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Question Paper Code : 81133

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024

Seventh / Ninth Semester

Civil Engineering

OML 753 – SELECTION OF MATERIALS

(Common to : Aeronautical Engineering / Aerospace Engineering / Automobile Engineering / Industrial Engineering / Industrial Engineering and Management / Manufacturing Engineering / Marine Engineering / Mechanical Engineering / Mechanical Engineering (Sandwich) / Mechatronics Engineering / Petrochemical Engineering / Production Engineering / Robotics and Automation / Bio-Technology / Biotechnology and Biochemical Engineering / Chemical Engineering / Chemical and Electrochemical Engineering / Food Technology / Petrochemical Technology / Petroleum Engineering / Pharmaceutical Technology / Plastic Technology / Polymer Technology)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate between thermoplastic and thermosetting plastics.
2. How does silicon addition influence the property of steel?
3. Why is fatigue strength important?
4. Define "Curie Temperature" of a magnetic material.
5. Mention any two applications of "Metal matrix composites".
6. State the advantages of polymer flame spraying process.
7. Mention the difference between annealing and sintering methods.
8. Name the tests that which are used for finding plastic flexibility.
9. Mention any two materials that which are used for making bone implant.
10. Justify whether diamond films are ideal candidates for protective coating applications.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the salient properties and uses of Titanium alloys. (8)
(ii) Differentiate between low, medium and high carbon steels. (5)

Or

- (b) (i) What are shape memory alloys and infer how they can be utilized for engineering applications? (7)
(ii) Discuss briefly about the preparation of Glass fibers. (6)

12. (a) (i) Draw the Stress–strain curve for a metallic material and interpret the details that we can get out of the curve. (6)
(ii) Elaborate on the optical properties of materials which should be taken in to account during materials selection for optical applications. (7)

Or

- (b) Discuss the eco-attributes of materials selection and steps in calculating the Eco-indicator. (13)

13. (a) Explain the process details of any two types of casting methods with necessary diagram. (13)

Or

- (b) Explain the process, design, technical features, economics and the environmental aspects related to Electro plating method. (13)

14. (a) Discuss the associated properties that which are generally studied by testing a ceramic material. (13)

Or

- (b) What is Non-destructive testing? Discuss how NDT inspection method is applied for testing of industrial components? (13)

15. (a) Give detailed interpretation on choice of materials and their properties that which are considered preferential to be used in electronic packing. (13)

Or

- (b) Explain in detail the uses of advanced materials for manufacture of sports equipments. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Explain the uses of material selection charts. Using an example interpret the criteria that which are necessarily important for selecting suitable material for the product design using Ashby Charts.

Or

- (b) Elaborate the factors which are important while selecting materials for Biomedical applications.