BT-MRE-I-12.19-1473 Reg. No. | | | | | | | | |

A

B.Tech. Degree I Semester Examination in Marine Engineering December 2019

19-208-0103 ENGINEERING CHEMISTRY

(*2019 Scheme*)

Time: 3 Hours Maximum Marks: 60

(5 × 15 = 75)

I. (a) With the help of a neat diagram explain the Reverse osmosis process.

(b) 0.30g of $CaCO_3$ was dissolved in HCl and the solution was made into 1 litre with distilled water. 100ml of the above solution required 30ml of EDTA solution. 100ml of hard water required 33ml of EDTA solution on titration. After boiling, 100ml of this water required 10ml of EDTA solution. Calculate the temporary and permanent hardness of water.

(c) Discuss the sources of air pollution.

OR

II. (a) Explain the working of electrodialysis cell.

(b) Correlate BOD and COD. Give the significance of BOD in water analysis.

(c) A sample of water on analysis gives following results. Ca^{2+}=320mg/l, Mg^{2+}=72mg/l, HCO_3^- = 610mg/l, Cl^- = 355mg/l, and Na^+ =23mg/l. Calculate the temporary and permanent hardness of water sample.

III. (a) What is single electrode potential? Derive Nernst's equation for single electrode potential.

(b) Explain the working of Weston-Cadmium cell with a neat diagram and equations.

(c) Write short notes on :(i) Edisson Cell (ii) Potentiometric titrations

OR

IV. (a) Write notes on (i) Liquid crystal display (ii) Non-stoichiometric defects in crystals

(b) Calculate the emf of the following electrochemical cell at 25^0C:

Cu / $Cu^{2+}_{c=0.1M}$ // $H^{+}_{c=0.01M}$ / H_2(1 atm.), Pt (E^0_{Cu} = 0.34v)

(c) Write brief notes on (i) OLED (ii) Fullerenes

V. (a) Explain the theory of electrochemical corrosion of metals taking iron as example.

(b) Discuss the methods available for metallic coating

(c) Write notes on (i) Pilling – Bedworth rule (ii) Special paints

OR

VI. (a) Discuss any four factors influencing rate of corrosion of metals.

(b) What are the different ingredients of paints? Explain their functions.

(c) Describe sacrificial anode protection and impressed current cathodic protection.

(P.T.O.)

VII. (a) Describe proximate analysis of coal. What is the significance of this analysis?

(b) What are the characteristics of a good fuel?

(c) Describe the Fischer-Tropsch process for the preparation of synthetic petrol.

OR

VIII. (a) Describe the determination of calorific value of a fuel by Bomb calorimeter method.

(b) The temperature of 1000g. of water was increased from 26.2^0C to 29.8^0C on burning 0.80 g of a solid fuel in a bomb calorimeter. Water equivalent of calorimeter is 385g. If the fuel contains 7.07% hydrogen, calculate its gross and net calorific values.

(c) Write notes on (i) Fuel cells (ii) LPG and LNG

IX. (a) Describe the preparation, properties and applications of (i) polyurethanes (ii) Thiokol rubber

(b) Distinguish between thermplastic and thermosetting plastics. Give one example each. Give equations for their preparations.

(c) What is rneant by vulcanization? Explain.

OR

X. (a) Give the method of preparation, properties and important uses of the following polymers. (i) Polystyrene (ii) PVC (iii) Teflon (iv) Phenol-formaldehyde resin

(b) A ship model of scale $\frac{1}{40}$ is towed through sea water at a speed of 1 m/s. A force of 2 N is required to tow the model. Determine the speed of ship and the propulsive force on the ship, if prototype is subjected to wave resistance only.

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