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CODE NO:- K-243

FACULTY OF ENGINEERING

T.E.(MECH/PROD) Examination

June 2014

Design of Machine Elements-II

[Time: Three *Hours*] **[Max. Marks:80]**

"Please check whether you have got the right question paper."

N.B *i) Attempt any three questions from each section.*
ii) Assume suitable data if necessary.
ii) Use of non-programmable calculates is allowed.

SECTION-A

Q. 1 Design a pair of spur gears having 20^0 inviolate full depth teeth for transmitting 18KW. The pinion rotates at 250 rpm and velocity ratio is 1:3. The allowable static stresses for gear and pinion materials are 120 and 140 mpa respectively are 120 and 140mpa respectively. The pinion has 18 teeth. 14

Q. 2 A helical cast steals gear having 30^0 helix angles has to transmit 30KW at 1400 rmp. If the gear has 24 teeth, determine the necessary module, pitch diameter and face width for 20^0 full depth teeth. The static stress for cast steel may be taken as 60^0 mpa. The face width may be taken as 3 times the normal pitch. Find out the end thrust on the gear. The tooth factor for 20^0 full depth inviolate gears may be taken as $0.0.154 - \frac{0.912}{T_t}$, Where T_t is the formative number of teeth? 14

Q. 3 A centrifugal clutch is to be designed to transmit 20 KW at 1000 rpm. The clutch has 4 shoes. The speed at which engagement begins is $^3/_4{}^{th}$ of the running speed. The inside radius of the rim is 140 mm . The shoes are lined with friction material having the coefficient of friction of 0.25. determine: 13

1) Mass of the shoe 2) size of shoes

Q. 4 Write short notes 13

a) Types of gear trains
b) Advantages and disadvantages of worm and worm gear.
c) Friction materials for clutches and its desirable characteristics.

SECTION -B

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Q. 5 A flat beet drive is used to transmit 12 kw power from a pulley rotating at 700 rpm to another pulley rotating at 250 rpm. The center distance between the pulleys is twice the diameter of larger pulley. The belt is operating at constant speed of 20 m/s. the stress in the beet should not exceed 3 $3N/mm^2$ if the density of leather belt is 0.98 gm/cc and coefficient of friction between belt and pulley is 0.35 & belt thickness as 5 mm , calculate: 14

i) Diameter of pulley
ii) Length & width of the belt
iii) Belt tensions

Q.6 A deep groove ball bearing has a dynamic capacity of 20,000 N and it operates on the following work cycle having different radical loads: 14
5500 N at 500 rpm for 20% of time,
8500 N at 200 rpm for 25% of time,
4000 N at 425 rpm for remaining time.
Assume that the loads are steady and the inner race rotates; find the average life of bearing in hours.
Write about profit-volume ratio.

Q.7 In a hand and block brake, the band is lined with 15 blocks, each subtending an angle of 16^0 at the center. Find out the least force required for the brake to absorb 215 kw at 250 rpm. take $\mu = 0.35$, lengths of pins on either side of fulcrum=150 mm, and 30mm respectively and length of leve z= 0.5 m. consider brake drum diameter as 800 mm and thickness of each block as 70mm. 13

Q.8 Write short notes 13

a) Compare sliding contact bearing and rolling contact bearing.
b) Strength of bevel gears.
c) Heat dissipation in brakes.

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