

March 2021

ENGINEERING MATERIALS*Time Allowed: 3 Hours**Full Marks: 70***Answer to Question No.1 is compulsory and Answer any five questions from the rest.**

1. Choose the correct answer from the given alternatives: 1×20
- i) Two most important characteristics of cast iron, for which it has wide engineering applications, are
 (a) Tensile strength and toughness (b) Compressive strength and vibration damping
 (c) Hardness and brittleness (d) Strength and ductility
- ii) Which of the following is not a characteristic property of ceramic material
 (a) high temperature stability (b) high mechanical strength
 (c) low elongation (d) low hardness
- iii) Rapid quenching of austenite in the heat treatment of steel produces a supersaturated and distorted crystal structure, which is known as
 (a) cementite (b) pearlite
 (c) ferrite (d) martensite
- iv) What happens when thermosetting polymers are heated?
 (a) They become soft (b) They are deformed
 (c) They become rigid (d) All of the above
- v) Which among the following is a paramagnetic material?
 (a) Iron (b) Cobalt (c) Nickel (d) Aluminum
- vi) Non-destructive testing is used to determine
 (a) location of defects (b) chemical composition (c) corrosion of metal (d) All of these
- vii) Which among the following is not a type of Non-destructive testing?
 (a) compression test (b) visual testing (c) ultrasonic testing (d) eddy current testing
- viii) Eddy current test is used to detect
 (a) cracks (b) hardness (c) conductivity (d) All of the above
- ix) Which of the following statements is not true for cold working process?
 (a) Cold working process does not provide good surface finish
 (b) Cold working process produces internal stress in a metal
 (c) Fatigue strength of metals can be improved
 (d) Cold working process takes place below recrystallization temperature
- x) An eutectoid steel consists of
 (a) 100% austenite (b) pearlite and cementite
 (c) 100% pearlite (d) pearlite and ferrite
- xi) The heat treatment process used for softening hardened steel is
 (a) normalizing (b) tempering (c) carburizing (d) annealing
- xii) The lower critical point for all steels is
 (a) 600°C (b) 723°C (c) 700°C (d) 913°C

- xiii) The process in which carbon and nitrogen both are absorbed by the metal surface to get it hardened is known as
 (a) cyaniding (b) flame hardening (c) carburizing (d) nitriding
- xiv) The process used for relieving the internal stresses previously set up in the Metal and for increasing the machinability of steel, is
 (a) full annealing (b) spheroidising (c) process annealing (d) normalising
- xv) Bronze is an alloy of
 (a) Copper and zinc (b) Copper and tin (c) Copper, tin and zinc (d) None of these
- xvi) Free cutting steels are produced by adding alloying element
 (a) lead (b) nickel (c) copper (d) zinc
- xvii) In the corrosion process of steel, following does not occur
 (a) a galvanic cell is formed (b) rust is formed at the cathode
 (c) the cathode gets corroded (d) anode gets corroded
- xviii) Nowadays, carbide cutting tools are produced by
 (a) forging process (b) casting process
 (c) powder metallurgical process (d) none of these
- xix) Heating and subsequent softening of cutting tool tip is reduced by adding _____ as alloying element.
 (a) vanadium (b) cobalt (c) tungsten (d) niobium
- xx) The heat treatment processes are carried out to the metals for
 (a) softening (b) hardening (c) property modification (d) all of these

2. a) What is surface Hardening?
 b) Write short notes on the following – (i) Induction Hardening, (ii) Flame Hardening. 2+(4+4)
3. How are plastics classified? How do Thermosetting plastics differ from Thermoplastics? What are the useful common properties of plastics? <https://www.wbscteonline.com> 3+3+4
4. What are the primary and secondary processes, used for processing of metal powders? Describe the different methods of producing metal powders. 5+5
5. a) Define – (i) Dye penetration test, (ii) Magnaflux test.
 b) State the difference between Non-destructive and Destructive Test of a specimen. 5+5
6. a) Define corrosion. How corrosion can be prevented?
 b) Define – (i) Thermal co-efficient of linear expansion, (ii) Thermal conductivity. (2+4)+(2+2)
7. What are plain carbon steels? How are they classified? Give a few applications of different classes of plain carbon steels. 2+3+5
8. a) How are alloy steels classified?
 b) Describe effects of alloying elements on the properties of alloy steels. 3+7
9. Describe Aluminium casting alloys and Y-alloy in brief. How is copper obtained? What are its properties and uses? 4+2+4