

- (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 cm^2 and weighs 0.001 kg/cm^3 and has an allowable tensile stress of 2.5 mN/m^2 . 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 :

Particulars	Pinion	Gear
Material	Heat treated cast steel	CI Alloy
Z	20	60
Profile	20° Full depth	Involute
σ_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 × 15 = 60 marks)