YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD

M.Sc. Mathematics ,IIIrd semester

Topology (MTH-511)

Time: 3 Hours **Max. Marks: 60**

Instructions:
1. *It is compulsory to answer all the questions (2 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART –A

Q1 (a) Define topological space with example. (2)

(b) Show that in a topological space each component is closed. (2)

(c) Prove that every discrete space that has more than one point is disconnected. (2)

(d) Define T_2 space and T_3 space. (2)

(e) If A and B form separation of topological space (X, τ) then A and B are both open and closed. (2)

(f) Show that $\overline{AUB} = \overline{A}\ U\ \overline{B}$ (2)

(g) Define limit point with example. (2)

(h) Give example of stronger and weaker topologies. (2)

(i) State Lindelof's theorem. (2)

(j) Define Closure of a set, give example. (2)

PART –B

Q2 (a) Show that every subspace of second countable space is second countable (5)

(b) Prove that the real line is connected. (5)

Q3 (a) Every closed and bounded interval on real line is compact. (5)

(b) A topological space is compact if every basic open cover has a finite sub cover. (5)

Q4 (a)) Prove that every compact subset of Hausdroff space is closed. (5)

(b) Prove that every closed subspace of a normal space is normal.

Q5 (a) Show that intersection of two topologies is also a topology. (5)

(b) Let X={a,b,c,d,e} and let τ={X,ϕ,{a},{c,d},{a,c,d}{a,b,c,d},{b,c,d,e}} and Y={a,d,e}⊂ Xthen τ is a topology on X, find the relative topology τ_y $on\ Y$. (5)

Q6 (a) Prove that in a topological space A is closed iff A contains its boundary. (5)

(b) Let (X, τ) be topological space and Let A be a subset of X, prove that union of a set and its derived set is closed. (5)

Q7 (a) Show that the image of a locally connected space which is both open and continuous is locally connected. (5)

(b) State and prove Tietze Extension Theorem.. (5)