BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSC **SEMESTER : VIII**
BRANCH: MATHEMATICS & COMPUTING **SESSION : SP/2025**

SUBJECT: MA412 TOPOLOGY

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Find the interior and closure of the set $[a\ b)$ in R_l the set of real numbers with the lower limit topology, where a and b are real numbers.	[5]	1	1
Q.1(b)	Show that the real line R and the plane R^2 are not homeomorphic.	[5]	1	1
Q.2(a)	Prove that the sequence of real valued functions $f_n: [0\ 1] \to R$, defined by $f_n(x) = x^n, x \in [0\ 1]$ is not uniformly convergent.	[5]	2	3
Q.2(b)	Show that R_l the set of real numbers with the lower limit topology is disconnected.	[5]	2	1
Q.3(a)	Define a dense set. Prove that open interval $(2\ 3)$ is dense in the closed interval $[2\ 3]$.	[5]	3	1, 3
Q.3(b)	Define a regular space and a normal space. Also, give an example of each.	[5]	3	1
Q.4(a)	State Heine Borel theorem. Determine the compact subspaces of real line R.	[5]	4	1,4
Q.4(b)	Define one point compactification of a topological space. Give the one point compactification of the real line R.	[5]	4	1
Q.5(a)	Let $f: R \to R$ be the function defined by $f(x) = x$ for all $x \in R$ where R is the real line with the usual metric. Prove that f is uniformly continuous.	[5]	5	3
Q.5(b)	Define sequential compactness. Give one condition on a topological space X which guarantees that compactness and sequential compactness are equivalent?	[5]	5	1

::::::29/04/2025::::::E