Form A: *Ref. No.* **Ex/Prod/T/122/2018**

B.E. PRODUCTION ENGINEERING FIRST YEAR EXAMINATION, 2018

(2nd Semester)

SUBJECT: MATERIAL SCIENCE AND TECNOLOGY

Time : Three hours **Full Marks 100**

ANSWER ALL QUESTION

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

1. a)	Draw a [2 6 $\bar{4}$] direction in a base centered orthorhombic lattice.	3
b)	Discuss about the different types of point imperfections with suitable sketches.	5
c)	Differentiate between Ionic bond and Co-valant bond	4
d)	Metal X 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 Silver.	4
2. a)	Explain the Creep and Anelasticity phenomenon of metal.	5+3
b)	What is toughness? Compare and discuss the stress-strain behaviour among pure ductile, semi-ductile and Non-ductile material with neat sketches.	2+5
c)	Explain the principles of Ultrasonic Testing procedure for detecting a fault in plate material with suitable sketches.	5
3. a)	Differentiate between Homogeneous and Heterogeneous nucleation	5
b)	What do you mean by Phase? State and explain the phase rule.	1+1
c)	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
4. a)	Draw and label the T-T-T diagram for carbon steel with 0.8% carbon form kinetic curve.	5
b)	Write a short note on bainite and Nitriding.	3+4
d)	Describe Blast furnace and its working principle with suitable figures for steel making process.	8
5. a)	Write short notes on: (any five) a) Babbitt Metal; b) Nanometerial. c) Bioceramics d) PMMA e) Alumina f) Fiber Optics, g) German Silver	4×5