B. Tech.

(SEM. IV) EXAMINATION, 2006-07

MANUFACTURING SCIENCE - I

Time : 3 Hours] [Total Marks : 100

Note : (1) Answer all six questions.
(2) Marks are indicated with respective questions.
(3) Answer part of the question in sequential order at one place.

1 Answer the following : 4×5=20

(a) Suggest materials for :
   (i) Non-sparking tools
   (ii) Surgical knives
   (iii) Gas turbine blades
   (iv) Piston for aircraft engines.

(b) Differentiate between :
   (i) Risers and Runners
   (ii) Steel and Cast iron
   (iii) Hot working and Cold working
   (iv) Mechanisation and automation.

[V-4042] 1

[Contd...]
(c) Fill up the blanks:

(i) Extremely hard micro structural form of iron is _____.

(ii) In Stainless Steel, besides iron _____ is major alloying element.

(iii) Tungsten wires used for filaments in incandescent lamp are made through _____ technique.

(iv) The extrusion ratio is defined as the ratio of _____ of the billet to that of the extruded section.

(d) Choose the correct answer:

(i) A file having 10 teeth in 10 mm length is known as
(a) Smooth file
(b) Rough file
(c) Bastard file
(d) Second Cut file.

(ii) A diamond pointed chisel is used for cutting
(a) Grooves
(b) Keyways
(c) V-shaped grooves
(d) None of these.
(iii) Copper sheet is preferred for making utensils because of
(a) its good ductility
(b) its high strength
(c) its high heat conductivity
(d) all of these.

(iv) Ornaments and toys are made through the process of
(a) Shell mould casting
(b) Slush casting
(c) Die mould casting
(d) Centrifugal casting.

(e) Answer in brief:
(i) Statement of Hooke’s Law
(ii) Vulcanisation of rubber
(iii) Cores used into mould
(iv) Smithy hand tools.

2 Answer any two of the following: 8x2=16
(a) (i) Explain the roles of manufacturing processes do play relative to the standard of living of a country.
(ii) What costs make up manufacturing cost? 3

(b) Discuss in detail some of the common properties of engineering materials. Explain with examples. 8

(c) (i) Compare Tresca’s and von Mises’ yield criteria.

(ii) A paper clip is made of wire 1.2 mm in diameter. If the original material from which the wire is made is a rod of 18 mm in diameter. Calculate the engineering strain and true strain that the wire has undergone in its processing. (Note that true strain \( \varepsilon_t \) and engineering strain \( \varepsilon \) are related as \( \varepsilon_t = \log_e (1+E) \)).

3 Answer any two of the following : \( 8 \times 2 = 16 \)

(a) (i) How does roll forging differ from a conventional rolling operation? Explain this.

(ii) Explain the upset forging process. 4

(b) (i) Explain the significance of roll diameter with reference to roll separating force in rolling operation. 4

V-4042] 4 [Contd..
(ii) How does cold rolling mill differ from hot rolling mill? Explain the basic criteria in roll arrangement.

(c) (i) Explain the difference between direct extrusion and indirect extrusion processes. 4

(ii) A round billet of 70-30 brass having initial diameter of 125 mm is extruded at temperature of 675°C to 50 mm diameter rod. Calculate the extrusion force required. (Extrusion constant of brass is 250 MPa).

4 Answer any two of the following : 8x2=16

(a) In sheet metal working explain the term 4+4=8

(i) Blanking

(ii) Cup Drawing.

(b) (i) Describe the purpose of incorporating an angle on the surface of a punch in sheet metal working process. 4

(ii) Explain progressive die set. 4
(c) Explain why spring back in bending depends on:

(i) Yield stress
(ii) Elastic modulus
(iii) Sheet thickness and
(iv) Bend radius.

5 Answer any two of the following: 8×2=16

(a) Explain the four basic steps that are usually involved in making products by powder metallurgy technique.

(b) Discuss in detail the various high-energy-rate forming processes.

(c) Explain in detail, the thermosetting and thermoplastic polymer processing techniques.

6 Answer any two of the following: 8×2=16

(a) (i) Explain the four primary requirements of a molding sand. 4

(ii) Discuss the requirements of geometric features in use of cores. 4
(b)  (i) Describe how runner extension is helpful for good casting quality.  
(ii) Specify the advantages of precision investment casting process over other casting processes.

(c)  (i) Explain the differences between a jig and a fixture.
(ii) Explain the basic criteria in designing jigs and fixtures.