Shree H.N. Shukla College of Science
M.Sc. (Mathematics) Sem-1
IMP questions of Topology-1

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1. Let X be an infinite set and $\mathcal{T}$={ G ⊆ X : G is non empty set and X-G is finite}∪{ϕ} then show that $\mathcal{T}$ is topology on X
2. Prove that finite union of closed set is closed.
3. Let β ={(a , b)/ a $< b, a, b \in \mathbb{R}$} then show that β is basis of some topology .
4. X be any space and $A \subseteq \mathbb{R}$ than x ∈ $\bar{A}$ iff for any neighborhood U of x ∋ $U \cap A \neq \emptyset$.
5. If $A \subseteq B$ than show that $\bar{A} \subseteq \bar{B}$.
6. A = { $\frac{1}{n}$ / n∈ ℕ } than show that $\bar{A} = A \cup \{0\}$.
7. Let X and Y be spaces and f: $X \to Y$ is function. Than f is continues on X iff for each closed subset K of Y, $f^{-1}(K)$ is closed subset of X.
8. Prove that $(A \times B)^0 = A^0 \times B^0$ and $\overline{A \times B} = \bar{A} \times \bar{B}$.
9. Let X be a space and $A \subseteq X$ then $\bar{A} = A \cup A'$.
10. Prove or disprove $\overline{A \cap B} = \bar{A} \cap \bar{B}$.
11. Let be topology on X and Y ⊆ X then show that $\mathcal{T}_y$ = { G∩Y / G ∈ $\mathcal{T}$ } be topology on Y.
12. ℕ is the subspace of ℝ with standard topology then $\mathcal{T}_{\mathbb{N}}$ is topology on ℕ is discrete topology .
12. Suppose f : X → Y and g : Y → Z is continuous then show that gof : X → Z is continuous.
13. Show that $\bar{Q} = R$.
14. Show that $\bar{\bar{A}}$=A.
15. Show that (a,b) and (c,d) are homeomorphic.
16. Prove that every component is a maximal connected set and it is closed set..
17. $\mathcal{T}_\alpha$ be connected subset of X, for each $\alpha \in$ I and $\bigcap_{\alpha \in I} \mathcal{T}_\alpha \neq \emptyset$ then show that $\bigcup_{\alpha \in I} \mathcal{T}_\alpha$ is connected subset of X.
18. X and Y are locally connected if and only if X x Y are locally connected..
19. X and Y are connected if and only if X x Y are connected.
20. X and Y are locally connected if and only if X x Y are locally path connected.
21. X and Y are path connected if and only if X x Y are path connected.
22. Define path connected set and show that every path connected set on X is connected on X.
23. X is connected and locally path connected then X is path connected.
24. Definition: open set ,closed set , limit point of set, interior of set and closure of set.