

GUJARAT TECHNOLOGICAL UNIVERSITY**PDDC - SEMESTER – III • EXAMINATION – WINTER 2012****Subject code: X 31903****Date: 31/12/2012****Subject Name: Machine Design & Industrial Drafting****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) What do you mean by factor of safety ? List the important factors that influence the magnitude of factor of safety. **07**

(b) A machine component is subjected to flexural stress which fluctuates between $+ 300 \text{ MN/m}^2$ and $- 150 \text{ MN/m}^2$. Determine the value of minimum ultimate strength according to Modified Goodman relation Soderberg relation.
Take yield strength = 0.55 Ultimate strength ;
Endurance strength = 0.5 Ultimate strength and factor of safety = 2 **07**

Q.2 (a) Explain the advantages and disadvantages of welded joints over riveted joints. **07**

(b) Distinguish between cotter joint and knuckle joint. **07**

OR

(b) Design a sleeve and cotter joint to resist a tensile load of 60 kN. All parts of the joint are made of the same material with the following allowable stresses :
 $\sigma_t = 60 \text{ MPa}$; $\tau = 70 \text{ MPa}$; and $\sigma_c = 125 \text{ MPa}$ **07**

Q.3 (a) Distinguish between shaft and axle. How the shaft is designed when it is subjected to twisting moment only ? **07**

(b) Compare the weight, strength and stiffness of a hollow shaft of the same external diameter as that of solid shaft. The inside diameter of the hollow shaft being half the external diameter. Both the shafts have the same material and length. **07**

OR

Q.3 (a) List the different types of shaft couplings. Give the design procedure of flange coupling. **07**

(b) Design the rectangular key for a shaft of 50 mm diameter. The shearing and crushing stresses for the key material are 42 MPa and 70 MPa. **07**

Q.4 (a) Define the following terms :
Lever ; Leverage ; Mechanical Advantage ; Fulcrum ; Load arm ; Effort arm ; Bell Crank Lever **07**

(b) Discuss the design procedure of a rocker arm for operating the exhaust valve. **07**

OR

Q.4 (a) List various types of screw threads and explain them with the help of neat sketch. **07**

(b) A lead screw of a lathe has Acme threads of 50 mm outside diameter and 8 mm pitch. The screw must exert an axial pressure of 2500 N in **07**

order to drive the tool carriage. The thrust is carried on a collar 110 mm outside and 55 mm inside diameter and the lead screw rotates at 30 r.p.m. Determine :

The power required to drive the screw

The efficiency of the lead screw.

Assume a coefficient of friction is 0.15 for the screw and 0.12 for the collar.

Q.5 (a) Explain following AutoCAD command with example. **07**

Line

Trim.

Offset.

Circle

(b) Explain the importance of following in manufacturing **07**

Tolerance.

Surface roughness

OR

Q.5 (a) List and explain the various co-ordinate systems in AutoCAD **07**

(b) Define fit. Discuss different types of fits with neat sketches. **07**
