

23/4/19

Roll No.

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

B.E / B.Tech (Full Time) DEGREE END SEMESTER ARREAR EXAMINATIONS, APRIL 2019

Common to B.E.(Mechanical Engg., Industrial Engg., and Mining Engg.)

PH8251-Materials Science

(Regulation 2012)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What is meant by twinning?
2. What is creep?
3. State Gibb's phase rule.
4. A 31.6 % Pb -Sn alloy is just cooled below the eutectic temperature of 183 °c. The eutectic point is at 69.2 % of Sn and the α boundary is at 19.5 % Sn. What is the fraction of proeutectic α and the eutectic mixture $\alpha+\beta$?
5. Write the peritectic equation for the iron-carbon system.
6. Mention some effects of alloying elements in steel.
7. Define Fermi level.
8. What are ferrites?
9. Mention some applications of shape memory alloys.
10. What are biomaterials?



Part – B (5 x 16 = 80 marks)

11. What is the role of dislocations in plastic deformation? Discuss in detail various strengthening mechanisms.
12. a) Illustrate the phase diagram of iron as a single component system and explain the various phases including the phase rule and lever rule.

(OR)

- b) Draw the eutectic and peritectic phase diagrams. Describe the microstructural changes during cooling for these two systems.

13. a) With neat sketches, discuss the salient features of T-T-T diagram.

(OR)

b) Explain various diffusion hardening techniques used in steel.

14. a) (i) Discuss in detail the properties of intrinsic and extrinsic semiconductors. (12)

(ii) At a wavelength of 669 nm, the refractive index of a material is 2.22. Find its relative permittivity and absolute permittivity. (4)

(OR)

b) (i) Based on domain theory, explain the phenomenon of hysteresis in a ferromagnetic material. (12)

(ii) Calculate the critical field required to destroy superconductivity at 0.48 K for Cd, whose critical temperature is 0.52 K and $H_c(0)$ is 0.0026 T. (4)

15. a) Elucidate the properties and applications of metallic glasses.

(OR)

b) Write notes on ceramics and FRP.

