B. PRINTING ENGINEERING EXAMINATION, 2019

(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 **limit system** ? Explain with **neat Sketches.** (5)

(b) What is meant by '**Hole basis system**' and '**Shaft basis system**' ? Which one is preferred and why? (5)

(c) Calculate the **fundamental deviation** and **tolerances** and hence obtain the **limits of sizes for the hole and shaft in the following fit : 40mm H8/f7,** Given : $i = 0.45\sqrt[3]{D} + 0.001.D$ microns, where **D= G.M. diameter** of **30mm and 50mm** and fundamental deviation for shaft '**f**' upper deviat-ion for shaft $es = -5.5 (D)^{-0.41}$. (10)

2.(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(a).** (8)

3. (a) How the core diameter of the bolt is determined when a bracket having a rectangular base is bolted as shown in **FIGURE- 2**,to a wall by four bolts and carries load perpendicular to the axis of the bolt. **(10)**

(c) A bracket as shown in **FIGURE-1(b)**, supports a load of **30 kN**. Determine the size of the bolts, if the maximum allowable tensile stress in the bolt material is **60 N/mm²**. The distancecs are : $L_1 = 80mm$, $L_2 = 250mm$ and $L = 500mm$. (10)

4. (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)Design the rectangular key for a shaft of diameter **ϕ50mm.** The shearing and crushing stress for the key material are **42N/mm²** and **70N/mm².** (8)

5. (a)Discuss the **function of coupling** Give atleast two **practical examples.** (6)

(b)What are the requirement of a **good shaft coupling?** (4)

(c)**Sketch a protective type flange coupling** and indicate there on its leading dimensions for shaft **size of "d".** (10)

6. A pulley of Φ900mm diameter revolving at 200 r.p.m is to transmit 10H.P. 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 (τ) = 63N/mm². 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)

7. (a) What do you understand by **simplex, Duplex and triplex chains?** (6)

(b) Establish the relation : **p= D.sin(180°/T),** Where **p=pitch of the chain** and D= pitch circle diameter of **the sprocket.** (4)

(c)The centre –to centre distance between the two sprocktes of a chain drive is **600mm**. The chain drive is used to reduce the speed from **180 r.p.m.** to **90 r.p.m.** on the driving sprocket has **18T** and a pitch circle diameter **ϕ480mm.**

Calculate : **(i) Number of teeth** on the **driven sprocket; (ii) Pitch** and **the length** of the **chain.** (10)

8. A pair of straight spur gears is to transmit **26.67H.P.** when the pinion rotates at **300 rpm.** The velocity ratio is **1:3.** The allowable static stresses for the pinion and gear materials are **120 N/mm²** and **100 N/mm².**

The pinion has **15T** and its face width is **14times** the **module(m).** On considerin the the effect of the dynamic loading. **Determine : (i) module** of the gears;
(ii) face width; (iii) pitch circle diameter of both the pinion and the gear.(iv) draw the **dimensional sketch of this system.** (5+4+ 5+6)

9. (a) What is a **Bearing**? How will you **classify** the Bearings? (4)

(b)what are the four main parts of a **Ball Bearing**? (4)

(c)compare Ball and Roller Bearings. (3)

(d)What is "**Bearing Number**"? What do you mean by **Bearing No. 6204 and 6211**.

(e)For a radial Bearing the desired rated life is **20,000 hours** for a speed of **1200 r.p.m.** and radial load of **12kN**. Find the basic dynamic load rating for the Bearing.

(4+4+3+4+5)

10. (a) Name the various rollers used in inking system of a **OFF-SET printing machines** and mention thire dimensions, types of covering use. (10)

(b) A hollow cylinder made of steel to transmit **20 kW** at **200 r.p.m.** The ultimate shear stress for the steel is **360N/mm²** and **factor of safety as 8, find the inside diameter(d_i)** and outside diameter(d_o) of the cylinder. Given **d_i/d_o= 0.5** (10)

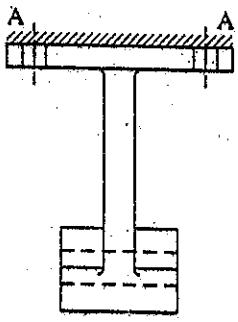


FIGURE- 1(a).

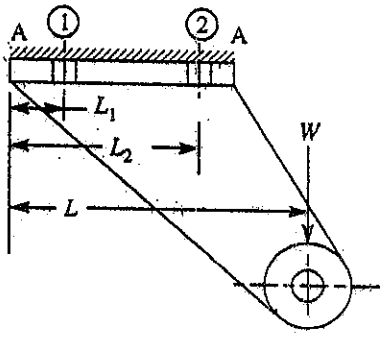
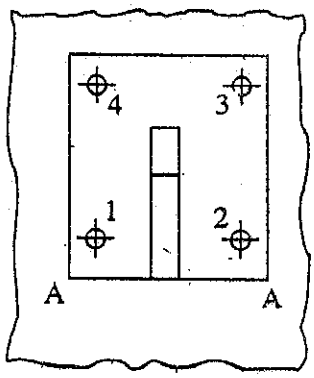


FIGURE- 1(b).



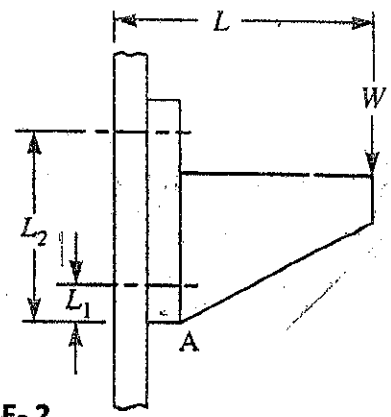


FIGURE- 2.