4250

BOARD DIPLOMA EXAMINATION, (C–14)
MARCH/APRIL—2016
DME—THIRD SEMESTER EXAMINATION

MATERIALS 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. State the principle of radiography testing.   3

2. Define space lattice and a unit cell.   1½+1½=3

3. What is slag? Where is it used?   1½+1½=3

4. Calculate the percentage of cementite and pearlite in 1·4% carbon steel.   1½+1½=3

5. State Gibbs phase rule and abbreviate the terms involved in it.
1+2=3

6. List out any six methods of heat treatment of steel.   6×½=3

7. Hardening should never be a final heat treatment for steel. Why? 3

8. What is alloy steel? Why are alloying elements added to steel? 1+2=3

9. What are the uses of lead, tin and zinc? 1+1+1=3

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

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PART—B 10×5=50

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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 about Izod and Charpy impact testing machines. 10

12. Describe the factors promoting grain size of steel. What is the effect of grain size on mechanical properties? 10

13. Describe the process of making steel by open-hearth process with a neat sketch. 4+6=10

14. *(a)* Draw and describe cooling curve for pure metal. 5

(b) Define solid solution. Distinguish between substitutional and interstitial solid solution. 1+4=5

15. Explain the following processes : 4+3+3=10

(a) Carburising

(b) Nitriding

(c) Sub-zero treatment

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16. Write down the compositions, properties and applications of the following : 5+5=10

(a) Gray cast iron

(b) White cast iron

17. (a) Explain briefly about (i) creep strength and (ii) ductility. 2½+2½=5

(b) What are the uses of pure copper? Name some applications of copper alloys and describe why the alloy is used for the particular application. 5

18. State the advantages and limitations of powder metallurgy. 10

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