

“Please check whether you have got the right question paper.”

- i) Attempt any three questions from each section.
- ii) Assume suitable data wherever necessary.
- iii) Use of non-programmable calculator is allowed.

SECTION-A

- Q.1 A gear drive is required to transmit a maximum power of 25 KW .The pinion runs at 200 rpm& has the 14 velocity ratio of 1.25. The Centre distance between the shafts is 650mm .The teeth has 20° stub involuteprofile .The static stress for the cast iron gear may be taken as 60 MPa and face width as 10 times the module .Find out module, face width and number of teeth’s on each gear .Check the design for dynamic and wear loads considering the dynamic factor in the Buckingham equation as 80 and the material combination factor for the wear as 1.4. Assume: - 1) Velocity factor $KV = \frac{3}{3+v}$.
2) Tooth form factor $y = 0.175 - \frac{0.841}{t}$.
- Q.2 a) Define and explain formative number of teeth on a helical gear . Derive the expression and to obtain its 06 value .
b) A pair of steel helical gears is used to connect the two paralled starts .A pinion sunning at 4000 rpm 07 tramits the 15 kw power . The safe static strength for material is 110 mpa .The gear ratio is 4: 1 ,the stub teeth with 20° pressure angle in diametral plane have helix angle of 20°. Design the gear completely and check the design for dynamic load . consider the number of teeth on pipion to be 30.
- Q.3 a) Enlist and explain the various means for controlling the engagement of a clutch . 04
b) A multiple disk clutch consists of steel and bronze plates transmits 12KW at1200 rpm .The inner and 09 outer dimeter of discs being 100mm and 160 mm respectively .The engagement factor is 1.2 .The coefficient of friction between contracting plates is 0.16 and maximum intensity of pressure is 0.25 mpa . using unifrom wear and unifrom pressure conitions , find out.The required number of steel and bronze plates.
- Q.4 Write short notes on :- 13
a) AWMA recommended power rating equations for warm gearing .
b) The materials used for lining of friction surfaces and its desirable properties .
c) Frooms of teeth in spur sears .

SECTION-B

- Q.5 Two shafts seperated by a distance of 1 m are connected by a V-belt . The driving pulley has a diameter 14 of 300 mm and transmits 100KW .The driving and driven pulleys runs at 900 rpm and 350 rpm respectively .The angle of groove on the pulley is 40°.The permissible tension in the belt is 850 N and the density of belt material is 1.1 GM/ CM² .The cross- sectional arca of the belt is $4 \times 10^{-4} M^2$ and 14 coe-fficient of friction is 0.25 . Find out the number of belts required and the length of each belt .
- Q.6 A deep groove ball hearing has a dynamic capacity of 20500 N and it operates on the following work 14 cycle of different radial loads :-
6000N at 250rpm for 20% of time.
9000 at 500 rpm for 25% of time .
3600 N at 400 rpm for remaining time .
Assume that the loads are steady and the inner race rotates , find the average life of bearing in hours.

Q.7 In a band and block brake, the band is lined with 12 blocks, each subtending an angle of 15° at the centre. Find out the least force required for the brake to absorb 250 kW at 250 rpm. Take $\mu=0.4$, lengths of pins on either side of fulcrum = 150 mm and 30 mm respectively and length of lever = 0.5 m. Consider brake drum diameter as 850 mm and the thickness of each block as 75 mm. 13

Q.8 Write short notes on :- 13

- Important factors to be considered in brake design.
- Gear materials and its selection.
- Types of belts, belt materials and criteria for its selection.