Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–III EXAMINATION – SUMMER 2016

Subject Code:X31902 **Date:30/05/2016**

Subject Name:Material Science & Metallurgy

Time:02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	(a)	Which are advantages and limitations of powder metallurgy?	07
	(b)	State the importance of study of "Material science" and briefly Explain "Engineering Requirements" of materials	07
Q.2	(a)	What are the applications of powder metallurgy?	07
	(b)	What is Gibb's Phase rule? Define system phase and degree of freedom. Show that the degree of freedom at eutectic point in a binary phase diagram is zero.	07
		OR	
	(b)	Explain selection criteria for engineering materials.	07
Q.3	(a)	Explain any two methods for production of metal powders	07
	(b)	What are the properties of alloying? Give effects of Nickel as alloying elements.	07
		OR	
Q.3	(a)	Explain Ultrasonic testing with advantages and limitations.	07
	(b)	Which are various surface hardening processes? Explain Flame hardening process with neat sketch.	07
Q.4	(a)	With the aid of steel portation of an iron-iron carbide equilibrium diagram.showing solid state transformation . Compare the transformations during cooling under equilibrium conditions from solids to room temperature of typical hypereutectoid steel and hypoeutectoid steel. Compare the resulting microstructure at room temperature and related properties.	07
	(b)	Differentiate between grey cast iron and spherical cast iron in terms of microstructure.properties.composition and applications.	07
		OR	
Q.4	(a)	Discuss the cathodic protection method of corrosion prevention for underground pipelines.	07
	(b)	What are the factors affecting the rate of corrosion? Explain the hydrogen evaluation and oxygen absorption mechanism of corrosion	07
Q.5	(a)	List the purposes of heat treatment. Differentiate between annealing and normalizing.	07
	(b)	Discuss mechanism of quenching of steel. state the advantages and draw backs of water and oil as quenching media.	07
		OR	
Q.5	(a)	What is "Wrought iron"? Enlist the properties and uses of it.	07
	(b)	Define critical cooling rate of steel. And show the same on a TTT diagram with complete labeling.	07

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