

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, November 2017
B. Tech. in Chemical Engineering, Semester III

Roll No.....

CHE306: Chemical Engineering Materials

Time: 3.00 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
 2. Assume suitable data wherever required and mention it clearly.
 3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
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Q.1 Objective type (1 marks each)

10

- i. Draw the plane (100) and (112) in cubic system.
- ii. The number of vacancies in a crystal _____ with decrease in temperature (decreases/ increases)
- iii. In edge dislocation, Burgers vector is _____ to the dislocation line. (Parallel/ Perpendicular).
- iv. Iron at room temperature has
(a) BCC structure (b) FCC structure
(c) HCP structure (d) none of the above
- v. In the Phase diagram, the curve above which the alloy is in the liquid state for all compositions is called_____.
- vi. Thermosetting plastics are plastics that can be
(a) remolded (b) cannot be remolded
(c) not affected by heat (d) repeated heating permitted for these
- vii. Cast iron normally contains
(a) 1 to 1.5 percent carbon (b) 2 to 4 percent carbon
(c) less than 1 percent carbon (d) none of these
- viii. Fick's law describes flow of atoms caused by
(a) temperature gradient (b) electric potential gradient
(c) concentration gradient (d) electric field gradient
- ix. Write the relation of atomic radius and edge length in case of BCC and FCC.
- x. The coordination number in FCC structure is
(a) 6 (b) 8 (c) 12 (d) 10

Q.2	Short answer type questions (2.5 marks each)	10
i.	What do you mean by Stress and Strain?	
ii.	X-ray of wavelength $1.65\text{\AA}$ strike at an angle 22.5° . Assuming that $n=1$, calculate the spacing between the planes responsible for reflection?	
iii.	Explain the term Poisson's Ratio.	
iv.	Explain the term Austenite and cementite in iron carbon system.	
Q.3A	Define the Burger vector? Explain the Screw dislocation with diagram.	5
Q.3B	Define Unit cell? Calculate the atomic packing factor for HCP structure.	5
Q.4A	What is diffusion? Explain steady state diffusion.	5
Q.4B	A BCC element of density 10.3 gm/cm^3 has a cell edge of 314 pm . Calculate the atomic mass of the element. (Avagadro's No. $N_A = 6.023 \times 10^{23}\text{ mol}^{-1}$).	5
Q.5A	What is Hook's law? Explain Young's modulus, bulk modulus and modulus of rigidity.	5
Q.5B	What do you mean by Vacancy? Explain the Frankel defect in ionic crystals with diagram.	5
Q.6A	Explain the term glass transition temperature for polymers.	5
Q.6B	What is a TIE line? Explain the Liver rule through suitable phase diagram.	5
Q.7A	Derive the Bragg's equation to calculate the distance between two parallel planes of a crystal.	5
Q.7B	What is polymer? Give the classification of polymers on the bases of structure.	5
OR		
Q.7B	Explain the number average and weight average molecular weight of polymers.	5
Q.8	What is Elastic and Plastic deformation? Explain the Slip and Twinning in plastic deformation.	10
OR		
Q.8	Draw and explain the salient features of the phase diagram of Pb -Sn alloy.	10
Q.9	What is Solid solution? Explain the Substitutional and interstitial solid solution with suitable examples and figures.	10
OR		
Q.9	A tensile stress is to be applied along the long axis of a cylindrical brass rod that has a diameter of 10 mm . Determine the magnitude of the load required to produce a $2.5 \times 10^{-3}\text{ mm}$ change in diameter if the deformation is entirely elastic. Given The Poission's ratio for brass is 0.34 and modulus of elasticity is 97GPa .	10
Q.10	What are the different Phases of Iron? Draw the Iron carbon phase diagram and explain all the salient features of the diagram.	10