

Ref. No. Ex/Prod/T/122/2017

B.E. PRODUCTION ENGINEERING FIRST YEAR EXAM 2017
(2nd Semester)
SUBJECT: MATERIALS SCIENCE AND TECHNOLOGY

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) | Draw and label the T-T-T diagram for carbon steel with 0.8% carbon form kinetic curve. | 5 |
| c) | Differentiate between Normalising and Full Annealing of carbon steel. | 5 |
| d) | Define "STEEL" very briefly (within 15 words). | 2 |
| e) | Describe Blast furnace and its working principle with suitable figures for steel making process. | 9 |
| f) | Describe L-D process with suitable figures for steel making process. | 6 |
| 2. a) | Describe briefly metallic bonding. | 3 |
| b) | Draw a $(4 \times 8 \times 6)$ plain in a Base-centered orthorhombic lattice. | 3 |
| c) | The interplaner spacing between $(\bar{2}01)$ plane in a Lithium crystal is 0.68\AA . Determine the lattice parameter and the atomic diameter. | 4 |
| d) | Differentiate between BCC and FCC crystal structure. | 5 |
| 3. a) | Explain different types of point defect with neat sketches. | 5 |
| b) | Define briefly the following (<i>with figure if required</i>): | 2×5 |
| | (i) Resilience; | |
| | (ii) Malleability; | |
| | (iii) Fatigue Failure; | |
| | (iv) Hardness; | |
| | (v) Anealsticity. | |

P.T.O.

B.E. PRODUCTION ENGINEERING FIRST YEAR EXAM 2017**(2nd Semester)****SUBJECT: MATERIALS SCIENCE AND TECHNOLOGY****Time : Three hours****Full Marks : 100**

- | | | |
|-------|--|-----|
| 4. a) | Compare Planar Growth and Dendritic Growth during solidification of materials with suitable diagram. | 5 |
| b) | Draw and label the phase equilibrium diagram for copper and silver alloy. | 5 |
| c) | Write Short note on Cooling Curve. | 4 |
| 5. a) | Differentiate between | 5+4 |
| | i) Austempering and Martempering of carbon steel. | |
| | ii) Nitriding and Carburising | |
| b) | Explain the mechanism of ingot structure formation during solidification with suitable sketches | 6 |
| 6. a) | Explain the principles of Ultrasonic Testing procedure for detecting a fault in plate material with suitable sketches. Describe advantage and disadvantages of Ultra sonic Non-Destructive Testing of materials. | 4+5 |
| b) | State the alloying composition percentage, properties and uses of the Babbitt metal and Nickel based super alloy. | 6 |
| 7. a) | Write short notes on: | 4×3 |
| | i) Zirconia, | |
| | ii) MMC | |
| | iii) Shape Memory Alloy | |
| b) | Decribe very briefly: | 3×1 |
| | i) Aramids | |
| | ii) Polyvinyl Chloride | |
| | iii) Sialon | |