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

CLASS: MSc/IMSc **SEMESTER : III/IX**
BRANCH: PHYSICS **SESSION : MO/2025**

SUBJECT: PH502 ADVANCED QUANTUM MECHANICS

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)	Discuss the essential elements of non-degenerate perturbation theory.	[5]	I	IV
Q.1(b)	Find out the first order correction to energy.	[5]	I	I
Q.2(a)	Explain with a diagram spin-orbit interaction.	[5]	I	II
Q.2(b)	Discuss the importance of Born-Oppenheimer approximation.	[5]	II	VI
Q.3(a)	Develop an expression for vector potential of pure radiation field using the method of separation of variables.	[5]	III	III
Q.3(b)	Find also the Hamiltonian of the radiation field due to electric field only	[5]	III	I
Q.4(a)	Discuss briefly the time dependent perturbation theory for a two level system.	[5]	IV	IV
Q.4(b)	Develop Klien-Gordan equation.	[5]	III	III
Q.5(a)	Construct Dirac relativistic equation for a free particle.	[5]	V	VI
Q.5(b)	Develop suitable form of Dirac matrices.	[5]	V	V

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