**2024/TDC (CBCS)/EVEN/SEM/
CHMSEC–401T/306**

TDC (CBCS) Even Semester Exam., 2024

CHEMISTRY

(4th Semester)

Course No. : CHMSEC–401T

(Fuel Chemistry)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

UNIT—I

1. Answer any *three* of the following questions :

1×3=3

(a) What is the fuel source for nuclear energy?

(b) Mention two uses of wind energy.

(c) What is primary fuel?

(d) What is calorific value?

(*Turn Over*)

(2)

2. Answer any *one* of the following questions : 2

(a) Write a brief note on solar energy.

(b) Define renewable and non-renewable energies. Give examples.

3. Answer any *one* of the following questions : 5

(a) (i) Write a brief note on the classification of fuel. 3

(ii) Explain the significance of calorific value. 2

(b) (i) Write a brief note on biodiesel. 2

(ii) A person needs 10000 kJ of energy per day. How much carbohydrate (in mass) should he consume? (Assume all energy needs are consumed by carbohydrate in the form of glucose) Heat of combustion of glucose is 2900 kJ mol^{-1}. 3

UNIT—II

4. Answer any *three* of the following questions : 1×3=3

(a) What do you mean by carbonisation?

(b) What is pitch?

(c) Mention two uses of producer gas.

(d) Define water gas.

(3)

5. Answer any *one* of the following questions : 2

(a) Write a brief note on the uses of coal-tar based chemicals.

(b) Write the composition and uses of coal gas.

6. Answer any *one* of the following questions : 5

(a) What is coal-tar? Explain, in detail, the distillation of coal-tar and the various fractions obtained. 1+4=5

(b) (i) Write the composition of water gas and producer gas. 2

(ii) Discuss the various uses of coal (fuel and non-fuel) in various industries. 3

UNIT—III

7. Answer any *three* of the following questions : 1×3=3

(a) What catalyst is used during catalytic cracking?

(b) Give two examples of non-petroleum fuel.

(c) Explain the term 'LPG' and mention its composition.

(d) Write two advantages of biodiesel.

(4)

8. Answer any *one* of the following questions : 2

(a) What is meant by cracking of petroleum?

(b) Mention two advantages each of gaseous and liquid fuel.

9. Answer any *one* of the following questions : 5

(a) Explain the term 'refining of petroleum'. Write the various fractions obtained on fractionation of petroleum and mention their uses. 2+3=5

(b) Illustrate the various types of cracking process with suitable example. 5

UNIT—IV

10. Answer any *three* of the following questions :
1×3=3

(a) Define the term 'petrochemical'.

(b) Write the structure and IUPAC name of isoprene.

(c) Write the reaction for preparation of vinyl acetate.

(d) Mention two uses of xylene.

(5)

11. Answer any *one* of the following questions : 2

(a) Discuss, in brief, the process of obtaining propylene oxide.

(b) Mention the natural source of toluene and its uses.

12. Answer any *one* of the following questions : 5

(a) Describe the method of production of butadiene using *n*-butane as the feed stock. 5

(b) How is isoprene manufactured from propylene? Mention its industrial importance. 3+2=5

UNIT—V

13. Answer any *three* of the following questions :
1×3=3

(a) How are lubricants classified?

(b) Define pour point.

(c) Mention two characteristics of a lubricant.

(d) Write two examples of synthetic lubricant.

(6)

14. Answer any *one* of the following questions : 2

(a) What are nonconducting lubricating oils?

(b) Write examples of solid and semisolid lubricants.

15. Answer any *one* of the following questions : 5

(a) What is meant by viscosity index? Explain the process of determination of viscosity index of a lubricating oil. 2+3=5

(b) Write notes on the following : 2½×2=5

(i) Cloud point

(ii) Conducting lubricating oil

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