

SECTION-B

2. What properties are required in a material for making a piston?
3. How torque transmission capacity of a clutch is calculated?
4. Explain design considerations for axle of an automobile.
5. How design against fluctuating loads is different than design against static loads?
6. Write various design steps for designing of a bolted joint.

SECTION-C

7. The following particulars refer to the valve spring of a petrol engine.

Length of the spring when the valve is open = 41 mm

Length of the spring when the valve is closed = 49 mm

Spring load when the valve is open = 360 N

Spring load when the valve is closed = 220 N

Maximum inside diameter of spring = 25 mm

Calculate wire diameter and pitch of the spring for the maximum permissible shear stress of 400 N/mm^2 and modulus of rigidity is $0.83 \times 10^5 \text{ N/mm}^2$.

8. Two shafts 300 mm apart transmitting 18.75 kW are to be connected by a steel pinion meshing with a cast iron gear. The velocity ratio is to be 3 to 1 and the smaller gear is to run at 600 rev/min. The ultimate strength of the material for gear is 168 MPa and the factor of safety is 4. Design the arms for the gear and find the diameter of the gear shaft.
9. A single cylinder double acting steam engine delivers 187.5 kW at 100 rev/min. The maximum fluctuation of energy/rev is 15%. The speed variation is limited to 1% either way from the mean. The mean diameter of the rim is 2.4 m. Design a cast iron flywheel for the engine.