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C14–M–302

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BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2016

DME—THIRD SEMESTER EXAMINATION

MATERIAL SCIENCE

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Write the differences between destructive and non-distructive tests. 3

2. What is the effect of grain size on mechanical properties? 3

3. List any six methods of steel making. 3

4. Calculate the percentage of cementite and pearlite in 1·2% carbon steel. 3

5. Define the following : 1½+1½=3

(a) Ferrite

(b) Austenite

6. What is meant by case-hardening? What are various case-hardening processes? 1+2=3

7. Write about vacuum hardening process. 3

8. What is the effect of carbon on properties of steel? 3

9. Write the composition, properties and uses of duralumin. 1+1+1=3

10. List different methods for compacting the metal powders. 3

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Explain the Rockwell hardness test and compare B-scale with C-scale. 5+5=10

12. *(a)* Define the term 'recrystallization'. 2

(b) Describe the solidification of pure metal with a neat sketch. 3+5=8

13. Draw a neat sketch of puddling furnace and explain how wrought iron is produced from it. 10

14. *(a)* Explain cooling curve of pure iron. 4

(b) Distinguish among hypoeutectoid, eutectoid and hyper-eutectoid steels. 6

15. Name the important heat-treatment processes of steel. Explain any two of them with neat sketches. 4+6=10

16. Write down the composition, properties and applications of the following : 10

(a) Mild steel

(b) Gray cast iron

(c) Malleable cast iron

17. *(a)* Define the following : 2+2+1=5

(i) Brittleness

(ii) Impact strength

(iii) Fatigue

(b) What are the desired properties of bearing metal? Name any three types of bearing metal. 2+3=5

18. Describe the characteristics of metal powders used in powder metallurgy. 10

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