Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –Ist SEMESTER–EXAMINATION – JULY- 2012

Subject code: 710801N **Date: 05/07/2012**

Subject Name: Advance Machine Design

Time: 2:30 pm – 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Draw neat sketch wherever necessary.**

Q.1 **(a)** Explain the wear and methods used to reduce it in detail. Explain the selection of materials in case where the components are subjected to wear. **07**

(b) 1. List the different theories of friction. Explain Bowden-Tabor adhesion theory of friction. **07**

2. Write short notes on porous bearing and its applications.

Q.2 **(a)** 1. Discuss the safe life v/s life safe design concepts. **07**

2. Write a note on product design and development.

(b) Discuss the recent advances in gear materials and its heat treatments in detail. **07**

OR

(b) What do you mean by power rating of gears? Explain the gear rating as per BIS-4460-1967 in detail. **07**

Q.3 **(a)** Discuss the basic principles to be considered while designing the materials handling equipments. **07**

(b) Design the of main girder of an E.O.T. crane (double girder type) from the following given data: **07**

Load to be lifted = 250 kN Weight of hook = 4 kN
Weight of crab = 6.5 kN Span = 13.7 m
Height of lift = 5.5 m Hoisting speed = 1.5 m/min
Cross traverse speed = 10 m/min
Hollow rectangular cross section with height to width ratio = 2.5
Steel plate thickness = 10 mm
Permissible bending stress = 100 MPa

OR

Q.3 **(a)** Explain the strength and rigidity base analysis of main girder of an E.O.T. crane in detail with neat sketches alongwith design equations. **07**

(b) Explain the design for manufacturing in detail. **07**

Q.4 **(a)** Discuss the different modes of lubrication with neat sketches. **07**

(b) 1. Explain the EHD lubrication in detail giving suitable examples. **07**

2. Write a note on concurrent engineering.

OR

Q.4 **(a)** Explain the materials and constructional features of high pressure vessels that can be considered in design. **07**

(b) 1. Explain hydrostatic lubrication and constructional features of hydrostatic bearing design. **07**

2. Differentiate clearly between hydrodynamic bearing and hydrostatic bearing with neat sketches.

Q.5 **(a)** Explain the designing against fracture. Discuss the different modes of crack face displacement with neat sketches. **07**

(b) 1. Explain the designing against creep. **07**

2. A De-laval steam turbine rotor has 100 mm radius below the blade ring and is 6 mm thick. The rotational speed is 24000 r.p.m.Find the rotor thickness at a radius of 50 mm. If the allowable stress is 180 MPa. Assume that the disc is of uniform strength. Take ρ = 7800 Kg/m^3.

OR

Q.5 **(a)** Explain the theory of rotating disc with uniform thickness and uniform strength. **07**

(b) 1 Explain the modeling of machine tools used in design. **07**

2 Discuss the important design cases related to thermal stresses.

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