BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2014

DMET—FOURTH SEMESTER EXAMINATION

HEAT TREATMENT TECHNOLOGY

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

PART—A 3×10=30

Instructions : (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Define Bainite and Martensite. 1½+1½
2. Differentiate between annealing and normalizing. 1½+1½
3. What is sensitization? State the causes and remedies of it. 1+1+1
4. Define alloying. Classify alloying elements with examples. 1+2
5. State the chemical composition and properties of cemented carbides. 1½+1½
6. Describe the heat treatment cycle for martempering process. 1+2
7. State the effect of carburizing on properties of steels. 3
8. Mention any six defects occurred during heat treatment of steels. 3
9. Distinguish between exothermic and endothermic atmospheres. 1½+1½
10. State the heat treatment process for Brass. 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. *(a)* Define isothermal transformation.
(b) Explain the construction of TTT diagrams with a neat sketch 2+8

12. *(a)* Explain the process of tempering of steel.
(b) Explain the effect of tempering on structural changes and mechanical properties of steel. 5+5

13. *(a)* State different quenching media.
(b) State the merits and demerits of any two quenching media. 4+3+3

14. *(a)* Define grain size. Determine the grain size of austenite by ASTM comparison method.
(b) Explain the method to determine austenite grain size by Heyns intercept method. 2+4+4

15. *(a)* Explain the heat treatment process for high speed tool steels.
(b) State the composition, properties and applications of maraging steels. 5+5

16. *(a)* Explain the process of flame hardening with a neat sketch.
(b) State the causes and remedies of warpages and distortions. 6+2+2

17. Classify heat treatment furnaces based on the following : 4+4+2
(a) Source of heat
(b) Type of heat treatment
(c) Type of operation

18. *(a)* Explain the precipitation sequence during ageing of Al-4·5% Cu alloy.
(b) List Al-alloys that respond to precipitation hardening. 8+2

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

11. *(a)* Describe the phase transformations occurred on heating of steels. 5

(b) Explain the decomposition of austenite on cooling. 5

12. *(a)* Define martensite. 2

(b) Explain the mechanism of formation of martensite from austenite during cooling. 8

13. *(a)* Define critical diameter and ideal critical diameter. 2+2

(b Differentiate between hardness and hardenability. 6

14. Define grin size. Explain grin size measurement by ASTM comparative method. 2+8

15. Describe high-speed tool steels w.r.t. *(a)* chemical composition, *(b)* properties, *(c)* applications, and *(d)* heat treatment process. 2½+2½+2½+2½

16. Explain different types of carburizing technique in detail. 10

17. *(a)* Explain the working principle of muffle furnace with a neat sketch. 3+2

(b) Explain the working principle of salt bath furnace with a neat sketch. 3+2

18. Explain the theory of age hardening. 10

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