Seat No. | | | | | | |

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BBI1305

Material Science
(New) (1030)

P. Pages : 3

Time : Three Hours **Max. Marks : 100**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt all questions.
5. From each questions attempt **any two** subquestions out of a, b, c.
6. Figures to the right indicate full marks.
7. Use of non programmable calculator is allowed.
8. Assume suitable data if necessary.

UNIT - I

1. Solve **any two.**

a) Write a short note on: **10**

i) Indexing of lattice directions.

ii) Indexing of lattice planes.

b) i) Draw the crystal structures of the following. **6**

a) zinc.

b) Copper.

c) α – iron

ii) Define : **4**

a) Primitive cell.

b) Atomic packing factor.

c) i) Explain the property and micro structure changes during cold working and annealing of metals. **6**

ii) Differentiate between "Slip and twinning". **4**

UNIT - II

2. Solve **any two.**

a) i) Explain the principle of the following methods of inspection. **6**

a) Magnaflux b) Dye-penetrant

c) Ultrasonic.

ii) Define : **4**

a) Resilience. b) Strain hardening coefficient.

b) i) Explain the Rockwell hardness test in detail. **6**

ii) Draw typical engineering stress-strain curves for the following materials. **4**

a) Aluminium
b) Cast iron
c) Mild steel
d) Natural rubber.

c) i) What is creep in metals ? Draw a typical creep curve and explain the various stages in creep. **6**

ii) Differentiate between 'Charpy and izod impact test'. **4**

UNIT - III

3. Solve **any two.**

a) i) What is coring ? Is coring desirable ? If no, explain methods of eliminating coring in short. **6**

ii) Write a short note on 'Lever Rule'. **4**

b) Draw a typical equilibrium diagram for two metals completely soluble in solid state and also completely soluble in liquid state. Explain cooling of any one alloy from the above system. **10**

c) What are the various strengthening mechanisms ? Explain any two methods in detail. **10**

UNIT - IV

4. Solve **any two.**

a) What is meant by powder characterization ? Mention some of the important characteristics of powder. How do they influence the compacting and sintering operations. **10**

b) Write a short note on: **10**

i) Self lubricating bearings.

ii) Diamond impregnated cutting tools.

c) What is the principle underlying the working of a thermocouple. State the various types of thermocouples with their specific applications. **10**

UNIT - V

5. Solve **any two.**

a) Write short note on: **10**

i) Mechanisms of dry corrosion.

ii) Season cracking.

b) Differentiate between the following. **10**

i) H_2 – embrittlement and H_2 – attack.

ii) Intergranular corrosion and stress corrosion.

c) Explain the following processes in brief giving their salient features. **10**

i) Electroplating.

ii) Cladding.

iii) Galvanising.

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