



GENERAL INSTRUCTIONS TO THE CANDIDATES

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K₁ to K₆)
2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.
3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.
4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.
5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.E DEGREE EXAMINATIONS: DEC 2015

(Regulation 2014)

Third Semester

MECHANICAL ENGINEERING

U14MET302: Engineering Materials and Metallurgy

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code

CO1 [K₁]

| List I | | List II | |
|----------------------|--|--------------------------------|--|
| A. Argentite | | I. Harden steel slightly | |
| B. Annealing | | ii. Silver | |
| C. Tungsten in steel | | lii. Increases wear resistance | |
| D. Vanadium | | Iv. Refines grain size | |

| | A | B | C | D |
|----|-----|----|----|-----|
| A) | ii | i | iv | iii |
| B) | i | ii | iv | iii |
| C) | iii | ii | iv | i |
| D) | iii | iv | i | ii |

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

- | | |
|---|-----------------------|
| 11. Define peritectic reaction. | CO1 [K ₁] |
| 12. What is intermediate phase? | CO1 [K ₁] |
| 13. Distinguish between carbonitriding and cyaniding. | CO2 [K ₂] |
| 14. Define hardenability. | CO2 [K ₂] |
| 15. What are the effects of Cr on properties of steel? | CO2 [K ₂] |
| 16. State any two distinguishing characteristics of nickel maraging steels. | CO3 [K ₂] |
| 17. What is polymerization? | CO2 [K ₂] |
| 18. What are engineering ceramics? | CO3 [K ₂] |
| 19. Define endurance limit in fatigue test. | CO4 [K ₂] |
| 20. Define creep. | CO3 [K ₂] |

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

- | | |
|--|-----------------------|
| 21. With the help of iron-iron carbide equilibrium diagram explain the various invariant reactions. | CO1 [K ₁] |
| 22. What is case hardening? Explain the following processes: i) Carburizing ii) Nitriding | CO2 [K ₂] |
| 23. Define Hardness. Explain any two types of hardness tests with neat sketches. | CO5 [K ₂] |
| 24. What are stainless steels? Explain the composition, properties and applications of austenitic, ferritic and martensitic of stainless steels. | CO1 [K ₂] |
| 25. What are the basic types of polymers? Explain them briefly. | CO5 [K ₂] |
| 26. Explain flame and induction hardening with neat sketches. | CO2 [K ₂] |
