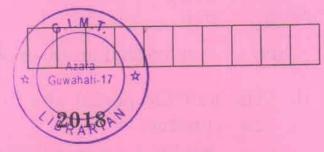
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CH 171202

Roll No. of candidate



B.Tech. 2nd Semester End-Term Examination

ENGINEERING CHEMISTRY - II

(New Regulation)

Full Marks - 70

Time - Three hours

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

Answer Q.No. 1 and any four from the rest.

1. Answer ALL questions:

 $(10 \times 1 = 10)$

- (a) The crystal systems are classified into
 - (i) 32 types
- (ii) 14 types
- (iii) 7 types
- (iv) 5 types
- (b) The porosity is an important property of refractory bricks, it increases
 - (i) chemical stability
 - (ii) resistance to corrosion
 - (iii) thermal conductivity
 - (iv) resistance to thermal spalling

(c)	Whi	ch of the following is a conducting polymer?
	(i)	Polythene
	(ii)	Polytetra fluroethylene
	(iii)	
	(iv)	Poly methyl methacrylate
(d)		half life period of a second order reaction product is
	(i)	directly proportional to initial concentration
	(ii)	independent of initial concentration
	(iii)	inversely proportional to initial concentration
	(iv)	directly proportional to the square of the initial concentration
(e) The constituents of cement that causes initial setting is		
	(i)	dicalcium silicate
	(ii)	tricalcium aluminate
	(iii)	tetra calcium alumino ferrite
	(iv)	tricalcium silicate
(f)	Natu	ural rubber is a high polymer of ———.
(g)		ng germanium with phosphorus produces type semi conductors
(h)	Liqu	id crystals are — like crystals.
(i)		calorific values of — coal is the est among different coals.
(j)	The	catalyst that increases the speed of a ion is called ———————— catalyst.

- 2. (a) Distinguish between number average and weight average molecular weight of a polymer.
 - (b) What are the monomers used for each of the following polymers? Give commercial application of each.
 - (i) Bakelite
 - (ii) Teflon
 - (iii) PVC
 - (iv) Polymethyl meth acrylate
 - (c) Bring out differences between thermoplastic and thermo setting plastics. (4+8+3=15)
- 3. (a) Calculate the miller indices of the plane whose intercepts are (2a,3b,2c) and $(\frac{1}{2}a,\frac{1}{2}b,\alpha c)$.
 - (b) Supposing the edge length of a cube to be 'a' calculate the interplanar distance $d_{(hkl)}$ between the set of planes
 - (i) 200
 - (ii) 222.
 - (c) Derive Bragg's equation for diffraction of x-rays by crystals.
 - (d) In Bragg's reflection of X-rays a reflection was found at 30° with lattice plane spacing 1.87A. If this is a second order reflection calculate the wave length of X-rays. (2+3+5+5=15)
- 4. (a) Define order and molecularity of a reaction.

 Distinguish between the two.
 - (b) Derive rate constant for a first order reaction.

 Calculate the half life period of first order reaction.

- (c) The specific rate constant of a first order reaction is 4.0×10^{-5} min⁻¹ at 25°C and 8.0×10^{-4} min⁻¹ at 45°C. Calculate the energy of activation for the reaction. (5 + 5 + 5 = 15)
- 5. (a) What are liquid crystals? How are they classified? Discuss the properties of cholesteric liquid crystals. State the application of liquid crystals in
 - (i) Thermography
 - (ii) Radiation sensors.
 - (b) What are the characteristics of a good fuel? (2+2+4+4+3=15)
- 6. (a) What is meant by calorific value of a fuel?
 - (b) Calculate the gross and net calorific value of a sample of coal having composition

$$e = 80\%$$
, $H = 7\%$, $O = 3\%$, $N = 1.5\%$, $S = 2.5\%$.

- (c) Define octane number of fuel. How is it related to its chemical constituents?
- (d) How does reforming of petrol increase its octane number? (2+5+5+3=15)
- 7. (a) What are refractories? Explain refractoriness and thermal spalling.
 - (b) Discuss in brief the manufacture of port land cement by wet process.
 - (c) Based on band theory explain the classification of substances into conductors, semi conductors and insulators. (6 + 6 + 3 = 15)