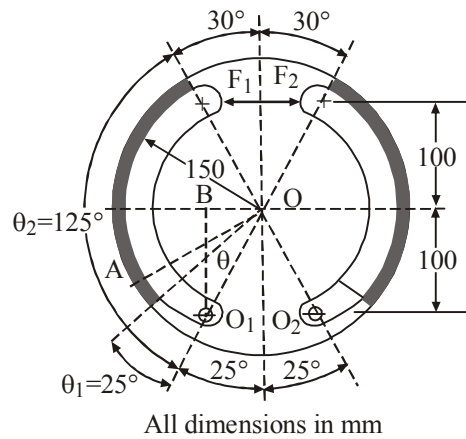


SECTION-B

- Q2. Draw a flow chart of design procedure and explain its components in details
- Q3. Design a spring for a balance to measure 0 to 1000 N over a scale of length 80 mm. The spring is to be enclosed in a casing of 25 mm diameter. The approximate number of turns is 30. The modulus of rigidity is 85 kN/mm^2 . Also calculate the maximum shear stress induced.
- Q4. A plate 100 mm wide and 12.5 mm thick is to be welded to another plate by means of parallel fillet welds. The plates are subjected to a load of 50 kN. Find the length of the weld so that the maximum stress does not exceed 56 MPa. Consider the joint first under static loading and then under fatigue loading.
- Q5. The following particulars of a single reduction spur gear are given: Gear ratio = 10:1; Distance between centres = 660 mm approximately ; Pinion transmits 500 kW at 1800 rpm.; Involute teeth of standard proportions (addendum = m) with pressure angle of 22.5° ; Permissible normal pressure between teeth = 175 N per m m of width. Find :
- a) The nearest standard module if no interference is to occur;
 - b) The number of teeth on each wheel;
 - c) The necessary width of the pinion; and
 - d) The load on the bearings of the wheels due to power transmitted.
- Q6. What are the design considerations for piston of internal combustion engine? What should be the properties of piston rings?

SECTION-C

- Q7. Give a complete design analysis of a single plate clutch, with both sides effective, of a vehicle to transmit 22 kW at a speed of 2800 r.p.m. allowing for 25% overload. The pressure intensity is not to exceed 0.08 N/mm^2 and the surface speed at the mean radius is not to exceed 2000 m/min. Take coefficient of friction for the surfaces as 0.35 and the outside diameter of the surfaces is to be 1.5 times the inside diameter. The axial thrust is to be provided by 6 springs of about 24 mm coil diameter. For spring material, the safe shear stress is to be limited to 420 MPa and the modulus of rigidity may be taken as 80 kN/mm^2 .
- Q8. Fig. 1 shows the arrangement of two brake shoes which act on the internal surface of a cylindrical brake drum. The braking force F_1 and F_2 are applied as shown and each shoe pivots on its fulcrum O_1 and O_2 . The width of the brake lining is 35 mm. The intensity of pressure at any, point A is $0.4 \sin \theta \text{ N/mm}^2$, where θ is measured as shown from either pivot. The coefficient of friction is 0.4. Determine the braking torque and the magnitude of the forces F_1 and F_2 .



Q9. What are various theories of failure? Discuss the theories applicable for ductile material in detail.