TDC (CBCS) Even Semester Exam., 2022

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

SECTION—A

Answer any *fifteen* of the following questions : 1×15=15

1. Define biomass.

2. Mention two disadvantages of solar energy.

3. What is calorific value?

4. What is primary fuel?

5. Define producer gas.

6. What do you mean by carbonisation?

7. Write the names of two coal-tar-based chemicals.

8. What is pitch?

9. Explain what is synthetic petrol.

10. Mention the range of carbon composition in diesel oil.

11. Explain the term 'LPG' and mention its composition.

12. Write two advantages of biodiesel.

13. Define the term 'petrochemical'.

14. Under which group petrochemicals are classified as product of petroleum?

15. Write the structure and IUPAC name of isoprene.

16. Write the reaction for preparation of butadiene from *n*-butane.

17. Mention two characteristics of a lubricant.

18. What is complete fluid lubrication?

19. Define pour point.

20. What is conducting lubricating oil?

SECTION—B

Answer any *five* of the following questions : 2×5=10

21. Define renewable and nonrenewable energies and give two examples for each of them.

22. Write two advantages each for wind and solar energy.

23. What are solid fuels?

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

25. Explain catalytic cracking with a suitable example.

26. Mention two advantages each of liquid and gaseous fuel.

27. Give the IUPAC names for *(a)* vinyl acetate and *(b)* propylene oxide.

28. Discuss in brief the process of obtaining propylene oxide.

29. Mention four properties of a good lubricant.

30. Give examples of solid and semisolid lubricants.

SECTION—C

Answer any *five* of the following questions : 5×5=25

31. *(a)* Write a brief note on the classification of fuels. 3

(b) How is calorific value calculated? 2

32. *(a)* The thermochemical equations for solid and liquid rocket fuels are—

$$2Al(s) + \frac{3}{2}O_2(g) \rightarrow Al_2O_3(s);$$

$$\Delta H = -1667 \cdot 8 \text{ kJ mol}^{-1}$$

$$H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(e);$$

$$\Delta H = -285 \cdot 9 \text{ kJ mol}^{-1}$$

(i) Which of the two is a better fuel?

(ii) Find ΔH for

$$Al_2O_3(s) \rightarrow 2Al(s) + \frac{3}{2}O_2(g)$$ 2+1=3

(b) Write a brief note on Biodiesel. 2

33. What is coal-tar? Discuss in detail the distillation of coal-tar and the various fractions obtained. 1+4=5

34. Mention the composition of coal gas, producer gas and water gas. Write a few uses of them. 3+2=5

35. What is refining of petroleum? Write the various fractions obtained on fractionation of petroleum and mention their uses. 2+3=5

36. *(a)* Discuss in detail the various types of cracking process. 3

(b) Define CNG and LNG. 2

37. *(a)* Discuss the process of manufacture of xylene from petroleum fraction. 4

(b) What is selective sulphonation? 1

38. Write the processes of manufacture of butadiene and isoprene from petroleum fraction. 2½+2½=5

39. Write notes on the following : 2½×2=5

(a) Synthetic lubricants

(b) Classification of lubricants

40. Define the following terms with reference to lubricants : $2\frac{1}{2} \times 2 = 5$

(a) Viscosity index

(b) Cloud point

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