B. PRINTING ENGINEERING EXAMINATION, 2017

(2nd Year, 2nd Semester)

PRINTING MACHINE DESIGN

Time : 3 hrs.   Full marks : 100

(attempt any five questions)

1. (a) What are the important terms used in screw threads? **(6)**
   (b) What do you understand by the single start and double start threads? **(3)**
   (c) What is meant by a bolt of **sizes M20 X 1.5 and M20 X 2.5 ?** **(3)**
   (d) Explain the method of determining the size of the bolt when the bracket carries an eccentric load acting parallel to the axis of bolts as shown in **FIGURE -1.** **(8)**

2. (a) What is a Bearing? How will you classify the Bearings ? **(4)**
   (b) On what factors the selection of a Bearing for a particular application depends ? **(4)**
   (c) What are the four main parts of a Ball Bearing ? **(4)**
   (d) Compare Ball and Roller Bearings . **(3)**
   (e) For a Radial Ball Bearing, the desired rated life is **10,000 hours** for a speed **of 600 r.p.m.** and radial load of **5kN.** Find **the basic dynamic load rating** for the Bearing. **(5)**

3. (a) Distinguish clearly, giving example between shaft, axle and spindle. **(6)**
   (b) How the shaft is designed when it is subjected to combined twisting and bending moment only ? **(8)**
   (c) A solid shaft is transmitting **1 MW at 260 r.p.m. Determine the diameter** of The shaft if the maximum torque transmitted exceeds the mean torque by **20%.** Given maximum allowable shear stress (τ) = **60 N/mm^2.** **(6)**

4. (a) Explain the terms with neat sketch :
   (i) **Circular pitch** (ii) **tooth thickness** (iii) **base circle**

   (iv) **pressure angle** (v) **module** (10)

   (b) What condition must be satisfied in order that a pair of spur gears may'

   have a constant velocity ratio ? (10)

5. (a) What is a key ? state its function. (4)
   (b) How are the keys classified ? Draw neat sketches of different types of
   keys and state their applications. (8)
   (c) What do you mean by factor of safety ?
   List the important factors that influence the magnitude of
   factor of safety. (8)

6. (a) What are the important terms used in limit system ? Explain with neat
   Sketches. (7)
   (b) What is meant by 'Hole basis system' and 'Shaft basis system' ? Which
   one is preferred and why? (6)
   (c) Calculate the fundamental deviation and tolerances and hence obtain the
   limits of sizes for the hole and shaft in the following fit : **60mm H8/f7,**
   Given : $i = 0.45 \sqrt[3]{D} + 0.001.D$ microns, where **D= G.M. diameter** of
   50mm and 80mm and fundamental deviation for shaft 'f' upper deviat-
   -ion $es = -5.5 (D)^{0.41}$. (7)

7. A pulley of **Φ900mm** diameter revolving at **200 r.p.m** is to transmit **7.5 kW**.
   the tension in the tight side is twice that in the slack side. The maximum tension
   is not to exceed **145N in 10mm** width of the leather belt. Maximum shear
   stress $(\tau) = 63N/mm^2$. Determine : (i) **size of the leather belt** (ii) **diameter
   of the shaft** (iii) **dimensions of the various parts of the pulley, assuming**
   pulle have **six arms.** (5 + 7 + 8)

8. A shaft is supported on bearings **A and B, 800mm** between centres. A **20°**
   straight tooth spur gear having **Φ600mm** pitch diameter, is located **200mm**

to the right of the left hand **bearing A**, and a **Φ700mm** diameter pulley is mounted **250mm** towards the left **of bearing B**. The gear is driven by a **pinion** with a downward tangential force while the pulley drives a horizontal belt having **180°** angle of wrap. The pulley also serve as a flywheel and weight **2000N**. The maximum belt tension is **3000N** and the tension ratio is **3 : 1**.

Given allowable shear stress of the material **is 40N/mm².**

Determine : (i) **the space diagrams**   (ii) **torque diagram** (iii) **load diagrams** (iv) determine **the size of the shaft.**
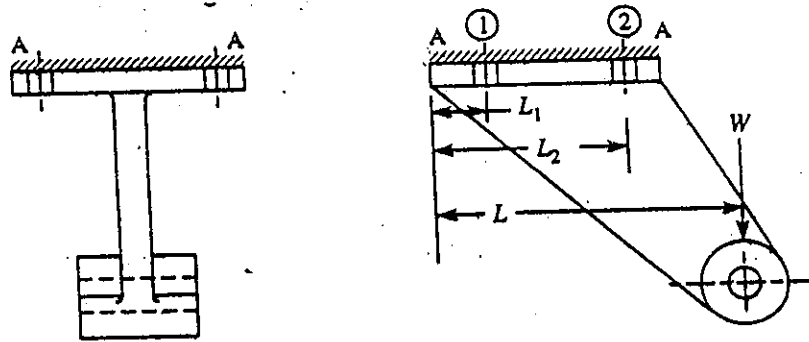
(4 + 4 + 4 + 8)

FIGURE-1.