Reg. No. :

Question Paper Code : X10947

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
AND APRIL/MAY 2021
Second Semester
Aeronautical Engineering
PH 8251 – MATERIALS SCIENCE
(Common to Aerospace Engineering/Automobile Engineering/Industrial Engineering/Industrial Engineering and Management/Manufacturing Engineering/Marine Engineering/Mechanical Engineering/Mechanical Engineering (Sandwich)/Mechanical and Automation Engineering/Mechatronics Engineering/Production Engineering/Robotics and Automation)
(Regulation 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. What are isomorphous systems ? Give an example.
2. How do you identify a phase change of a system with a cooling curve ?
3. What are hypo and hypereutectoid steels ?
4. How do you obtain Martensite phase of Fe-C system ?
5. How does a material undergo plastic deformation ?
6. Differentiate ‘toughness’ and ‘resilience’ in materials.
7. Differentiate hard and soft magnetic materials.
8. Explain dielectric breakdown in materials.
9. What are the types of Carbon nanotubes ?
10. What are metallic glasses ?

PART – B **(5×16=80 Marks)**

11. a) i) Explain binary eutectic alloy systems using Lead Tin phase diagram. **(8)**

ii) Draw diagrams to show the formation of microstructure at various temperatures and compositions in the phase diagram. **(8)**

(OR)

b) Explain binary peritectic alloy system using Platinum-Silver phase diagram.

12. a) Explain the invariant reactions and different phases formed in Iron-Carbon system.

(OR)

b) Explain the phase transformations and TTT diagrams of steel.

13. a) Explain Ductile and Brittle Fracture Mechanisms. Describe the brittle fracture phenomenon using Griffith's criterion and theory.

(OR)

b) Explain the mechanisms of creep and creep-resistance in materials.

14. a) Formulate expressions for electronic, ionic and orientational Polarization and obtain Langevin-Debye Equation for dielectric materials.

(OR)

b) Explain the Domain Theory of Ferromagnetism and the types of energy involved in Ferromagnetic materials.

15. a) Describe how fiber reinforced plastic materials are synthesized and processed. What are their applications ?

(OR)

b) Explain the properties and applications of Shape Memory Alloys.