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Total Number of Pages : 01

B.Tech.  
PME3I001

3<sup>rd</sup> Semester Regular / Back Examination 2018-19  
**INTRODUCTION TO PHYSICAL METALLURGY & ENGINEERING MATERIALS**  
**BRANCH : MECH**  
**Time : 3 Hours**  
**Max Marks : 100**  
**Q.CODE : E894**

**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** **Short Answer Type Questions (Answer All-10)** **(2 x 10)**
- a) Show the plane (111) and [110] direction in cubic crystal
  - b) What is the Burger Vector?
  - c) Write down the Hall – Patch equation and mentioned its significance?
  - d) What is the use of Lever –rule?
  - e) Mentioned two difference between homogeneous and heterogeneous nucleation?
  - f) Why carbon solubility more in austenite?
  - g) Define Recrystallization and factors affecting recrystallization?
  - h) What are the effect of addition of Si in steel?
  - i) What is the difference between TTT and CCT?
  - j) What is Bragg's law?

**Part- II**

- Q2** **Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(8 x 6)**
- a) Differentiate between edge and screw dislocation with neat sketch?
  - b) Explain critical resolved shear stress and derive the Schmid's law?
  - c) What is miller indices? How they are determined, Explain with example?
  - d) What is slip? Mention four differences between slip and twinning?
  - e) Draw a neat sketch iron – carbon equilibrium diagram? Mention all the phases, lines and temperatures?
  - f) Mentioned five differences between hot working and cold working?
  - g) What is meant by Polymer? Discuss the properties, applications and chemical structure of any four types of polymer??
  - h) Give any two important properties of ceramics? Write short notes on any four ceramics materials?
  - i) Explain in detail the different method used for strengthening of materials?
  - j) What is yield – point phenomena? Describe it with a neat sketch of load – elongation curve of low carbon steel?
  - k) What is allotropy? What is allotropic transformation? Give any three examples which show allotropic transformation and explain them?
  - l) Explain the allotropic transformation of Iron?

**Part-III**

- Q3** **Long Answer Type Questions (Answer Any Two out of Four)**
- Describe the FCC, BCC and HCP metallic crystal in detailed with sketch? **(16)**
  - Draw a neat sketch iron – carbon equilibrium diagram? Mention all the phases, lines and temperatures? **(16)**
  - State Home – Rothery rules that favors the substitutional solid solutions? **(16)**
  - What is the effect of various alloying elements on TTT diagram? Draw a TTT diagram for a eutectoid steel **(16)**