

B.E. PRODUCTION ENGINEERING FIRST YEAR EXAMINATION, 2019 (OLD)
(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 $(4 \times 2 \times 6)$ plain in a Base-centered Monoclinic lattice.. **3**
- b) Discuss the different types of surface imperfections. **5**
- c) Differentiate between Ionic bond and Co-valant bond **4**
- d) Calculate the unit cell dimension and atomic diameter of Aluminium. Atomic weight and its density is 26.98 and 2.7g/cm³ (at 293°K) respectively. **4**
- e) Differentiate between BCC and FCC crystal structure. **4**
2. a) Describe briefly Creep of the metal. **4**
- b) Define briefly the following: **2×4**
 - (i) Proof stress;
 - (ii) Malleability;
 - (iii) Fatigue Failure;
 - (iv) Hardness;
- c) Discuss the application of different Non-destructive testing techniques on the following cases/materials: **2×4**
 - i) Welding joints;
 - ii) Plate and Similar material;
 - iii) Ceramics, plastics materials and other non-metallic material;
 - iv) Composite material.
3. a) Compare Planar Growth and Dendritic Growth during solidification of materials with suitable diagram. **4**
- b) Write Short note on Cooling Curve. **3**
- 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**

Ref. No. Ex/Prod/T/122/2019(OLD)

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4. a) Draw and label the T-T-T diagram for carbon steel with 0.8% carbon form kinetic curve. **5**
- b) Differentiate between Normalising and Full Annealing of carbon steel. **5**
- c) Briefly discuss about Steel making process by Electric furnaces. **6**
- d) Write short notes on: Nodular Cast Iron. **4**
5. a) Write short notes on: (any five) **4×5**
- a) Inconel;
 - b) Shape Memory Alloy.
 - c) Bioceramics
 - d) Zirconia
 - e) MMC.
 - f) German Silver