

**Duration: 3 Hours**

**Total Marks: 80**

**N.B.:**

- 1) **Question No.1 is compulsory.**
- 2) Solve any three from the remaining questions
- 3) Figures to RHS indicate full marks.
- 4) Draw neat sketches wherever necessary.

**Q. 1 Solve any Four out of Six.**

**20**

- a) Differentiate between Slip and Twinning.
- b) Differentiate between Ductile fracture and Brittle fracture.
- c) Explain Hardenability Test.
- d) Explain Magnetic particle testing.
- e) Define composite and discuss its classification.
- f) Explain Classical creep curve.

**Q. 2 a)** Draw and explain Time Temperature Transformation diagram. Also indicate various cooling patterns on the diagram. **10**

**b)** Draw and explain Screw type injection moulding process with its advantages, limitations. **10**

**Q. 3 a)** What is fatigue? Explain fatigue testing in detail. **10**

**b)** How surface hardening different from case hardening? Explain carbonitriding in detail. **10**

**Q. 4 a)** Classify crystal imperfections. Distinguish between Edge and Screw dislocation. **10**

**b)** Derive an expression for Griffith's theory of brittle fracture. **10**

**Q. 5 a)** Explain Peritectic and Eutectic reaction with neat sketch. **10**

**b)** Explain critical resolved shear stress, Derive an expression for the same. **10**

**Q. 6 Write short notes on (Any four)**

**20**

- a) Classification of materials.
- b) Modes of deformation in materials.
- c) Nano materials and their synthesis route.
- d) Austempering Process.
- e) Isomorphous phase diagram.
- f) Work hardening.