

**B.TECH. DEGREE EXAMINATION, MAY 2015****Eighth Semester**

Branch : Automobile Engineering/Mechanical Engineering

AU 010 801/ME 010 801—DESIGN OF TRANSMISSION ELEMENTS (AU, ME)

(Common to AU 010 801 and ME 010 801)

[New Scheme—2011 Admissions/Regular]

Time : Three Hours

Maximum : 100 Marks

*Answer any two questions from Part A and Part B.**Each question carries 25 marks.**Assume missing data suitably.**Machine design data book as per syllabus is permitted.***Part A***Module 1 and 2.*

1. An automotive single-plate clutch consists of two pairs of contacting surfaces. The outer diameter of the friction disc is 270 mm. The co-efficient of friction is 0.3 and the maximum intensity of pressure is 0.3 MPa. The clutch is transmitting a torque of 531 N-m, (assuming uniform wear, calculate (i) the inner diameter of the friction disc ; and (ii) spring force required to keep the clutch engaged.
2. A simple band brake of drum diameter 650 mm has a band passing over it with an angle of contact of 225° . While one end of the band is connected to the fulcrum, the other end is connected to the brake lever at a distance of 410 mm from the fulcrum. The brake lever is 1100 mm long. The brake is to absorb a power of 15 kW at 720 r.p.m. Design the brake lever of rectangular cross-section assuming the depth to be twice the width.
3. Determine the dimension of the bearing and journal to support a load of 6 kW at 750 r.p.m. using hardened steel journal and bronze backed basic bearing. An abundance of oil provided which has a specific gravity of 0.95 at 15.5°C and viscosity of 9.5 centi stokes at 82°C , that may be taken to the limiting temperature of oil. Assume a clearance of 0.001 mm per mm of diameter is allowed.
4. Derive Petroff's equation for the coefficient of friction in a lightly loaded bearing.

Turn over

Part B*Module 3 and 4.*

5. In a spur gear, a 11 kW motor running at 1450 r.p.m. drives a shaft through a pair of spur gears with a velocity ratio of 4.5 : 1. Forged steel SAE 1045 pinion and CI gear are specified. Design the gear and check for dynamic and heat load considerations.
6. Derive an expression for beam strength of a spur gear tooth (Lewis equation) using standard notations. State the assumptions under which this equation is valid.
7. Find the diameter of a steel connecting rod for an engine in which the maximum load on the piston is 700 kN. Crank of the engine is 0.6 m radius, connecting rod length 3 m, factor of safety is 8.
8. A single cylinder double acting steam engine delivers 187.5 kW at 100 rev/min. The maximum fluctuation of energy/revolution is 15 per cent. The speed variation is limited to 1 percent either way from the mean. The mean diameter of the rim is 2.4 m. Design a cast iron flywheel for the engine.

(4 × 25 = 100 marks)

