MAR ATHANASIUS COLLEGE OF ENGINEERING, KOTHAMANGALAM - 686666
(GOVERNMENT AIDED AUTONOMOUS ENGINEERING COLLEGE)
DEPARTMENT OF SCIENCE AND HUMANITIES
FIRST SESSIONAL EXAMINATION, OCTOBER 2026
ENGINEERING CHEMISTRY (A)

(B24CY1T01A)

(S_1: EC_A, EC_B, CS, DS, AI&ML)

(Answer all Questions)

Time: 1.5 Hours **Maximum: 40 Marks**

Part A

1. Why nanomaterials are better catalysts compared to bulk materials? **(CO1) (3 Marks)**
2. What are nanomaterials? Give two important properties of nanomaterials. **(CO1) (3 Marks)**
3. Why does the electronic spectrum appear to be broad? **(CO2) (3 Marks)**
4. Calculate and draw the vibrational modes of CO_2. **(CO2) (3 Marks)**

Part B

5. **(a)** How nanomaterials are classified based on structure and dimension. **(CO1) (8 Marks)**

   (b) Distinguish nanomaterials and bulk materials. **(CO1) (6 Marks)**

6. **(a)** Explain the different types of electronic transitions that can occur in a molecule. Give an example for each transition. Draw the energy level diagram to represent these transitions. **(CO2) (8 Marks)**

   (b) Which molecule is IR active, O_2 or CH_4? Give the reason for its IR activity. The CO molecule shows IR absorption at 2140 cm^{-1}. Calculate the force constant of the chemical bond. Given that the atomic masses of C = 12 amu and O = 16 amu. **(CO2) (6 Marks)**

VISION

Excellence in Education through Resource Integration

MISSION

The institution is committed to transform itself into a centre of excellence in Technical Education upholding the motto "Knowledge is Power". This is to be achieved by imparting quality education to mould technically competent professionals with moral integrity, ethical values and social commitment and by promoting innovative activities in the thrust areas emerging from time to time.

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