Registration No :

3rd Semester Back Examination 2019-20
INTRODUCTION TO PHYSICAL METALLURGY & ENGINEERING MATERIALS
BRANCH : MECH
Max Marks : 100
Time : 3 Hours
Q.CODE : HB827
Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1	**Only Short Answer Type Questions (Answer All-10)**	(2 x 10)
a)	Define Material Science?	
b)	Define Toughness?	
c)	What is imperfection?	
d)	Differentiate between cold working and hot working?	
e)	Define hardness and ductility?	
f)	Define composite?	
g)	What is Peritectic reaction?	
h)	Derive Gibb's phase rule? What is the minimum and maximum number of phases which could exist in a pure metal?	
i)	Mention any two differences between interstitial solid solutions and substitutional solid solutions ?	
j)	Why are grain boundaries are favourable sites for nucleation or growth for precipitates?	

Part-II

Q2	**Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**	(6 x 8)
a)	What is plain carbon steel? Discuss about advantages and limitations of plain carbon steel?	
b)	Define austenitic grain size. Explain effect of grain size on properties of steel?	
c)	Explain briefly the BCC and FCC structure and calculate the atomic packing factor for BCC structure?	
d)	Draw and explain Iron–Iron Carbide equilibrium diagram. Label all components properly?	
e)	Briefly explain the Eutectic and peritectic reactions using proper examples. Write a note on allotropy?	
f)	Write and explain the Hume-Rothery Rules of solid solution formation with suitable examples?	
g)	What is Metallography? Discuss about polishing techniques for metals and alloys. Give the requirements of etching in microscopic observation?	
h)	Define equilibrium diagram. What information may be obtained from an equilibrium diagram? Explain its role in the development of new alloys?	
i)	What is cooling curve? Draw the cooling curves for binary solid solution alloy and binary eutectic alloy?	
j)	What is cast Iron? Explain how malleable cast iron produce from white cast iron?	
k)	Mention the properties and applications of Grey cast iron and compare it with white cast iron?	
l)	What do you mean by Coding of steel? Discuss about Coding of steel as per American Standard?	

Part-III
Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Give a brief Classification of engineering materials and explain Engineering requirements of materials? **(16)**

Q4 Explain the effects of grain size, heat treatment and alloying elements on properties of single phase material? **(16)**

Q5 What are the ceramic materials? Write short note on various applications of ceramic materials? **(16)**

Q6 What are polymers? Discuss the different Polymerization mechanisms with sketch? **(16)**