TYBSC, MATHS PAPER III (TOPOLOGY OF METRIC SPACE)
QUESTION BANKS (CONNECTEDNESS)

	Choose correct alternative in each of the following			
1	**Let (X, d) be a finite metric space.If $A \subseteq X$ is connected then**			
	(a)	$A = X$	**(b)**	$A \neq X$
	(c)	A **is singleton set.**	**(d)**	A **has more than one element.**
2	**If A, B are connected subsets of R with usual metric such that $A \cap B \neq \emptyset$, then**			
	(a)	**Only $A \cup B$ is connected.**	**(b)**	**Only $A \cap B$ is connected.**
	(c)	**Both $A \cup B$ and $A \cap B$ are connected.**	**(d)**	**Only $A + B$ is connected.**
3	**If A is connected subset of a metric space X then……… is also connected.**			
	(a)	$\underline{A}$	**(b)**	**Interior of A.**
	(c)	**Both (a) and (b).**	**(d)**	**None of these.**
4	**An open ball in a metric space is …..**			
	(a)	**Connected**	**(b)**	**Path connected**
	(c)	**Both (a) and (b).**	**(d)**	**Compact.**
5	**Let (X, d) be a connected metric space and $f: X \to Z$ be a continuous map. Then**			
	(a)	f **is onto.**	**(b)**	f **is one-one.**
	(c)	f **is bijective.**	**(d)**	f **is constant.**
6	**A line is ……..**			
	(a)	**Convex.**	**(b)**	**Connected.**
	(c)	**Path connected.**	**(d)**	**convex, connected, path connected**
7	**If A is path connected subset of R^n then which of the following set is not path connected.**			
	(a)	A^0	**(b)**	$\underline{A}$
	(c)	$\underline{A} \cup A$	**(d)**	**None of these.**
8	**The set $R^2 - \{(x, y)/y = 0\}$ is …..**			
	(a)	**Path connected .**	**(b)**	**Connected.**
	(c)	**Not connected.**	**(d)**	**Semi-closed.**
9	**The components of the set $(0,1) \cup \{2,3\}$ are …**			
	(a)	$(0,1)$	**(b)**	**{2},{3}**
	(c)	$(0,1)$**, {2} and{3}**	**(d)**	**None of these.**
10	**If A is connected subset of Q, with usual distance, then …**			
	(a)	$A = Q$	**(b)**	A **is an infinite bounded set.**
	(c)	A **is singleton set.**	**(d)**	**None of these.**
11	**Metric space $R^2 \setminus \{0\}$,with Euclidean metric,is …….**			
	(a)	**Connected and path connected.**	**(b)**	**Connected but not path connected.**
	(c)	**Neither connected nor path connected.**	**(d)**	**path connected but not connected.**

12	**Let X be connected metric space and Y be any metric space then the product space $X \times Y$ …..**				
	(a)	**Is connected.**	**(b)**	**May not be connected.**	
	(c)	**Must be connected.**	**(d)**	**never connected**	
13	**Every convex set is ..**				
	(a)	**Connected.**	**(b)**	**Path connected.**	
	(c)	**Both (a) and (b).**	**(d)**	**None of these.**	
14	**Continuous image of a connected set is always …**				
	(a)	**Path connected.**	**(b)**	**Not path connected.**	
	(c)	**Not connected.**	**(d)**	**None of these.**	
15	**If a metric space X can be written as union of two non-empty,disjoint and open sets then..**				
	(a)	**X is connected.**	**(b)**	**X is separated.**	
	(c)	**X is path connected.**	**(d)**	**None of these.**	
16	**Every continuous function on a connected metric space to a set {-1,1} is …..**				
	(a)	**One-one.**	**(b)**	**Onto.**	
	(c)	**Bijective.**	**(d)**	**Constant.**	
17	**Let A, B and C are subsets of a metric space X such that $A \subseteq B \subseteq C$ and A, C are connected then …..**				
	(a)	**Set B may not be connected.**	**(b)**	**Set B is not connected.**	
	(c)	**Set B is also connected.**	**(d)**	**None of these.**	
18	**If A, B are connected subsets of R^2 with Euclidean metric such that $A \cap B \neq \emptyset$, then**				
	(a)	**Both $A \cup B$ and $A \cap B$ are connected.**	**(b)**	**only $A \cup B$ is connected but $A \cap B$ need not be.**	
	(c)	**Only $A \cap B$ is connected but $A \cup B$ need not be.**	**(d)**	**neither $A \cup B$ nor $A \cap B$ connected.**	
19	**If A, B are closed subsets of a metric space X then $A \cap B^c$ is….**				
	(a)	**Connected.**	**(b)**	**Closed.**	
	(c)	**Separated.**	**(d)**	**None of these.**	
20	**If the characteristic function χ_A is continuous on a non-empty proper subset $A$of metric space X then….**				
	(a)	**X is not connected.**	**(b)**	**X is connected.**	
	(c)	**X is path connected.**	**(d)**	**X is compact.**	
21	**$R^n \backslash \{0_{R^n}\}$ is not path connected if**				
	(a)	**n=3**	**(b)**	**n=4**	
	(c)	**n=1**	**(d)**	**None of these.**	
22	**The set $R^2 \backslash Q \times Q$,Euclidean metric, is….**				
	(a)	**Not connected.**	**(b)**	**Not path connected.**	
	(c)	**Connected.**	**(d)**	**None of these.**	
23	**Let (X, d) be a connected metric space and $f: X \to N$ be a continuous map. Then**				
	(a)	**f is onto.**	**(b)**	**f is one-one.**	
	(c)	**f is bijective.**	**(d)**	**f is constant.**	

24	**The unit circle S^1 , usual distance ,is….**			
	(a)	**Compact and connected**	**(b)**	**Connected but not compact.**
	(c)	**Compact but not connected.**	**(d)**	**Neither compact nor connected.**
25	**If A, B are connected subsets of R with usual metric such that $A \cap B \neq \emptyset$, then the following set may not be connected.**			
	(a)	$A \cup B$	**(b)**	$A \cap B$
	(c)	$A \backslash B$	**(d)**	**$A \times B$ in R^2 (Euclidean distance)**
26	**The component of the set $R \backslash Q$ is**			
	(a)	**An infinite set.**	**(b)**	**A set having more than one element.**
	(c)	**A singleton set.**	**(d)**	**Having exactly two points.**