P P SAVANI UNIVERSITY

Third Semester of B. Tech. Examination

May 2019

SECH2040 Chemical Engineering Materials & Metallurgy

25.05.2019, Saturday **Time: 09:00 a.m. To 11:30 a.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1 MCQ (Any Five) **[05]**

(i) Time temperature transformation diagrams are drawn for _____

a) Iron
b) Manganese
c) Any alloy
d) Only steel

(ii) In which of the following defect the density of the crystal is affected?

a) Schottky defect
b) Frenkel defect
c) Stone-Wales defect
d) Antisite defect

(iii) Frenkel defect belongs to which of the following classes?

a) Point defect
b) Linear dislocation
c) Interfacial defect
d) Bulk defect

(iv) Which of the following is true for polymers?

a) They have very high molecular mass
b) They do not have a linear stress-strain curve
c) They have high strength to mass ratio
d) All of the mentioned

(v) Which of the following element when alloyed with magnesium does not reduce the tendency to crack under stress?

a) Aluminum
b) Silicon
c) Zinc
d) Copper

(vi) In a single – component condensed system, if degree of freedom is zero, maximum number of phases that can co – exist _____

a) 2
b) 3
c) 0
d) 1

(vii) Which of the following is the property because of which a material can be drawn into wires?

a) Ductility

b) Elasticity
c) Malleability
d) Strength

Q - 2 (a)	Explain crystal structure of metals.	[05]
Q - 2 (b)	Discuss types of defects in crystals.	[05]

OR

Q - 2 (a)	Write short note on screw dislocation.	[05]
Q - 2 (b)	Explain deformation by slip and twinning.	[05]
Q - 3 (a)	Discuss the classification of heat treatment methods used in industries.	[05]
Q - 3 (b)	Describe annealing, normalizing, aus-tempering in short.	[05]

OR

Q - 3 (a)	Discuss quenching and temper heat treatment method with applications.	[05]
Q - 3 (b)	Explain flame and induction hardening, carburizing, nitriding and carbonitriding.	[05]
Q - 4	Attempt any one.	[05]
(i)	Discuss solidification of metals and alloys in detail with figure.	
(ii)	Explain nucleation and growth phenomenon in solidification process of metal.	

SECTION – II

Q - 1	Short Question (Any Five)	[05]
(i)	List out properties and application of green solvents.	
(ii)	Differentiate between asymmetric and symmetric membrane.	
(iii)	Cite examples of nanomaterial which can absorb and store hydrogen gas.	
(iv)	Why is micro emulsion thermodynamically stable?	
(v)	Write properties and uses of silicon carbide.	
(vi)	What do you understand by micro emulsion ?	
(vii)	How does protein works as enzyme ?	
Q - 2 (a)	Membrane separation processes are better than conventional processes. Explain	[05]
Q - 2 (b)	Discuss some colloidal materials and their industrial applications in brief.	[05]

OR

Q - 2 (a)	Explain the process of micelle formation.	[05]
Q - 2 (b)	Discuss the following terms : Microbial polymers, Green solvents, Hydrogel, stimuli responsiveness hydrogel.	[05]
Q - 3 (a)	Write short note on industrial enzymes.	[05]
Q - 3 (b)	Explain nano materials and bucky balls with industrial examples.	[05]
	Explain the properties of ceramics, ceramic Matrix, crystalline and non-crystalline ceramic systems.	

OR

Q - 3 (a)	Describe advanced materials with special reference to the applications in chemical Industries.	[05]
Q - 3 (b)	Explain the terms :- Elastomers, Advanced Polymer Conductive Polymer, Bio-Route Prepared Nano Polymer, Blended Polymer, Self-Cleaning Polymer Surfaces.	[05]
Q - 4	Attempt any one.	[05]
(i)	Explain polymer. Discuss the application of polymer in the industries.	
(ii)	Explain polymer processing and polymer matrix with properties and applications.	

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