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

CLASS: IMSc / MSc **SEMESTER : VIII/II**
BRANCH: PHYSICS **SESSION : SP/2025**

SUBJECT: PH408 STATISTICAL PHYSICS

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)	Define microcanonical, canonical and grand canonical ensembles. What are their distinguishing features?	[4]	1	2
Q.1(b)	Expand the Van der Walls equation of state $(p + a/v^2)(v - b) = RT$ in the form of virial expansion and determine first three virial coefficients.	[6]	1	3
Q.2(a)	What are distinguishing features of Bose-Einstein and Fermi-Dirac statistics.	[4]	2	2
Q.2(b)	Write a brief note on Bose-Einstein condensate and Fermi level energy.	[6]	2	2
Q.3(a)	Write an essay on critical exponents for van der Wall liquid-gas phase transition.	[6]	3	2
Q.3(b)	What are Landau levels?	[4]	3	1
Q.4(a)	Discuss the implication of Ising model using mean field theory	[10]	4	3
Q.5(a)	What is the connection between Brownian motion and diffusion phenomenon.	[5]	5	2
Q.5(b)	Briefly discuss features of the Langevin equation and Fokker-Planck equation.	[5]	5	2

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