Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 50404

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

First Semester

Civil Engineering

CY 6151 – ENGINEERING CHEMISTRY – I

(Common to all branches except Marine Engineering)

(Regulations 2013)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions.

PART – A   **(10×2=20 Marks)**

1. What is degree of polymerization ? Write the relationship between degree of polymerization and molecular weight.

2. Write the equation expressing viscosity and the weight average chain length (Zw).

3. Write all the three criteria for spontaneity of process.

4. Write any three Maxwell's relationships.

5. What are the fluorescence and phosphorescence ?

6. Which among the following is (are) IR active ? Why ?

   a) CO_2 b) N_2 c) H_2

7. Find the number of phases and components present in the following equilibria :

   i) $CaCO_3$ (s) $\rightleftharpoons$ CaO (s) + CO_2 (g)

   ii) ice (s) $\rightleftharpoons$ water (I) $\rightleftharpoons$ vapour (g)

8. What are the characteristics of eutectic point ?

9. What are nanoclusters and nanorods ?

10. What are the applications of CNT ?

PART – B   (5×16=80 Marks)

11. a) i) What is solution polymerization ? Discuss its advantages and disadvantages.   (8)

    ii) Give the expressions for the various molecular weights of a polymer.   (8)

(OR)

b) Discuss the various steps involved in chain or vinyl or radical polymerization. (16)

12. a) i) Derive Van't Hoff Isotherm and Van't Hoff equation.   (10)

    ii) Derive integrated form of Van't Hoff equation.   (6)

(OR)

b) i) The free energy change ΔG for a reaction is –3.138K Cal at 27°C and $(\partial \Delta G / \Delta T)$ is 14.39 Cal/deg. Find ΔH for the reaction at 300 K.   (8)

   ii) 18 g of water at 95°C is placed in a thermostat at 298 K. Calculate ΔS for the system (water) and for the surroundings (thermostat) if the mean molar heat capacity of water is 75.3JK^{-1}.   (8)

13. a) Draw the block diagram of UV or vis or IR spectrophotometer and list the various sources, monochromators, sample holders and detectors used in the above spectrophotometers.   (16)

(OR)

b) i) Draw Jablonski diagram and indicate the various photo processes.   (8)

   ii) Briefly discuss about different electromagnetic radiations and their interaction with matter.   (8)

14. a) i) How do the properties of metal improve by alloying ?   (8)

    ii) Give short notes on ferrous and non-ferrous alloys.   (8)

(OR)

b) With phase diagram of lead-silver system, apply phase rule and indicate the phases present in various parts of the diagram.   (16)

15. a) Discuss any three methods of synthesis of carbon nano tubes.   (16)

(OR)

b) i) Give the distinction among molecules, nanoparticles and bulk materials.   (6)

   ii) How the properties of nanomaterials are different from bulk materials ?   (10)

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