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Question Paper Code: 55702

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Fifth Semester

Mechanical Engineering

15UME502 - ENGINEERING MATERIALS AND METALLURGY

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Cast iron is a
 - (a) ductile material
 - (b) malleable material
 - (c) brittle material
 - (d) tough material
2. Eutectoid reaction occurs at
 - (a) 600⁰ C
 - (b) 723⁰ C
 - (c) 1147⁰ C
 - (d) 1493⁰ C
3. Diffusion of both nitrogen and carbon into the steel surface
 - (a) Carbonitriding
 - (b) Cyaniding
 - (c) Carburizing
 - (d) Nitriding
4. Rapid cooling is also known as
 - (a) Nitriding
 - (b) Tempering
 - (c) Quenching
 - (d) Hardening
5. Plastic deformation results from the following
 - (a) Slip
 - (b) Twinning
 - (c) Slip & Twinning
 - (d) None of these

6. UTM is used to measure
- | | |
|---------------|----------------------|
| (a) Toughness | (b) Brittleness |
| (c) Hardness | (d) Tensile Strength |
7. Brass is an alloy of
- | | |
|------------------|---------------------|
| (a) Copper & Tin | (b) Copper & Zinc |
| (c) Tin & Zinc | (d) Copper & Nickel |
8. Austenite Stabilizers
- | | |
|--------------------|------------------|
| (a) Mn, Ni, Cu, Co | (b) Mo, O, H, N |
| (c) Pb, Sn, Zn, Zi | (d) Cr, W, V, Si |
9. Different types of monomers are added together to form
- | | |
|--------------------------|------------------------|
| (a) Linear polymer | (b) Non-linear polymer |
| (c) Cross-linked polymer | (d) Copolymer |
10. Fibre- Reinforced plastic is
- | | |
|-------------|---------------|
| (a) Polymer | (b) Composite |
| (c) Alloy | (d) Ceramics |

PART - B (5 x 2 = 10 Marks)

11. Define Eutectic and Eutectoid reactions.
12. What is TTT diagram?
13. Differentiate Brittle and Ductile fractures.
14. What are HSLA steels and where are they used?
15. Name any four engineering Ceramics.

PART - C (5 x 16 = 80 Marks)

16. (a) Differentiate between two types of solid solutions with a neat sketch and explain the factors that contribute it. (16)
- Or
- (b) Draw the Iron-Iron carbide equilibrium diagram neatly and label all the region (16)
17. (a) Elaborate TTT diagram with neat sketch. (16)

Or

- (b) Explain the purposes of heat treatment and explain any two purposes in detail. (16)
18. (a) Categorize the types of fractures in detail. (16)

Or

- (b) Demonstrate the Charpy and Izod Pendulum Impact test with illustrative sketch. (16)
19. (a) Explain any eight alloying additions and their effects on steel. (16)

Or

- (b) Explain, select different aluminium and aluminium based alloys, its composition, its properties and applications. (16)
20. (a) (i) Explain the role of fibers and matrix in composites. (12)
- (ii) Write the different classifications of ceramics. (4)

Or

- (b) Write short notes on the properties and applications of Al_2O_3 and SiC. (16)
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