/ ME / sem-VI / Machine Desige-I / 25/11/14

QP Code :15053

(4 Hours) **[Total Marks : 100**

N.B : (1) Question No. **1** is **compulsory**.
(2) Answer any **four** from the remaining.
(3) Assumption made should be clearly stated.
(4) Use of PSG Design Data Book is permitted.

1. Answer any **four** of the following ;— **20**
   (a) Explain the nipping of the leaf spring with neat sketch.
   (b) What is factor of safety, what factors to be considered for its selection?
   (c) Explain overhauling and self-locking of screw.
   (d) What are the design considerations in forging process?
   (e) What is stress concentration, what are the methods to reduce stress concentration?

2. Design a cotter joint for socket and spigot type to sustain an axial load of 100KN. The material selected for joints has the following design stresses. **20**
   $\sigma_t = 120MPa$, $\sigma_c = 160MPa$, $\tau = 80$ MPa.

3. A shaft is supported at the bearing at A and B 1000 mm apart. An involute spur gear having PCD 400mm is located 300mm to the right of LH bearing and 600mm diameter pulley is mounted 350mm to the left of the RH bearing. The gear is driven by the pinion located vertically above, while the pulley transmits power via belt drive to a pulley iocated vertically below. The ratio of belt tension is 2. The pulley weighs 2500N. Design the shaft transmitting 20KW at 400rpm. The shaft rotates clockwise when viewed from A. **20**

4. (a) Design a bush pin type flexible coupling to connect the output shaft of an electrical motor to the shaft of centrifugal pump. The motor delivers a power of 20KW at 960 rpm. The overall torque for motor is 15 percent of mean torque. **12**
   (b) A truck spring has 12 numbers of leaves 2 of which are full length leaves. The spring supports are 1m apart and the central band is 80mm wide. The central load is to be 8KN with permissible stress of 200MPa. Determine the thickness, width and deflection of the spring leaves if the total depth to width ratio of spring is 3, use E = 210GPa. **8**

[TURN OVER