

June : 2026

CHEMISTRY

Paper: SEC-CHM-201

Coal and Petroleum Chemistry

Time: 2 Hours

Total Mark: 45

(The figures in the right margin indicate full marks of the questions)

1. Choose the correct option:

1×6=6

- a) The catalyst used in Fischer-Tropsch process for the synthesis of methane is—
(i) Cu (ii) Fe
(iii) Mg (iv) Ti
- b) Producer gas mainly consists of—
(i) CO & CO₂ (ii) CO & H₂
(iii) CO & N₂ (iv) CO & O₂
- c) An example of naphthene is—
(i) Cyclopentane (ii) Isopentane
(iii) Cumene (iv) Pyrrole
- d) During thermal cracking the intermediate formed is—
(i) Carbocation (ii) Carbanion
(iii) Free radical (iv) Carbene
- e) Tricresyl phosphate is an example of—
(i) Base oil (ii) Additive
(iii) Friction modifier (iv) Thickener
- f) Polytetrafluoroethylene is a—
(i) Solid lubricant (ii) Liquid lubricant
(iii) Synthetic lubricant (iv) Semi-solid lubricant

2. Answer the following questions (*any six*): $2 \times 6 = 12$

- a) What are renewable and non-renewable energy sources? Give example of each. $1+1=2$
- b) How fuels are classified based on their origin? Give examples. 2
- c) Write the four primary stages of fractional distillation. $\frac{1}{2} \times 4 = 2$
- d) What are the important changes taking place during cracking? 2
- e) Write four advantages of synthetic lubricant. 2
- f) What are the differences between base oil and additives? 2
- g) What is carbonization of coal? Write two major applications of this process. $1+1=2$

UNIT I

3. Answer the following questions (*any three*): $3 \times 3 = 9$

- a) Discuss the composition, types, and uses of coal gas. 3
- b) Write the chemical formula of water gas and how it is prepared? $1+2=3$
- c) Write the uses of three coal tar bases chemicals. 3
- d) Discuss the environmental effects of fossil fuel. 3

UNIT II

4. Answer the following questions (*any three*): $3 \times 3 = 9$

- a) Discuss the major advantages of biogas. 3
- b) How is vinyl acetate made from acetylene? What are the uses of vinyl acetate? $2+1=3$
- c) Discuss three important properties of CNG. 3
- d) What are octane and cetane number? Discuss with examples. $1 \frac{1}{2} \times 2 = 3$

UNIT III

5. Answer the following questions (*any three*): $3 \times 3 = 9$

- a) What are viscosity index, cloud point and pour point? $1+1+1=3$
- b) Which form of lubricant is grease? Mentions their advantages and disadvantages. $1+1+1=3$
- c) Write short notes (*any two*): $1 \frac{1}{2} \times 2 = 3$
 - (i) Thickener.
 - (ii) Extreme pressure additive.
 - (iii) Friction modifier.
- d) State the factors on which the electrical conductivity of lubricating oils depends. 3
