

Dec.-22-0189

ME-506 Materials Technology (ME, AE)

B.Tech. 5th (CBCS)

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

- Note :** (i) This question paper carries five sections. Attempt five questions in all, select one question from each sections A, B, C & D. Section E is compulsory.
(ii) Draw neat and comprehensive sketches wherever necessary to clearly illustrate your answer.

SECTION - A

- (a) What is a solid solution? Differentiate between substitutional solid solution and interstitial solid solution. (5)
(b) Explain the Gibb's phase rule. (5)
- Discuss iron-carbon equilibrium diagram in detail. (10)

SECTION - B

- (a) Differentiate between full annealing and process annealing. (5)
(b) Discuss the properties of following micro-constituents:
(i) ferrite
(ii) martensite (5)
- (a) What do you understand by plastic deformation? Discuss the mechanism of plastic deformation. (5)
(b) What is work hardening? Discuss the different stages of work hardening. (5)

SECTION - C

- (a) What are ceramics? Discuss different types of ceramics. (5)
(b) Discuss the mechanical behavior of polymers. (5)
- Discuss the properties of any five important alloys used in mechanical engineering practice. (10)

SECTION - D

- (a) Differentiate between brittle fracture and ductile fracture. How they are caused? (5)
(b) Discuss the various methods for improving the fracture strength. (5)
- (a) Explain the phenomenon of creep in metals. How it is controlled? (5)
(b) Discuss different methods of preventing corrosion of metals. (5)

SECTION - E

- (i) What are the different types of phase diagrams?
(ii) What are peritectic and peritectoid systems?
(iii) State the various purposes of heat treatment.
(iv) Write down the classification of heat treatment processes.
(v) What is the difference between nitriding and cyaniding process?
(vi) What is Bauschinger effect?
(vii) What is age hardening?
(viii) What are polymers?
(ix) State the characteristics of fatigue.
(x) What is creep? Draw a typical creep curve. (10×2=20)