Question Bank for PG Course
অঙ্ক (Mathematics)

নবম (খ ১) পত্র **(Paper - IXB(i))**
Advanced Topology : PGMT-IXB(i)
(NEW SYLLABUS)

1. If for every collection of closed sets $\{F_\alpha : \alpha \in \Delta\}$ in a topological space (X, τ), possessing the finite intersection property, the intersection $\cap \{F_\alpha : \alpha \in \Delta\}$ of the entire collection is non-empty. Then which of the followings is/are true?
   (i) X is finite
   (ii) X is compact
   (iii) X is empty
   (iv) X is uncountable

2. Which of the followings is/are true?

   (i)   Every closed subspace of a sequentially compact space is sequentially compact
   (ii) Every closed subspace of a Frechet compact space is Frechet compact
   (iii) A subspace of a countably compact space need not be countably compact
   (iv) Every closed subspace of a countably compact space is countably compact

3. Let (X, τ) be a topological space. The following statements are

   (i) X is compact
   (ii) Every filter in X has a cluster point
   (iii) Every ultrafilter in X converges.

   Which of the followings is/are true?

   (a) (i) implies (ii)
   (b) (ii) implies (iii)
   (c) (iii) implies (i)

4. Which of the followings is/are true?

   (i)   A countably compact Lindeloff space is compact

   (ii) Any Frechet compact T_1 –space is countably compact

5. Consider the topological space $(\mathbb{N}, \tau)$. Here $\mathbb{N}$ is the set of natural numbers and τ is the odd-even topology on $\mathbb{N}$. The space $(\mathbb{N}, \tau)$ is

   (i)   Second countable
   (ii) Countably compact

   (iii) Frechet compact.

6. Which of the followings is/are not true?

   (i)   A compact space is paracompact
   (ii) A discrete space is paracompact
   (iii) Every regular Lindeloff space is paracompact
   (iv) Every paracompact is compact

7. Fill in the blank.

    A uniform space is pseudo-metrizable if its uniformity has a .... base.

    (i)   countable base

    (ii)   local base

8. Which of the followings is/are true?

    (i)   A uniform space is complete iff every Cauchy net is convergent

    (ii)   Every compact subset of a uniform space is totally bounded

9. Put the correct sentence in the blank.

    A uniform space is compact ....it is totally bounded and complete.

    (i)   if
    (ii)   Only if

    (iii)   if and only if

10. Put the correct sentence in the blank. If the uniformity on X has a countable base then the induced topology is .... countable.

    (i)   first
    (ii)   second

11. Let X be a non-empty set. A mapping q: X× X →R is said to be a quasimetric on X if the following holds:

    (i) $\begin{cases} q(x,y) \geq 0 \\ q(x,y) \leq q(x,z) + q(z,y) \end{cases}$

    (ii) $\begin{cases} q(x,y) \geq 0 \text{ and } q(x,x) = 0 \\ q(x,y) \leq q(x,z) + q(z,y) \end{cases}$

    (iii) $\begin{cases} q(x,x) = 0 \\ q(x,y) \leq q(x,z) + q(z,y) \end{cases}$

    (iv) $q(x,y) \leq q(x,z) + q(z,y)$

12. Put the correct sentence in the blank. Every regular, T_1 and .... space is metrizable

    (i)   First countable
    (ii)   Second countable
    (iii)   Separable
    (iv) T_0

13. Which of the followings is/are not true?

    (i)   Paracompact implies every open cover has an open star refinement

    (ii)   Paracompact implies every open cover has an open pointwise star refinement

14. The space l_2 is

    (i)   Complete but not Compact
    (ii)   Complete but not totally bounded
    (iii)   Compact

    (iv)   Totally bounded

15. $\mathbb{R}^\omega$ with product topology is

    (i)   locally compact

    (ii)   not locally compact