Ref. No. Ex/Prod/T/222/2018 (Old)

B.E. PRODUCTION ENGINEERING 2ND YEAR 2ND SEMESTER EXAMINATION, 2018 (OLD)

SUBJECT: MATERIAL SCIENCE AND TECNOLOGY

Time : Three hours **Full Marks : 100**

ANSWER QUESTION NO. 1 AND
ANY FOUR QUESTIONS FROM THE REST

(Answer briefly. Irrelevant discussion will be penalised.
Draw the sketches neatly and label them properly)

1. a)	Draw the iron-carbon equilibrium diagram and properly label the phase name, temperature, percentage of carbon, eutectic, eutectoid, peritectic point, hyper and hypo eutectic and eutectoid zone, commercial cast iron and different steel range etc.		**13**
b)	Explain Avrami equation.		**2**
c)	Draw and label the T-T-T diagram for carbon steel with 0.8% carbon form kinetic curve.		**5**
2. a)	Draw a [6 4 $\bar{2}$] direction in a base centered monoclinic lattice.		**3**
b)	Calculate and compare the APF of Tungsten and Nickel.		**6**
c)	Differentiate between Ionic bond and Co-valant bond		**4**
d)	Copper has an atomic radius of 1.28Å, and an atomic weight of 63.5g/mol. Compute its Density.		**4**
e)	Compute planar density of (110) plane for Gold.		**3**
3. a)	Describe strain hardening phenomenon. Explain and deduce the true stress and the true strain with suitable stress-strain diagram.		**4+4**
b)	Discuss about diffusion and its various types? Discuss the different diffusion mechanism of the solution with neat sketches.		**2+4**
c)	Explain proof stress, proportional limit, yield strength, ultimate tensile strength and fracture point with the help of stress-strain diagram.		**6**
4. a)	Differentiate between heterogeneous and homogeneous nucleation.		**6**
b)	What is Recalescence?		**3**
c)	Explain the mechanism of ingot structure formation during solidification with suitable sketches.		**6**
d)	Compare Planar Growth and Dendritic Growth during solidification of materials with suitable diagram.		**5**

[Turn over

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Time : Three hours **Full Marks : 100**

5. a)	Draw and label the phase equilibrium diagram for lead and tin alloy.	**6**
b)	Differentiate between Normalising and Full Annealing of carbon steel.	**5**
c)	Write short notes on : Nitriding and Martempering of carbon steel.	**5+ 4**
6. a)	Describe Blast furnace and its working principle with suitable figures for steel making process.	**8**
b)	Write short notes on: Bright Steel;	**3**
c)	Differentiate between thermoplasts and thermoset polymer.	**4**
d)	Write short note on shape memory alloy	**5**
7. a)	Explain the principles of Ultrasonic Testing procedure for detecting a fault in plate material with suitable sketches.	**5**
b)	Explain briefly the sintering process with figures.	**3**
c)	Describe briefly three different biodegradable plastics with their uses.	**6**
d)	Write short notes on: i) Cubic Boron Nitride; ii) Inconel.	**3+3**