

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 140859 Roll No.

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B.Tech.

(SEM. VIII) THEORY EXAMINATION 2013-14

ADVANCED MATERIALS TECHNOLOGY

Time : 3 Hours

Total Marks : 100

Note :- Attempt **all** questions as instructed.

1. Answer the following as instructed/asked for : (2×10=20)
 - (i) What is the scientific name of the popularly said 'God particle' which is supposed to give mass to other particles and thus to matter ? This particle is claimed to have been discovered in LHC experiments in CERN lab ?
Nobel-Prize in physics has recently (last year) been awarded on it.
 - (ii) What is chemical symbol of platinum ?
 - (iii) Write the material for twist drier.
 - (iv) What is the manufacturing-process for engine-block of car ?
 - (v) Write the curie temperature of steel.
 - (vi) Why, usually, Tempering is done after Quenching ?
 - (vii) Why Titanic ship failed after it collided with the iceberg in cold sea ?
 - (viii) Why WTC twin-tower collapsed not-immediately, but after about an hour after the aeroplanes impacted the towers and the blast-fire made it hot enough ?

(ix) Write the purpose for which mild-steel reinforcement is given into the RCC-building.

(x) What is galvanizing and why is it done ?

2. Attempt any **two** of the following : **(10×2=20)**

(a) Classify various carbon-steels based on %C in it; and write its properties and applications. Also show the variation of mechanical properties (such as strength, hardness and ductility) with %C in it.

(b) Classify various Alloy-steels and write its properties and applications. What is weld-decoy in stainless-steel-welds and how is it overcome ?

(c) Classify various cast-irons and write its properties and applications. Explain why, as compared to steel; cast-iron is not considered suitable for machine-components, but for machine-bed (base) cast-iron is considered better than steel ?

3. Attempt any **two** of the following : **(10×2=20)**

(a) Draw a labelled Iron-Carbon equilibrium-diagram to show the constituents; and briefly explain the crystal formation of 0.25% carbon-steel from molten stage. Also draw the microstructures and σ -E diagrams for (i) mild-steel and (ii) cast-iron.

(b) Enlist the heat-treatment processes and describe them. Also draw TTT-diagram. Also, show some of the these heat-treatment processes on the diagram.

(c) In two hours carburizing-process, desired-carburizing is achieved upto a depth of 1 mm; how much time will be required to achieve the carburizing upto a depth of 3 mm, at the same temperature to same material ?

4. Write short notes on any **four** of the following : **(5×4=20)**

(a) Materials used in dentistry

(b) Mechanical behaviour and mechanical properties of bone

(c) Bio-compatible materials

(d) Viscoelasticity

(e) Polymers

(f) Ceramics

5. Attempt any **two** of the following : **(10×2=20)**

(a) Draw binding-energy per nucleon (E_b/A) versus Atomic-mass (A), and explain how this-curve indicates both Nuclear-fission and Nuclear-fusion. Also briefly describe the Nuclear-fission and Nuclear-fussion.

(b) Explain briefly, the purpose and use of (i) Uranium (ii) Control-rod (iii) Moderator (iv) Uranium-enrichment and (v) Fast-breeder reactor.

(c) Briefly discuss, in reference to nuclear-reactors; Radiation-hazard, Safety and Waste-disposal.