(Pages 2)

	1	All	REDUC	Ar	6	1
Nam	e	13		100	/4	
Reg.	No.	THR			F \ 7	BRA

NGG. COL

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2007

ME 04 702—DESIGN OF MACHINE ELEMENTS

(2004 admissions)

Time: Three Hours

Maximum: 100 Marks

Use of Design Data Handbook permitted.
Missing data can be suitably assumed.
Assumption made must be clearly specified.

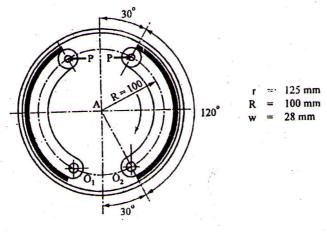
Part A

- 1. (a) What characteristics should a brake or clutch friction material should posses?
 - (b) What are the advantages and disadvantages of Chain Drives?
 - (c) What are applications of worm drive? What is meant by self locking?
 - (d) State important reasons why involute profile are preferable over cycloidal profile in general.
 - (e) List out the steps to be followed while designing a journal bearing.
 - (f) Explain how the rolling contact bearings are designated. What is the function of cage in those bearings?
 - (g) What are the points to be considered, while designing components to be forged?
 - (h) Role of computers in the preparation of working drawings.

 $(8 \times 5 = 40 \text{ marks})$

Part B

2. (a) The internal expanding shoe brake has a drum of diameter 250 mm. R=100 mm and face width of the shoe = 28 mm. Calculate the actuating force, torque capacity and the hinge pin reactions, if $P_{max}=600$ kPa and $\mu=0.32$.



Or

Turn over

(b) A compressor requiring 50 KW is to Run at about 250 r.p.m. The drive is by V-belts from an electric motor running at 750 r.p.m. The diameter of the pulley on the compressor shaft must not be greater than 1 meter while the centre distance between pulleys is limited to 1.75 m. The belt speed should not exceed 1600 m/min.

Determine the number of V-belts required to transmit power if each belt has a cross-section area of 3.75 cm² and weighs 0.001 kg/cm³ and has an allowable tensile stress of 2.5 mN/m². The groove angle of the pulley is 35° coefficient of friction between the belt and the pulley is 0.25.

3. (a) Two spur gears are to be used for a rock crusher drive and are to be of minimum size. The gears are to be designed for the following requirements:

Power to be transmitted: 20 kW

Speed of the Pinion : 1200 r.p.m.

Velocity Ratio : 4:1

Tooth Profile : Involute 20° stub

Service factor : 1.8. Assuming heavy shock and 8 - 10 Hrs per day.

Or

(b) A pair of bevel gears are used to connect two shafts at right angles and transmit 10 kW power. Determine the module and check for dynamic and wear loads. The details are as follows:

Particles		Pinion	Gear
Material	•••	Heat treated cast steel	CI Alloy
\mathbf{Z}		20	60
Profile	•••	20° Full depth	Involute
$\sigma_{ m d}$		196	80
BHN		250	180
Speed	:	1200 r.p.m.	400 r.p.m.
			•

Or

4. (a) A journal bearing 160 mm long and 45 mm dia supports a radial load of 8000 N. The shaft speed is 160 r.p.m., oil used is SAE 60 at 25°C inlet temperature. Using clearance ratio of 600, find the rise in temperature, maximum film pressure and minimum film thickness. Also find power lost in friction and by finding heat dissipated state whether artificial cooling is required for bearing.

Or

- (b) Select a suitable ball-bearing for the spindle of a wood working machine revolving at 1200 r.p.m. One of the bearing is subjected to a radial load of 2.5 kN and a thrust of 2 kN. The other carries only a radial load of 3 kN. The machine is to be used 8 hours per day, 6 day in a week and a service life of 10 years is desired. The diameter of the spindle is 50 mm and it can be turned down slightly at the ends for mounting the bearings.
- 5. (a) With neat sketches, discuss the factors that must be taken into account while designing the parts for machining.

Or

(b) Discuss briefly the steps involved in the preparation of working drawings for manufacture of parts.

 $(4 \times 15 = 60 \text{ marks})$