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**Question Paper Code: 55072**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

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)

- Pearlite is the combination of
  - Leduburie and Cementite
  - Ferrite and Cementite
  - Ferrite and Austenite
  - Austenite and Cementite
- Eutectoid reaction occurs at
  - 600<sup>0</sup> C
  - 723<sup>0</sup> C
  - 1147<sup>0</sup> C
  - 1493<sup>0</sup> C
- Diffusion of both nitrogen and carbon into the steel surface
  - Carbonitriding
  - Cyaniding
  - Carburizing
  - Nitriding
- Rapid cooling is also known as
  - Nitriding
  - Tempering
  - Quenching
  - Hardening
- Plastic deformation results from the following
  - Slip
  - Twinning
  - Slip & Twinning
  - 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. Outline the purpose of Annealing.
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) Explain various points in Iron-Carbide equilibrium diagram. (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) Distinguish between thermo plastic and thermo-setting plastic. (8)

(ii) Classify the polymers. (8)

Or

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

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