 8

(b) State and prove ultra filter principle. 8

SECTION – III

5. (a) Define with example point finite covering and locally finite covering. Also discuss their relationship. 4

(b) State and prove Michaell theorem of paracompactness. 12

6. (a) Prove that a T_3 space with σ locally finite base, every open set is F_σ - set. 8

(b) Why the notion of paracompactness is generalization of compactness ? Discuss. 8

SECTION – IV

7. Prove that every second axiom T_3 – Space X is metrizable. 16

8. (a) Define homotopy of paths and show that the relation of homotopy with respect to x of paths based on x is an equivalence relation of the set of all paths in E based on X. 8

(b) Define a covering map. Under what conditions is the restriction of a covering map. Establish a covering map between R and S'. 8

SECTION – V

9. (i) Give an example of normal space which is not completely normal.

(ii) Define a regular space and give an example of a regular space which is not T_1.

(iii) Define Covering spaces.