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[5559]-116

S.E. (Mechanical and Automobile Engineering) (Second Semester)

EXAMINATION, 2019

ENGINEERING METALLURGY

(2015 PATTERN)

Time : 2 Hours

Maximum Marks : 50

Please read the following instruction carefully:

- 1. Answer four questions: Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8**
- 2. Neat diagram should be drawn wherever necessary**
- 3. Use of non programmable electronic pocket calculator is allowed**
- 4. Figures to the right indicate full marks. (Marks in square bracket are maximum marks.)**

1	a	Explain with the help of neat, well labelled sketch. the term 'Dendrite'.	[4]marks
	b	Differentiate between solid solution and intermetallic compound.	[4]marks
	c	What are the variables that determine the microstructure of an alloy?	[4]marks
		OR	
2	a	Define the following terms a) Eutectetic Transformation b) Grain c) Solvus line. d) Deoxidation:	[4] marks
	b	What is a spark test? What is its use?	[4]marks
	c	List the steps in process used to prepare a metallographic sample for observation under optical microscope.	[4]marks

P.T.O.

3	a	As the tempering temperature of a hardened component is increased, the hardness of the component decreases, Explain why the hardness of the component decreases with temperature?	[4]marks
	b	Draw neat diagram of microstructures and indicate phases present and their amounts in the following plain carbon steels under equilibrium conditions: i. 0.4 % carbon steel ii. 1.2% carbon steel:	[4]marks
	c	Rank the following iron-carbon alloys and associated microstructures from the highest to the lowest tensile strength:	[4]marks
		(a) 0.25 wt% C with spheroidite (b) 0.25 wt% C with coarse pearlite (c) 0.60 wt% C with fine pearlite (d) 0.60 wt% C with coarse pearlite Justify your answer	
		OR	
4	a	Sketch and label microstructure of the following steels – i. Hypoeutectoid steel ii. Eutectoid steel	[4]marks
	b	State two advantages of alloy steels over plain carbon steel and two advantages of plain carbon steel over alloy steel	[4]marks
	c	What is martempering? What are the advantages of martempering over conventional hardening?	[4]marks
5	a	Explain why thicker sections are more susceptible to cracking during hardening heat treatment. Which heat treatment will you recommend to prevent cracking?	[5] marks:
	b	Mention the names of alloying elements used and percent of alloy used in the following steels- 1. T70 2. XT75W18Cr4V1	[4]marks
	c	Give two major differences between martensitic and pearlitic transformations.	[4]marks
		OR	
6	a	What influence does Molybdenum (Mo) addition have on steel? Why is Mo used as an alloying element?	[5]marks
	b	What is stainless steel? Why are these steels stainless?	[4]marks

	c	Mention the names of alloying elements used and the amount in percent of alloy used in the following steels- 1. C40 2. AISI 1040	[4]marks
7	a	Differentiate between ferrous and non ferrous metals and alloys. Give examples of each.	[5]marks
	b	Why is it not advisable to repair by welding a structure made of non heat treatable Aluminium alloy?	[4]marks
	c	What is the difference between natural and artificial aging process of a precipitation hardening alloy?	[4]marks
		OR	
8	a	What is precipitation hardening? Explain how the hardness of Aluminium-4.5% copper alloy can be increased by precipitation hardening? Illustrate with sketch.	[5]marks
	b	What is season cracking of brasses? How can it be avoided?	[4]marks
	c	Which alloy is used for soldering of electronic components? Why?	[4]marks