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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**TEST - 1**

**Even Semester:** 2018-19

**Course Code:** MEC 216

**Course Name:** Design of Machine Elements II

**Programme & Sem:** BTech (MEC) & VI Sem

**Date:** 05 March 2019

**Time:** 1 Hour 15 Mins

**Max Marks:** 40

**Weightage:** 20%

**Instructions:**

- (i) Read the question properly and answer accordingly.
- (ii) All questions are compulsory
- (iii) Scientific and Non-programmable calculators are permitted.
- (iv) Use of Design hand book is allowed

**Part A**

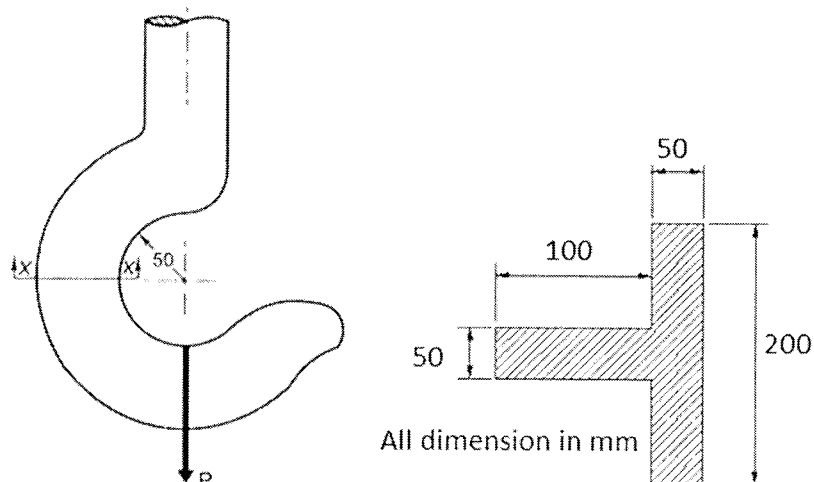
Answer **all** the Questions. **Each** question carries **five** marks. (2Qx5M=10)

1. What are the disadvantages of V-belts over flat belts?
2. 6 X 19 wire rope with fibre core and nominal diameter of 10 mm are used for a hoist. The weight of the hoist along with the material is 10 kN, which is raised through a distance of 300 m. The maximum acceleration during the operation is limited to  $2 \text{ m/s}^2$ . Determine the maximum load that the rope supposed to carry during operations.

**Part B**

Answer **both** the Questions. **Each** question carries **ten** marks. (2Qx10M=20)

3. A crane hook (internal diameter 50 mm) having an approximate 'T' cross-section is shown in Fig1. It is made of plain carbon steel and ultimate tensile stress is  $400 \text{ N/mm}^2$  and factor of safety is 5. Determine the load carrying capacity of the hook.



**Fig.1**

4. The layout of a double-ply leather belt drive is shown in Fig. 2. The mass of the belt is 3 kg per meter length and the coefficient of friction is 0.4. Calculate (i) the tensions on the tight and loose sides, and (ii) the length of the belt. The belt is transmitting 40 kW of power.

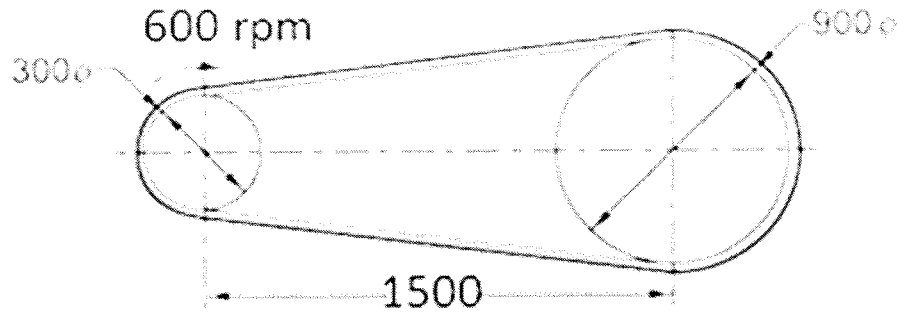


Fig.2.

### Part C

Answer the Question. Question carry **ten** marks.

(1Qx10M=10)

5. It is required to select a V-belt drive to connect a 14 kW, 2000 rpm normal torque A.C. motor to a centrifugal pump, running at approximately 500 rpm, for a service of 18 hours per day. The centre distance should be approximately 600 mm. Assume that the pitch diameter of the driving pulley is 150 mm.

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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**TEST - 2**

**Even Semester:** 2018-19

**Course Code:** MEC 216

**Course Name:** Design of Machine Element II

**Program & Sem:** B.Tech & VI Sem

**Date:** 15 April 2019

**Time:** 1 Hour 15 minutes

**Max Marks:** 40

**Weightage:** 20%

**Instructions:**

- (i) *Read the questions properly and answer accordingly*
- (ii) *Question paper consists of 3 parts*
- (iii) *Scientific and Non programmable calculators are permitted*

**Part A**

Answer **both** the Questions. **Each** Question carries **four** marks.

(2Qx4M=8M)

1. Define the following in the context of springs.  
i) Pitch                      ii) Nip                      iii) Solid length                      iv) Free length
2. Define the following in the context of gears  
i) module                      ii) Circular pitch                      iii) Velocity ratio                      iv) Helix angle.

**Part B**

Answer **both** the Questions. **Each** question carries **eight** marks.

(2Qx8M=16M)

3. It is required to design a helical compression spring subjected to a maximum force of 1250 N. The deflection of the spring corresponding to the maximum force should be approximately 30 mm. The spring index can be taken as 6. The spring is made of patented cold-drawn steel wire whose ultimate strength and modulus of rigidity are 1090 and 81370 N/mm<sup>2</sup>. The permissible shear stress for spring wire should be taken as 50% of the ultimate tensile strength. Design the spring and calculate: i) wire diameter ii) mean coil diameter iii) Number of active coils iv) total number of coils v) free length of the spring vi) pitch.
4. Design a pair of helical gear to transmit 12 kW at 1200 rpm of pinion. The velocity ratio is 3:1. Pinion has 24 teeth and is made of 0.4% carbon steel untreated. The gear is made of cast steel. The teeth are 14.5<sup>0</sup> involute form in normal plane. Helix angle is 25<sup>0</sup>.

### Part C

Answer the Question. The Question carries **sixteen** marks.

(1Qx16M=16M)

5. Design a pair of spur gears to transmit a power of 18 kW from a shaft running at 1000 rpm for a parallel shaft to be run at 250 rpm maintaining a centre distance of 160 mm between shaft centre. Suggest suitable surface hardness for gear pair. Assume class III precision gear , pressure angle =  $20^\circ$ , Medium shock load with 8 to 10 hr service. The material for pinion is Cr-Ni-Steel 0.45% C heat treated and gear is made of alloy steel case hardened. Find out the required hardness for the gears.