Q1/ Define "Limit point". Show that a subset A of a space (X, τ) is closed if and only if A contains all it is limit points.

Q2/

(i) Consider (X, **D**), where **D** is the discrete topology. What is the base for **D** ? Explain it.

(ii) Prove that **D**(**Q**) = **R**, where **Q** is the set of all rational numbers and **R** is the set of all real numbers.

Q3/

(i) Write "**True**" or "**False**" of the following: :

Let (X, τ) be a topological space and A, B $\subset$ X.

(1) Every metric space is topological space.

(2) $b(A) = (A^c \cup ext(A))^c$.

(3) A subset A of a space (X, τ) is called dense in itself if $A \subset Cl(A)$.

(4) If x is not adherent point of A then it is not limit point of A.

(5) $Cl(A \cup B) = Cl(A) \cup Cl(B)$.

(6) $b(A) \subset b(A^o)$.

(7) If $A^o \cap A^c = \phi$, then $A^c \cap A^o \setminus \{x\} = \phi$.

(8) $A^o = \cup \{G: G$ is open set and $A \subset G\}$.

(9) $A \cap ext(A) = \phi$.

(10) A point $x \in X$ is an exterior point of A if and only if x is an adherent point of A.

(ii) Define "Base for a topology". Let **B** be a base for a topology τ on X and let **B*** be a class of open sets containing **B**, i.e., **B** $\subset$ **B***$\subset \tau$. Show that **B***is also a base for τ.

(iii) Let τ be a topology on a set X consisting of four sets, i.e., $\tau = \{X, \phi, A, B\}$, where A and B are non-empty distinct proper subsets of X. What conditions must A and B satisfy to become τ a topology on X ? Check it.