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Name.....

Reg. No.....



# SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2008

## ME 04 702 – DESIGN OF MACHINE ELEMENTS

Time : Three Hours

Maximum : 100 Marks

*Use of Design Data Hand-book permitted.*
*Missing data can be suitably assumed.*
*Assumptions made must be clearly specified.*

### Part A

1. (a) What are the thermal considerations to be considered in brake design?
   (b) What are the advantages and disadvantages of V-Belt drives?
   (c) Define and explain the significance of formative number of teeth (of Helical Gears).
   (d) What is interference in Gears? What are the methods to be followed for the prevention of interference?
   (e) What are the commonly used materials for sliding contact bearings?
   (f) What are the advantages and disadvantages of rolling contact bearings?
   (g) List the factors to be considered while designing sheet metal components?
   (h) Explain the role of computer in product design, manufacturing and management.

(8 × 5 = 40 marks)

### Part B

2. (a) Determine the main dimensions of a cone clutch faced with leather to transmit 30 kW at 750 r.p.m. from an electric motor to an air compressor. Assume an overload factor of 1.75. Due to the possibility of contamination of lining a low value of 0.2 for friction factor is recommended

*Or*

   (b) A roller chain drive transmits 4 kW power. The driving shaft on an electric motor runs at 600 r.p.m. and velocity ratio is 5. The drive is required to operate continuously with periodic lubrication, and drive a machine such that the load can be regarded as fairly constant. Assuming factor of safety as 14; Select the drive, and check for power capacity of IT, based on breaking load and bearing pressure.

3. (a) A pair of helical gears with 23° helix angle is to transmit 2.5 kW at 10,000 r.p.m. of the pinion. Velocity ratio is 4 : 1. Both gears are to be made of hardened steel, with an allowable stress of 100 mN/m$^2$ for each gear. The Gears are 20° stub and the pinion is to have 24 teeth. Determine the minimum diameter gears that can be used and the required BHN.

*Or*

**Turn over**

(b) Design a norm gearing to transmit 11 kW from an electric motor running at 1500 r.p.m. to a machine running at 75 r.p.m. Load is intermittent (less than three hours of continuous service) and steady.

4. (a) Design a journal bearing for a centrifugal pump. The load on the bearing is 3.5 kN and the journal diameter is 75 mm. The shaft runs at 900 r.p.m. The heat of friction is to be dissipated from the bearing housing. The ambient temperature may be taken as 25° C.

*Or*

(b) Ball bearing is to be selected for application in which the radial load 2200 N during 90% of the time and 8000 N during the remaining time. The shaft runs at 150 r.p.m. and a life of 5000 hours is desired.

5. (a) What principles of casting design that must be observed in order to obtain sound casting? Explain.

*Or*

(b) What is the purpose of a working drawing? Briefly discuss the elements that a working drawing package will contain.

(4 × 15 = 60 marks)