

17303

21718

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any TEN of the following :

20

- (a) Define : (i) Thermal conductivity (ii) Toughness
- (b) State any four applications of grey cast iron.
- (c) Define : (i) Hypoeutectoid steel (ii) Hypereutectoid steel.
- (d) State the objectives of heat treatment.
- (e) List any four surface heat treatment processes.
- (f) State the purpose of normalising.
- (g) Explain the term pure metal & alloy.
- (h) State any four advantages of alloy steel.
- (i) Classify copper alloys.
- (j) State any four applications of high carbon steel.

- (k) Explain surface hardening & case hardening.
- (l) State any two properties of tool steel.
- (m) Define the term solid solubility.
- (n) State any four characteristics of polymers.

2. Attempt any FOUR of the following :

16

- (a) Differentiate between amorphous solids & crystalline solids. (any four)
- (b) Explain isomorphous system with cooling curve equilibrium diagram.
- (c) Draw Time - Temperature isothermal Transformation (TTT) diagram for plain carbon steel & show various regions on it.
- (d) State the effect of following alloying elements on steel :
 - (i) Tungsten
 - (ii) Molybdenum
- (e) State chemical composition, properties & applications of cartridge brass.
- (f) State properties & applications of neoprene rubber.

3. Attempt any FOUR of the following :

16

- (a) Differentiate between destructive & non-destructive testing on any four criteria.
- (b) Draw neat sketch of iron-carbon equilibrium diagram & show important temperature & phases on it.
- (c) Differentiate between annealing & normalising on following criteria :
 - (i) cooling
 - (ii) microstructure
 - (iii) hardness
 - (iv) ductility

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- (d) Explain tempering & state the purpose of tempering.
- (e) State chemical composition, properties & applications of High Chromium High Carbon (HCHC) tool steel.
- (f) State the type of steel with its chemical composition of following IS specification :
 - (i) 40 Cr4Mo3
 - (ii) XT75W18Cr4V1

4. Attempt any FOUR of the following :

16

- (a) State chemical composition, properties & applications of white metal.
- (b) State characteristics & applications of ABS.
- (c) List various methods of powder making & explain any one.
- (d) List any eight mechanical properties of engineering materials & define any two in detail.
- (e) Explain nitriding process with neat sketch. State advantages & disadvantages of it.
- (f) Differentiate between flame hardening & induction hardening. (any four)

5. Attempt any FOUR of the following :

16

- (a) Draw microstructure of nodular cast iron & state advantages & applications of it.
- (b) State chemical composition, properties & applications of duralumin.
- (c) Explain nature, properties & applications of nano materials.
- (d) Explain liquid carburising & state any two merits & demerits of it.

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- (e) State chemical composition, advantages, disadvantages & applications of mild steel.
- (f) Explain eutectic reaction with phase diagram.

6. Attempt any FOUR of the following :

16

- (a) Write short note on :
 - (i) Austenite
 - (ii) Cementite
 - (b) State any four types & applications of tool steel.
 - (c) Explain Induction hardening process with neat sketch.
 - (d) State chemical composition, characteristics & advantages of 18:4:1 high speed steel with any two applications.
 - (e) Differentiate between thermoplastic & thermosetting plastic.
 - (f) State any four applications of powder metallurgy.
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