Total No. of printed pages = 5

END SEMESTER (REGULAR/RETEST) EXAMINATION, MAY/JUNE-2025

Semester : 4th

Branch : Mechanical Engineering

Subject Code : Me-402

ENGINEERING MATERIAL

Full Marks – 70

Time –Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

(i) Question Nos.1 and 2 are compulsory.

(ii) Answer any *five* questions from the rest.

1. Fill in the blanks : 1×5=5

(a) Pig iron is manufactured in _____ furnace.

(b) Stainless steel is an alloy of iron, carbon and _____.

(c) The ability of a material to absorb energy before failure is known as _____.

[Turn over

(d) The co-ordination number of a Body Centered Cubic structure is _____ .

(e) The total Bravais Lattice are _____ .

2. Choose the correct answer : 1×10=10

(a) Which of the following is a ceramic material ?

(i) Brass (ii) Glass

(iii) Nylon (iv) Copper

(b) The process of increasing the hardness of steel by rapid cooling is called

(i) Annealing (ii) Normalizing

(iii) Quenching (iv) Tempering

(c) The ability of a material to be drawn into sheets is called

(i) Ductility (ii) Malleability

(iii) Hardness (iv) Fatigue

(d) The Co-ordination Number of a Face Centered cubic structure is

(i) 8 (ii) 10

(iii) 12 (iv) 14

(e) The most commonly used method for metal powder production is

(i) Atomization (ii) Grinding

(iii) Electrolysis (iv) Chemical reduction

(f) Which of the following is a non- destructive test ?

(i) Tensile test (ii) Compression test

(iii) Creep test (iv) Ultrasonic test

(g) The process of providing a thin layer of zinc coating on iron and steel is called

(i) Electroplating

(ii) Galvanising

(iii) Cementation

(iv) None of the above

(h) High speed steel contains what percentage of chromium ?

(i) 1% (ii) 2%

(iii) 3% (iv) 4%

(i) Which of the following atmosphere(s) is/are commonly used in sintering ?

(i) Oxygen (ii) Hydrogen

(iii) Nitrogen (iv) Both (ii) and (iii)

(j) Which of the following is an example of a thermoplastic polymer ?

(i) Bakelite (ii) Nylon

(iii) Epoxy resin (iv) Phenolic resin.

3. What do you mean by mechanical property of materials ? Name eight such mechanical properties of materials. Explain any four of them. 1+2+8=11

4. (a) Define Unit Cell and Space Lattice. 2

(b) Explain with diagram about Simple cubic, BCC and FCC structures. 6

(c) Derive the Atomic packing factor for FCC structure. 3

5. (a) Differentiate among Cast iron, Wrought iron and Steel. 6

(b) Name the important properties which a bearing metal should possess. 5

6. (a) Differentiate between Thermoplastic and Thermosetting plastics. 3

(b) What do you mean by Destructive testing ? Explain any one kind of it. 1+4=5

(c) Write the objectives of heat treatment. 3

7. (a) Explain corrosion mechanism. 3

(b) What are the different types of corrosion ? 3

(c) Explain in detail any two methods to prevent corrosion. 5

8. Write short note on :

(a) High speed steel . 2

(b) Write short notes on any *three* : 3×3=9

(i) Cyaniding

(ii) Flow sheet for the production of iron and steel

(iii) Advantages of plastics

(iv) Magnetic Particle inspection

(v) Factors affecting corrosion.