

SECTION- C

3. Attempt any *one* part of the following: **7 x 1 = 7**

- a. Explain the structure, properties and applications of graphite.
- b. What are liquid crystals? Differentiate between Nematic and smectic liquid crystal?
Write two applications of liquid crystals.

4. Attempt any *one* part of the following: **7 x 1 = 7**

- a. What are organometallic compounds? Write their classification, preparation and applications.
- b. Write the preparation, properties and applications of: (i) Nylon -6 (ii) Bakelite.

5. Attempt any *one* part of the following: **7 x 1 = 7**

- a. What is Portland cement? Write the reactions involved in setting and hardening of cement.
- b. What are lubricants? Explain the theories of lubrication.

6. Attempt any *one* part of the following: **7 x 1 = 7**

- a) Define Phase rule. Apply phase rule to water system
- b) Describe Zeolite process of water softening. A zeolite softener was 90% exhausted by removing the hardness completely when 10,000 litres of hard water was passed through it. The exhausted zeolite bed required 200 litres of 3% sodium chloride solution for its complete regeneration. Calculate the hardness of water sample.

7. Attempt any *one* part of the following: **7 x 1 = 7**

- a. What is rank of coal? Describe proximate and ultimate analysis of coal.
- b. i. Explain shielding and deshielding in NMR spectroscopy.
ii. An aromatic compound (Molecular mass=135) give the following signals in NMR Spectrum.
(i) Singlet (2.09 δ), 3H (ii) A distorted singlet (3.09 δ), 1H
(iii) A multiplet (7.27 δ), 3H (iv) A multiplet (7.75 δ), 2H.
Predict the structure of the compound.