**COURSE CODE: 2030508**

**PG DEGREE EXAMINATION – JAN 2009**

**M.SC (MATHS)**

**SET TOPOLOGY AND THEORY OF RELATIVITY**

**(For the Candidates Admitted from Calendar Year 2007 Onwards)**

**Time: 3 hours** **Max.Marks:75**

**Section – A**

**Answer All the questions:** **15 X 1 = 15**

1. Write the two properties of topology.
2. Let {a} be a family of topologies on x , show that there is a unique smallest topology Containing all the collections ………
3. If B is a basis for the topology of x then the…………
4. Definition of closed sets.
5. State uniform limit theorem.
6. A subset A of a space x is said to be……..in x if A =x.
7. Define first count ability axiom.
8. The sets S(C, U) from a sub basis for a topology on C(x , y) that is called the……..
9. Write the point wise convergence.
10. Definition of convergent subsequence.
11. Every Para compact ………..X is normal.
12. Give an example for discrete topology.
13. Write the finite intersection property.
14. Define Cartesian product.
15. If U is open in z then $g^{-1}(U)$ is open in Y and……….is open in X.

**Section-B**

**Answer any Five Questions:** **5 X 6 = 30**

16. a) Let B and $B^1$ be bases for the topologies ψ and $\psi^1$ respectively on X , then the Following are equivalent (i) $\psi^{1}$ is finer than ψ .(ii) For each x € X and each basis element B € B containing x ,there is a basis element $B^1$ € $B^1$such that x € $B^1$ C B.

    **(Or)**

    b) Show that the topologies of $R_e$ and $R_k$ are not comparable.
17. a) Every compact Hausdorff space is normal.

    **(Or)**

    b) Let A be a subset of the topological space X, Let A1 be the set of all limits points of a .Then $\overline{A} = A \cup A^1$ .
18. a) Show that every order topology is Hausdorff.

    **(Or)**

    b) Let X and Y be topological spaces, let then the following equivalent; (i) If f is continuous (ii) For every closed set B of Y, the set $f^{-1}(B)$ is closed in X.
19. a) If each space $X_\alpha$ is A Hausdorff space then $\pi X_\alpha$ is a Hausdorff space in both the box and product topologies.

    **(Or)**

    b) Let X be a metric space with metric d, Define d: X × X → R by the equation $\overline{d}(x,y) = \min\{d(x,y),1\}$ , then $\overline{d}$ is a metric that induces the same topology as d.
20. a) Every closed subspace of a compact space is compact.

    **(Or)**

    b). State and prove uniform continuity theorem

**Section -C**

**Answer any Two questions:** **2 X 15 = 30**

21. State and prove i. Pasting lemma, ii. Maps into products?
22. Prove a finite cartesion product of connected space is connected?
23. Prove tube lemma?
24. State and prove urysolm lemma?
25. State and prove tietze Extension theorem?