Q. Code: 954163

Reg. No. | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Sixth Semester

CH16602 – MATERIALS SCIENCE AND TECHNOLOGY

(Chemical Engineering)

(Regulation 2016)

Time: Three Hours **Maximum : 100 Marks**

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

		CO	RBT
1.	How modulus of elasticity is determined for a material showing non-linear stress-strain behavior?	1	U
2.	List are the technological properties one must consider for selecting materials in process industries?	3	R
3.	Distinguish substitution and interstitial solid solutions.	1	AN
4.	Compare elastic, anelastic and viscoelastic behavior of a material with the help of a stress- strain curve.	3	AN
5.	Write the significance of phase diagram for an isomorphous system and mention their limitations.	2	AP
6.	With an example, write the application of Lever rule for a two-component system.	2	AP
7.	Draw and label various regions of TTT and CCT curves.	3	AN
8.	Distinguish ferrous and nonferrous alloys.	1	AN
9.	List the key criteria for defining nanomaterials?	4	R
10.	Give any two examples for one, two- and three-dimensional nanomaterials.	4	U

PART B - (5 X16 = 80 Marks)

11.	(a)	Explain in detail the factors to be considered and the procedure to be followed while selecting materials for industrial application.	(16)	3	AN
		(OR)			
	(b)	Write in detail the thermal properties of materials and compare the specific heat, heat capacity and thermal conductivity of metals, ceramics and polymers.	(16)	3	AN

12.	(a)	Write a note on plastic deformation by slip and twinning. Write in detail the mechanisms and conditions under which these deformations occur.	**(16)**	**4**	**U**
		(OR)			
	(b)	Classify various crystalline defects and write a note on strengthening mechanism of metals.	**(16)**	**4**	**U**
13.	(a)	(i) Model the phase diagram for a completely miscible binary system and explain its important features.	**(8)**	**2**	**AP**
		(ii) Draw the phase diagram of Ag-Pt system and explain important invariant reactions in the system.	**(8)**	**2**	**AP**
		(OR)			
	(b)	Draw iron-iron carbide equilibrium diagram, subdivide into different phases and explain the microstructural changes happening during phase transformation.	**(16)**	**2**	**AP**
14.	(a)	Compare Bessemer converter, open hearth and Basic oxygen process of steelmaking.	**(16)**	**1**	**U**
		(OR)			
	(b)	Discuss about the properties of pig iron, cast iron and mild steel and their respective applications.	**(16)**	**1**	**U**
15.	(a)	(i) Classify the two general approaches available for synthesis of materials with examples.	**(6)**	**4**	**R**
		(ii) List various properties of nanomaterials and discuss its application in detail.	**(10)**	**4**	**R**
		(OR)			
	(b)	List the techniques available for characterization of nanomaterials and explain any two in detail.	**(16)**	**4**	**R**