Question Paper Code : 91840

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Third/Fourth Semester

Mechanical Engineering

ME 6403 : ENGINEERING MATERIALS AND METALLURGY

(Common to Automobile Engineering/Manufacturing Engineering /Mechanical and Automation Engineering)

(Regulations 2013)

(Also Common to PTME 6403 – Engineering Materials and Metallurgy for B.E. (Part-Time) – Third Semester (Regulations – 2014))

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A   (10×2=20 Marks)

1. Draw a typical cooling curve of pure metal and a solid solution.

2. What do you mean by invariant reaction ?

3. Differentiate annealing and normalizing treatments.

4. "Austempering is different from other hardening treatments". Why ?

5. Give the effects of adding Silicon in steel.

6. What are bearing alloys ? Give an example.

7. Differentiate between composite and an alloy.

8. Give any 2 examples of commodity polymer.

9. Define the term Fatigue.

10. Distinguish Ductile and brittle fracture.

PART – B   (5×13=65 Marks)

11. a) Sketch and label Iron-Carbon equilibrium diagram. Explain the different invariant reactions present in it.

(OR)

b) i) What do you understand by solid solutions ? Explain its types.   (9)

   ii) Sketch the microstructure of Grey cast iron and mention its properties and applications.   (4)

12. a) What is hardenability ? How is Jominy end quench test used to measure hardenability of steels ?

(OR)

b) Explain TTT diagram with neat sketch and indicate all the phases with microstructure.

13. a) i) Brief on the influence of alloying elements in steel under classification of carbide former and non carbide former. **(6)**

ii) Discuss the types and applications of stainless steel. **(7)**

(OR)

b) i) How the titanium alloy are classified ? Mention their composition, properties and applications ? **(7)**

ii) Brief on the precipitation hardening and ageing treatment of Al-4% Cu alloy. **(6)**

14. a) What is meant by Engineering polymer's ? Discuss the properties, applications and chemical structures of any four of them.

(OR)

b) Write short notes on any four Engineering Ceramics.

15. a) i) What are the different hardness tests performed in metallic natural ? Specify the indenter and hardness measurement scale of the same. **(4)**

ii) Explain the procedure of tensile test for metals. **(9)**

(OR)

b) Explain the mechanism of plastic deformation with suitable illustrations.

PART – C **(1×15=15 Marks)**

16. a) i) Discuss the use of Mg alloys in automotive Industries. **(8)**

ii) Explain the use of Nimonics in high temperature applications. **(7)**

(OR)

b) i) Discuss the method surface hardening of stainless steels. What are its specific advantages. **(10)**

ii) What are the situations in which slip is substituted by twining. **(5)**