Question Bank (G scheme)

Name of subject: DESIGN OF MACHINE ELEMENTS   **Unit Test: II**

Subject Code: 17610   **Course: ME6G**

Semester: VI

Q.1. Attempt any three :-**set any five bits** (3 x 3 = 9)

1. Distinguish between shaft and axle. What type of stresses are induced in shaft?(**Chap. 3**)
2. What is key? State its applications.**(Chap.3)**
3. Write down the classification of coupling and draw neat sketch of any one**.(Chap.3)**
4. What are the requirements of good coupling?(**Chap.3**)
5. Define the following terms with reference to spring:- i) Solid Length, ii) Free Length, iii) Spring index, iv) Spring rate, v) Pitch.**(chap.5)**

6.. Explain the Wahl's stress factor and state its importance in design of helical springs.(**Chap.5**)

7. What is power screw? State its applications and advantages.(**Chap.4**)
8. State the types of thread profiles used for power transmission. Draw neat sketch of any two**.(Chap.4)**
9. Explain Self- locking and Over Hauling of screw.(**Chap.4**)
10. What are the various stresses induced in a power screw**.(Chap.4)**
11. Show that efficiency of self-locking screw is less than 50%. **(Chap.4)**

Q.2. Attempt any TWO:-**set any three bits** (8 x 2 = 16)

1. A line shaft is driven by means of a motor placed vertically below it. The pulley on the line shaft is 1.5mt. in diameter and has belt tensions of 5.4KN and 1.8KN on the tight side and slack side of the belt respectively. Both these tensions may be assumed to be vertical. The pulley is overhang from the shaft, the distance from center line of pulley to the center of bearing is 400mm. assume maximum allowable shear stress of 42MPa. Determine the diameter if the shaft. **.(Chap.3)**
2. A shaft made of mild steel is required to transmit 100KW at 300rpm. The supported length of the shaft is 3mt. It carries two pulleys each weighing 1500N supported at a distance of 1mt. from the ends respectively. Assuming 42MPa of shear stress, determine the diameter of the shaft.**.(Chap.3)**

3. Design a close helical spring for a service load ranging from 2250N to 2750N. The axial deflection of the spring for the load range is 6mm. assume spring index of 5. The permissible shear stress intensity is 420N/mm² and modulus of rigidity is 84N/mm². Neglect the effect of stress concentration.**(Chap.5)**

4. A truck has 12 number of leaves; two of which are full length leaves. The spring supports are 1.5 mt. apart and central band is 85mm wide. The central load is to be 5.4KN with permissible stress 280N/mm². Determine the thickness and width of steel spring leaves. The ratio of the total depth to the width of spring is 3. Also determine the deflection of the spring.**(Chap.5)**

5. Design a helical compression spring for maximum load of 1000N for a deflection of 25mm using spring index as 5. The maximum permissible shear stress for spring wire is 420N/mm².

    Take G= 84x10³ N/mm². **(Chap.5)**

6. The lead screw of a lathe has square threads of 50mm outside diameter and 8mm pitch. The screw must exert an axial pressure of 2500N in order to drive the tool carriage. The thrust is carried on collar 110mm outside diameter and 55mm inside diameter and lead screw rotates at 30rpm. Find:- i) Power required to drive the screw, ii) efficiency of the lead screw. Assume μ= 0.15 for screw and μ= 0.12 for collar.**(Chap.4)**

7. A lead screw of lathe has square threads of 24mm outside diameter and 5mm pitch. In order to drive tool carriage the screw exerts an axial thrust of 2.5KN. Find the efficiency of screw and power required to drive the screw if it rotates at 300rpm. Neglect collar friction and assume coefficient of thread friction as0.12**. (Chap.4)**