R20 Regulation *Subject code: 3P3CE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech III Semester Regular/Supplementary Examinations, March/April 2023

Metallurgy and Material Science

(Mechanical Engineering)

Maximum Marks: 70 Date:10.04.2023 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 Write a note on BCC with suitable examples.
2 Classify solid solutions.
3 Define Gibbs phase rule.
4 What is equilibrium diagram?
5 State the importance of heat treatment process.
6 What is tempering?
7 List out the various alloying elements in cast iron?
8 Write the properties of non-ferrous metals.
9 Give the difference between composite and ceramic material with suitable examples.
10 Write the properties of polymers.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 (a) Enumerate the effect of coarse and fine grains on the properties of metals in detail. 5M
(b) Explain FCC, HCP in detail with a neat sketch and compare their properties. 5M

OR

12 (a) Define solid solution. Explain the types of solid solutions in detail with a neat diagram. 5M
(b) Summarize the Hume – Rothery rule in detail with suitable examples. 5M

13 (a) With suitable example, explain binary phase diagram with a neat sketch. 5M
(b) What are isomorphous phase diagrams? Explain in detail with suitable examples. 5M

OR

14 Discuss the eutectic and eutectoid transformation in detail with their composition, properties and microstructure. 10M

15 Draw the Fe-Fe_3C Diagram and explain the various reactions, Phases involved in it. 10M

OR

16 (a) Differentiate between annealing and normalizing on five salient points. 5M
(b) Classify alloy steels. Write any two alloy steels with their composition, properties and applications in detail. 5M

17 What are the alloys of titanium? Explain them in detail with their properties, composition and applications. 10M

OR

18 (a) Classify the alloys of copper in detail and explain any 2 alloy with their composition, properties and applications. 5M

(b) Write the properties of aluminum. What are the various aluminum alloys? 5M

19 (a) How glass is manufactured? Write the properties of glass. Explain the types of glass in detail with its composition and properties. 5M

(b) Classify ceramic materials in detail and write the properties of ceramic materials. 5M

OR

20 (a) How composite materials are classified? Explain any two composites with its composition, properties and its applications. 5M

(b) Classify polymers. What is polymerization? Explain any two polymers with its composition, properties and its applications. 5M