



B.E./B.Tech. (Full Time) END SEMESTER EXAMINATIONS APRIL /MAY 2014

MATERIALS SCIENCE AND ENGINEERING

V SEMESTER – (REGULATIONS 2008)

ML 9302 – MATERIAL ASPECTS IN DESIGN

Time: 3 hours

Maximum marks: 100.

PART – A

(10 x 2 = 20 Marks)

1. List eight basic forms of corrosion
2. Write any two DFM guidelines for plastic processing
3. List four general criteria for selection of materials
4. Draw the schematic figure of the design process with corresponding design tools , materials and process selection
5. List the factors determining the process selection
6. Give the classification of joining process
7. Write the difference between shaft basis and hole basis system
8. The dimensions of the mating parts according to basic hole system are given as follows. Hole 25mm & 25.02 mm, Shaft 24.97mm & 24.95 mm. Find the hole tolerance ,the shaft tolerance and allowance
9. Define endurance limit
10. Draw the torsional shear stress diagram for the helical spring.

PART – B

(5 x 16 = 80 Marks)

11. With an example, discuss in detail about how the quantity of parts influence the selection of a process to make a part. **(16)**
12. (a) With an example, discuss in detail about geometric tolerance in design **(16)**

(OR)

(b) Discuss in detail about various types of fits and tolerances. **(16)**
13. (a) A horizontal nickel steel shaft rests on two bearings, A at the left and B at the right end and carries two gears C and D located at distances of 250 mm and 400 mm respectively from the centre line of the left and right bearings. The pitch diameter of the gear C is 600 mm and that of gear D is 200 mm. The distance between the centre line of the

bearings is 2400 mm. The shaft transmits 20kW at 120 r.p.m. The power is delivered to the shaft at gear C and is taken out at gear D in such a manner that the tooth pressure F_{TC} of the gear C and F_{TD} of the D act vertically downwards. Find the diameter of the shaft, if the working stress is 100 MPa in tension and 56 MPa in shear. The gears C and D weighs 950N and 350N respectively. The combined shock and fatigue factors for bending and torsion may be taken as 1.5 and 1.2 respectively. (16)

(OR)

(b) A hot rolled steel shaft is subjected to a torsional moment that varies from 330Nm clockwise to 150Nm counterclockwise and an applied bending moment at a section varies from +440Nm to -220Nm. Determine the shaft diameter. The material has an ultimate strength of 550MN/m² and yield strength of 410MN/m². Factor of safety 2. (16)

14.(a) With an example, discuss in detail about the guidelines of Design for Assembly (16)

(OR)

(b) Explain in detail about the guidelines of Design for welding (16)

15.(a) Explain in detail about the various corrosion prevention methods (16)

(OR)

(b) Explain in detail about the guidelines of Design for fatigue failure. (16)