

Code No: 157EP**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech IV Year I Semester Examinations, December – 2023/January - 2024****ENGINEERING MATERIALS****(Common to CE, ME, ECE)****Time: 3 Hours****Max.Marks:75****Note:** i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A**(25 Marks)**

- 1.a) Differentiate between TRIP steels and dual phase steels. [2]
- b) What are applications of HSS steels? [3]
- c) What is the role of sigma phase in superalloys? [2]
- d) What are heat resistant alloys? [3]
- e) What are super-conducting materials? [2]
- f) What are Piezo electric materials? Give few examples. [3]
- g) What are stainless steels? [2]
- h) Why stainless steels are corrosion resistant? [3]
- i) What are bio-materials? [2]
- j) What are the characteristics of biomaterials? [3]

PART – B**(50 Marks)**

2. What are Maraging steels? Discuss the importance of composition in maraging steels. Explain their applications. [10]

OR

- 3.a) What are structural steels? How they are classified? [4+6]
- b) Explain important properties and applications of structural steels.
4. Explain the role of γ , γ' , γ'' and η phases in nickel iron base super alloys. [10]

OR

- 5.a) How heat resistant materials are classified? Give some examples in each group and discuss their properties and applications.
- b) Discuss the microstructure and heat treatment of cobalt base heat resistant alloys. [6+4]
- 6.a) Distinguish between ferroelectrics and piezoelectrics.
- b) Explain why lead and zinc with even number of electrons in the outer shell and a full valence band are conductors. [5+5]

OR

- 7.a) Why does the conductivity of a semiconductor change with impurity content? Compare this with the behaviour of metallic conductors.
- b) Write a brief note on extrinsic semiconductors. [6+4]

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- 8.a) Explain the classification of stainless steels.
- b) Explain the important properties of ferritic stainless steels. [5+5]

OR

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- 9.a) Explain the chemical composition and important properties of austenitic stainless steels.
- b) Distinguish between austenitic and martensitic stainless steels. [6+4]

- 10.a) What are the important properties of metallic biomaterials?
- b) Explain the classification of biomaterials. [5+5]

OR

- 11. Explain seven different types of biomaterials and its applications individually. [10]

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