

B.TECH. DEGREE EXAMINATION, MAY 2014**Eighth Semester**

Branch: Automobile Engineering

DESIGN OF TRANSMISSION ELEMENTS (M)

(Regular/Supplementary)

Time: Three Hours

Maximum Marks: 100

Answer one full question from each module Use of Design Data Book is permitted. .

Missing Data may be assumed.

Module-1

1. A cone clutch has a cone angle of 30° and is used to transmit 10 kW at 1500rpm. The width of the face is one-fourth of the mean diameter of friction lining. The normal intensity of pressure between contact surfaces is 0.12 MPa and coefficient of friction is 0.2, assuming uniform wear, design the clutch dimensions. (25 marks)

OR

2. A differential band brake has an operating lever 240mm long. The ends of the band are attached at 40mm and 120mm on either side of the pivot. The drum diameter is 600mm. Arc of contact is 300° . Design the brake to absorb 15kW at 1200 rpm. (25 marks)

Module-2

3. (a)What is the difference between thick film and thin film lubrication?

(b)The following data is given for a 360° hydrodynamic bearing,

Radial load = 3.6 kN

Journal diameter = 55 mm

Bearing length = 27.5 mm

Radial clearance = 0.05 mm

Viscosity of lubricant = 25 CP.

Sommerfeld number of bearing is 0.0923.

Determine (i) Journal speed; (ii) Coefficient of friction; (iii) Power loss in friction; (iv) Flow requirement; (v) Temperature rise. (20 marks)

OR**P.T.O**

4. A journal bearing 160 mm long and 45 mm dia. supports a radial load of 8,000 N. The shaft speed is 160 rpm; oil used is SAE 60 at 25° C inlet temperature. Using clearance ratio 600, find the rise in temperature, maximum films pressure and minimum film thickness. (25 marks)

Module-3

5. (a) How do you specify the size of gear tooth? (5 marks)

(b) A pair of spur gear is to be designed. The pinion rotates at 800 rpm. and transmits 6 kW to gear rotating at 200 rpm; Starting torque can be taken as 140% of rated torque for pinion and gear allowable stress is 150 MPa. (20 marks)

OR

6. (a) Explain why helical gears are capable of transmitting, grater power at high speed as compared to the spur gear. (5 marks)

(b) A pair of helical gears is to be designed to transmit 20 KW at a pinion speed of 1500 rpm. The velocity ratio is 2.5. Selecting suitable materials, determine the dimensions of the gears. (20 marks)

Module-4

7. Design a flywheel for a single cylinder, four stroke vertical cylinder diesel engine developing 4kW at 1500 rpm. Assume coefficient of speed fluctuation $C_s=0.01$. (25 marks)

OR

8. Design a piston for a four stroke diesel engine developing power at 1500 rpm. Other related data are the following.

(1) Piston diameter= 87mm

(2) Length of the stroke = 96mm

(3) Mean effective pressure = 0.7 N/mm²

(4) bsfc = 0.26 kg/kWh

(5) L/r ratio= 4

(6) Heat conducted through the piston crown= 10% of heat generated during combustion.

(7) Calorific value of the fuel (CV) = 42 MJ/kg

Assume that the piston is made of aluminium alloy.

(25 marks)