Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2022

EN3BS04 Engineering Chemistry

Programme: B.Tech. Branch/Specialisation: All

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Which one of the following is complexometric titration? **1**

(a) FAS Vs $K_2Cr_2O_7$ (b) $FeSO_4$ Vs $KMnO_4$

(c) Hard water Vs EDTA (d) Acid Vs Base

ii. Colloidal conditioning of boiler is done by using - **1**

(a) Calgon (b) EDTA (c) Ion-exchanger (d) Lignin

iii. What is power alcohol? **1**

(a) Ethanol + Petrol (b) Ethanol + Diesel

(c) Methanol + Petrol (d) Methanol + Diesel

iv. Which of the following contain highest percentage of volatile matter? **1**

(a) Peat (b) Lignite

(c) Bituminous coal (d) Anthracite

v. Greases are not used to lubricate- **1**

(a) Rail axle boxes (b) Gears

(c) Delicate instruments (d) Both (a) & (b)

vi. Tetrafluoroethylene is a monomer of - **1**

(a) Nylon 6,6 (b) Teflon

(c) Polythene (d) PVC

vii. In rotary cement kiln, quick lime is obtained in which of the following zone? **1**

(a) Drying (b) Clinkering

(c) Calcination (b) Both (a) & (b)

viii. Carborundum is an example of - **1**

(a) Neutral refractory (b) Cement component

(c) Acidic refractory (d) Basic refractory

P.T.O.

ix. In GSC and GLC, stationary phases are respectively - **1**
(a) Solid and liquid (b) Liquid and solid
(c) Liquid and gas (d) Solid and gas

x. EMF stands for **1**
(a) Electromotive force (b) Electromagnetic force
(c) Electron-magnetron force (d) Both (a) & (c)

Q.2 i. What is hardness? Mention various units used for its expression and show their relation also. **3**

ii. How is boiler feed water softened by zeolite method? Write the chemical reaction involved during the softening process. **7**

OR iii. Calculate the quantities of lime (84% pure) and soda (92% pure) in Kg, for softening three lakh litres of water using 32.8ppm of sodium aluminate as a coagulant. The impurities present in water are as follows: Ca^{2+}: 240ppm Mg^{2+}: 96ppm HCO_3^-: 732 ppm, Dissolved CO_2: 44ppm, NaCl: 60ppm, Fe_2O_3: 160ppm **7**

Q.3 i. Define gross and net calorific value of a fuel? Write Dulong's formula for calorific values. **2**

ii. Write three differences between octane number and cetane number **3**

iii. Explain the manufacturing of synthetic petrol by Fischer-Tropsch's method. Draw a neat, labelled diagram. **5**

OR iv. A boiler is fired with coal having the following percentage composition by weight: C: 75% H: 9% S: 2% O: 4% N: 3% ash: 7%. (i) Calculate minimum oxygen and air required for combustion of 1 Kg of coal by weight. (ii) Minimum air required by weight if 20% excess air is used. **5**

Q.4 i. Define viscosity index. A lubricating oil has the same viscosity as its standard naphthenic and paraffinic type oils at 210°F, their viscosity at 38°C are 325, 430 and 260 respectively. Find the viscosity index of the oil. **4**

ii. Explain the following properties of lubricants and discuss their importance. **6**
(a) Cloud and pour point (b) Flash and fire point

OR iii. Give the preparation reaction, properties, and uses of the following polymers: **6**
(a) Nylon-6,6 (b) PVC

Q.5 i. Write an informative note on fullerene. **4**

ii. Describe the manufacturing of portland cement with the help of neat, labelled diagram of rotary kiln. Also mention the reactions in each zone. **6**

OR iii. Discuss the following properties of refractory material: **6**
(a) Refractoriness (b) Thermal spalling

Q.6 Attempt any two:

i. Discuss gas chromatography under the following headings: **5**
(a) Principle (b) Block diagram
(c) Process (d) Uses

ii. Give the principle and application of IR spectroscopy. Discuss modes of vibration involved. **5**

iii. Give principle, block diagram of spectrophotometer and list various application of UV spectroscopy. **5**

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