

Full Marks : 70

Time : 3 hours

Answer Q. No. 1 and any five from the rest

The figures in the right-hand margin indicate marks

1. Choose the most appropriate alternative : 20

(i) The following is not a composite material

- (a) Bamboo
- (b) FRP
- (c) Cermet
- (d) Spheroidal graphite cast iron.

(ii) Strength of materials can be improved by

- (a) Grain refinement
- (b) Alloying
- (c) Cold working
- (d) All the above.

(Turn Over)

7. Why do you add the following to steel 10

- (a) Chromium
- (b) Nickel
- (c) Manganese
- (d) Vanadium.

8. Classify steels based on composition. Write in brief about application of mild steels. 10

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(iii) Slip occurs in

- (a) A given plane and direction
- (b) A given plane and any direction
- (c) A given direction but no definite plane
- (d) None of the above.

(iv) Allotropy is

- (a) An element with different crystal structure
- (b) An element with different atomic weights
- (c) A mixture of two metals
- (d) All the above.

(v) Fe-C diagram exhibits

- (a) A eutectic reaction
- (b) A peritectic reaction
- (c) A eutectoid reaction
- (d) All the above.

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(vi) Annealing is done for

- (a) Stress relief
- (b) Reducing the hardness
- (c) Increasing the ductility
- (d) All the above.

(vii) Induction hardening is suitable for

- (a) Very low carbon steels
- (b) Copper alloys
- (c) 0.8% C steel
- (d) All the above.

(viii) Cast iron contains

- (a) 3.1 to 4.5% C
- (b) 0.2 to 1.8% C
- (c) more than 4.3% carbon
- (d) None of the above is true.

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(4)

(ix) Carbonitriding is done at temperatures

(a) Above the carburizing temperature

(b) Below the carburizing temperature

(c) Below or above depending on composition

(d) None of the above is true.

2. Draw a simple binary eutectic diagram with partial solubility. Label the phase fields. Give one example of a eutectic system. Draw the cooling curve for a hypo-eutectic, eutectic and hyper-eutectic alloy. State lever rule. 10

3. Draw an isothermal TTT diagram for eutectoid steel. Label the diagram and show how you can obtain the following structures 10

(a) Coarse pearlite

(b) Bainite

(c) Martensite.

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(5)

4. Write short notes on : 10

(a) Diffusion coating

(b) Heat treatment defects

(c) Stacking faults

(d) Sub zero treatment.

5. Distinguish between 10

(a) Annealing and normalizing

(b) Steel and cast iron

(c) Hot working and cold working.

6. Discuss in brief about the application of the following : 10

(a) Aluminium alloys

(b) Copper alloys

(c) Magnesium alloys

(d) FRP.

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