Lukhdhirji Engineering College, Morbi

Department of Mechanical Engineering

Assignment 08 - Shafts and Keys (CO 02&03)

Subject: Fundamental of Machine Design (3141907) **Semester : 4th**

Year: 2022-23

1. Differentiate the Shaft, Spindle and Axle.
2. Define Equivalent Banding Moment and Equivalent Torsional Moment with corresponding Equations. Then mention the situation where each concept is used for designing shaft.
3. "*Keys are normally weakest element of a transmission system*" Justify the statement.
4. A solid circular shaft is subjected to a bending moment of 3000 N-m and a torque of 10000 N-m. The shaft is made of 45C8 steel having ultimate tensile stress of 700 MPa and a ultimate shear stress of 500 MPa. Assuming a factor of safety as 6, determine the diameter of the shaft.
5. Design a shaft to transmit power from an electric motor to a lathe head stock through a pulley by means of a belt drive. The pulley weighs 200 N and is located at 300 mm from the centre of the bearing. The diameter of the pulley is 200 mm and the maximum power transmitted is 1 kW at 120 r.p.m. The angle of lap of the belt is 180° and coefficient of friction between the belt and the pulley is 0.3. The shock and fatigue factors for bending and twisting are 1.5 and 2 respectively. The allowable shear stress in the shaft may be taken as 35 MPa. Refer figure.