

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER- III(NEW) EXAMINATION – WINTER 2022****Subject Code:3131904****Date:22-02-2023****Subject Name:Material Science and Metallurgy****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define the following material properties: i) Ductility ,ii) Creep and iii) Hardness **03**
- (b) Classify the engineering materials. **04**
- (c) Explain and differentiate Edge dislocation and Screw dislocation with neat sketch. **07**
- Q.2** (a) Describe applications of phase diagram. **03**
- (b) Differentiate between deformation by slip and twinning. **04**
- (c) Explain the detail procedure of polishing the specimen for micro examination. **07**
- OR**
- (c) Using Gibb’s phase rule, explain unary phase diagram with the help of sketch. **07**
- Q.3** (a) Explain the phenomenon of “Allotropy” by giving a suitable example. **03**
- (b) Explain Macro examination and Micro examination. **04**
- (c) Explain Iron –Carbon diagram with neat sketch. **07**
- OR**
- Q.3** (a) State the composition, properties and applications of Hindalium and Invar. **03**
- (b) Explain Point defect & Line defect. **04**
- (c) Explain mechanical properties and applications of Gray Cast Iron. **07**
- Q.4** (a) State composition and specific applications of : **03**
Muntz metal ; German silver ; Naval brass
- (b) Differentiate between annealing and normalizing. **04**
- (c) Justify the need of Heat treatment processes for metals. Explain with neat sketch TTT diagram for heat treatment of steel. **07**
- OR**
- Q.4** (a) Compare nodular cast iron and malleable cast iron. **03**
- (b) Explain Pack Carburizing. **04**
- (c) Explain the principle of Radiography testing. With its use in metal testing. **07**
- Q.5** (a) Explain Dye penetrant testing. **03**
- (b) Explain Flame hardening. **04**
- (c) Define Powder Metallurgy. State advantages, limitations and applications of Powder Metallurgy. **07**
- OR**
- Q.5** (a) Completely describe the “Sintering Process”. **03**
- (b) State the Qualities Required in Bearing Metals. **04**
- (c) Explain the mechanism of corrosion. Also explain any one corrosion prevention technique in detail. **07**
