



Printed Pages : 4

TME - 603

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 4095**

Roll No.

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**B. Tech.****(SEM. VI) EXAMINATION, 2008-09****MACHINE DESIGN - II***Time : 3 Hours]**[Total Marks : 100*

- Note :**
- (1) Answer all the questions.
  - (2) Use of Design Data book is permitted.
  - (3) Assume data suitably wherever not provided.
  - (4) Marks and instructions are indicated therein.

**1** Attempt any **two** of the following: **20×2=40**

- (a) (i) Why involute gears are more commonly used as compared to the cycloidal gears? Discuss briefly.
- (ii) A pair of straight teeth spur gears is to transmit 25 kW when the pinion rotates at 300 rpm. The velocity ratio is 1:3. The allowable static stresses for the pinion and gear materials are 120 MPa and 100 MPa respectively. The pinion has 15 teeth and its face width is 15 times the module. Determine module, face width and pitch circle diameters of both pinion and the gear from the standpoint of



strength only, taking into consideration the effect of the dynamic loading. Assume  $20^\circ$  full depth involute pairs with ordinary cutting.

- (b) (i) What are the disadvantages of spur gears? How these difficulties are overcome in helical gears?
- (ii) Design a pair of helical gears of equal diameter,  $20^\circ$  stub tooth helical gears to transmit 40 kW with moderate shock at 1200 rpm. The two shafts are parallel and 45 cm apart. Find the module and face width of the teeth.
- (c) Design a worm gearing to transmit 10 kW from an electric motor running at 1500 rpm to a machine running at 75 rpm. Load is intermittent ( $< 3$  hr. of continuous service) and steady.

2 Attempt any **two** of the following : **20×2=40**

- (a) (i) Enumerate the advantages and disadvantages of rolling contact bearings.
- (ii) Select a single row deep groove ball bearing for a radial load of 4 kN and an axial load of 5 kN, operating at a speed of 1500 rpm for an average life of 5 years at 10 hrs. per day. Assume uniform and steady load.



- (b) (i) Explain how the following factors influence the life of a bearing.  
Load, Speed, Temperature
- (ii) Design a journal bearing for a centrifugal pump from the following data:  
Load on the journal = 20 kN  
Speed of the journal = 1000 rpm  
Absolute viscosity of oil at 55°C = 0.017 kg/m-s  
Ambient temperature of oil = 16°C  
Maximum bearing pressure for the pump = 1.5 N/mm<sup>2</sup>
- (c) (i) What are journal bearings? Give a classification of these bearings and discuss them briefly.
- (ii) Differentiate between "Hydro-dynamic lubrication"; "Wedge-film lubrication" and "squeeze-film lubrication".
- (iii) Write short note on the lubricants used in sliding contact bearings.

**3** Design a connecting rod for 4 stroke petrol engine, **20**  
with the following data:

Piston diameter = 0.10 m

stroke length = 0.15 m

Length of connecting rod (centre to centre) = 0.30 m

Weight of reciprocating parts = 20 N

Speed is 1500 rpm with possible overspeed of 2500 rpm  
Compression ratio = 4:1  
Maximum Explosion pressure = 2.5 MPa

**OR**

- 3 Design a piston for a single acting **four** stroke engine 20  
for the following specifications cylinder bore. = 0.30 m  
Stroke length = 0.375 m  
Maximum gas pressure = 8 MPa  
Brake mean effective pressure = 1.15 MPa  
Fuel consumption = 0.22 kg/kW/hr.  
Speed = 500 rpm  
Assume suitable data.
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