R17 Regulation *Subject code:* 1P3CD

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Year I Semester Supplementary Examinations, February 2021

METALLURGY AND MATERIAL SCIENCE

(Mechanical Engineering)

Maximum Marks: 70 Date: 26.02.2021 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 State the difference between substitutional and interstitial solid solution.
2 Define dislocation and its types.
3 Give some examples of Isomorphous alloy systems.
4 Define Peritectic and Eutectoid reactions
5 What are the four solid phases in the iron-carbon diagram?
6 What is the difference between hardness and hardenability?
7 Why is alloying done?
8 What makes a stainless steel "stainless"?
9 What are composites?
10 What do the following 'acronyms' refer: PE, PP, PS, PVC, PTFE, PMMA?

Part-B

Answer All the following questions. **(10M X 5=50Marks)**

11 A. Define atomic packing and explain the same for BCC. (5M)
B. The atomic radius of Fe is 0.124 nm. Find the lattice parameter of Fe. (5M)

OR

12 A. State the four rules of Hume-Rothery rules. (4M)
B. Define a solid solution and its types. (6M)

13 A. Define Gibbs phase rule. (3M)
B. Define tie line method of lever rule with neat sketch. (7M)

OR

14 Explain the eutetic type of phase equilibrium diagram with neat sketch. (10M)

15 Draw Iron -Carbide equilibrium diagram and mark on it all salient temperature and composition fields. (10M)

OR

16 Explain any two types of annealing process. (10M)

17 Explain the factors affecting the structure of cast iron. (10M)

OR

18 State the composition, applications of following alloys
(a) Phosphor bronze. (2M)
(b) Silicon bronze. (2M)
(c) Beryllium bronze. (2M)
(d) Manganese bronze. (2M)
(e) Aluminiumbronze. (2M)

19 Writea short note on FRP. (10M)

OR

20 Differences between thermosetting and thermoplastic polymers. (10M)