

Dr Raj Bahadur Singh

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20/11/23

(M)

Roll No. ....

National Institute of Technology Hamirpur  
Department of Material Science and Engineering  
End Term Examination Nov-Dec 2023 (Odd Semester 2023-24)

Sub: Phase Transformation

Course Code: MS-211

Time: 3hrs

Max. Marks: 50

Note: Answer all questions. Draw neat sketches wherever needed.

- Q. 1. What are various applications of the knowledge of phases and phase transformations in the industries. (8)
- Q. 2. Derive an expression for Homogeneous Nucleation and its critical radius. (7)
- Q. 3. Explain precipitation hardening with example (5)
- Q. 4. What is Gibbs free energy? What is the essential condition for phase transformation to occur? (7)
- Q. 5. Explain Massive Transformation. (5)
- Q. 6. Explain mechanism of martensitic transformation, factors affecting hardness of martensite and kinetics with suitable diagram (8)
- Q. 7. What is zone refining? (3)
- Q. 8. Draw and explain Fe-Fe<sub>3</sub>C Phase Diagram, indicate various phase field? What are the limitations of this diagram? (5)
- Q. 9. Lists the nucleation sites in the materials with their energy hierarchy (2)