DEPARTMENT OF MATHEMATICS
Indian Institute of Technology Guwahati

MA549: Topology   Quiz - I
Instructor: Rajesh Srivastava   September 11, 2023
Time duration: 1.5 hours   Maximum Marks: 10

N.B. Answer without proper justification will attract zero mark.

---

1. (a) If X is second countable topological space, does it imply that every subbase is eventually countable? $\boxed{1}$

   (b) For $\alpha \in \mathbb{R}$, define $D_\alpha = \{m + n\,\alpha : m, n \in \mathbb{Z}\}$. Does it imply that D_α is dense in $\mathbb{R}$ if and only if $\alpha \in \mathbb{R} \smallsetminus Q$? $\boxed{1}$

2. Prove/disprove that boundary of set in topological space is nowhere dense. $\boxed{1}$

3. Let $\tau = \{(-\infty, b) : b \in \mathbb{R}\} \cup \{\emptyset, \mathbb{R}\}$. Find derive set of $(1, 2]$ in the topological space $(\mathbb{R}, \tau)$. $\boxed{2}$

4. Find a subbase for K-topology τ_K on $\mathbb{R}$, which is not a basis for $(\mathbb{R}, \tau_K)$. Whether $(\mathbb{R}, \tau_K)$ is separable? $\boxed{3}$

5. Prove/disprove that the complement of every nowhere dense set in a topological space X is dense in X. $\boxed{2}$

END