CLASS: M.Sc. CHEMISTRY **15A/ 257**

St. JOSEPH'S COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 620 002

SEMESTER EXAMINATIONS – APRIL 2015

TIME: 2 Hrs. 20 Mins. **MAXIMUM MARKS: 70**

SEM	SET	PAPER CODE	TITLE OF THE PAPER
II	2014	14PCH2108	PHYSICAL CHEMISTRY – II

SECTION – B

Answer all the questions: **5 x 5 = 25**

31. a. Explain conservation theorem of linear momentum.

OR

b. Explain photo electric effect and mention its significance.

32. a. Set up Hamiltonian operator.

OR

b. Set up angular momentum operator.

33. a. Explain the postulates of quantum mechanics.

OR

b. Explain Pauli exclusion principle based on quantum mechanical approach.

34. a. Construct group multiplication table of C_{3v}:

OR

b. Explain the following

(i) Axis of rotation (ii) Inversion centre

35. a. Discuss the hybridization involved in AB_4 tetrahedral.

OR

b. Write a short note on symmetry in crystals.

SECTION – C

Answer any THREE questions: **3 x 15 = 45**

36. Outline the failure of classical mechanics and the success of quantum theory in explaining the experimental results of black body radiation.

37. a. Define Hermitian operator. (2)

    b. Two eigen functions of a Hermitian operator with different eigen values are orthogonal – Explain. (5)

    c. Distinguish linear and non-linear operator.

38. Setting up Schrodinger wave equation and solving for a particle in a 1D box.

39. a. Explain Great orthogonality theorem. (G.O.T)

    b. Explain how G.O.T helps to construct character table.

40. Find out the symmetric of normal modes of ammonia and predict using group theory which of these vibrations are IR active and Raman active.

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