

Total No. of Questions : 4]

SEAT No. :

PD61

[Total No. of Pages : 2

[6409]-267

**S.E. (Robotics and Automation) (Insem)  
DESIGN OF MACHINE ELEMENT  
(2019 Pattern) (Semester - IV) (211092)**

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Answer Q.1 or Q. 2, Q. 3 or Q. 4.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of scientific calculator is allowed.

Q1) a) Draw the flow chart of basic Design Procedure used in Machine Design. [3]

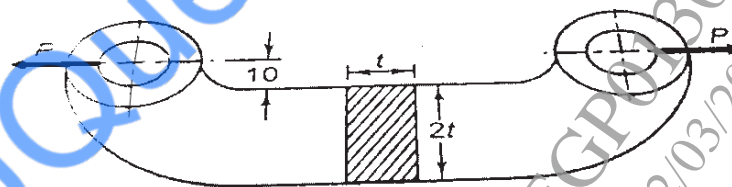
b) Explain the Various traditional design methods along with example design. [4]

c) Two rods, made of plain carbon steel 40C8 ( $S_{yt} = 380 \text{ N/mm}^2$ ), are to be connected by means of a cotter joint. The diameter of each rod is 50 mm and the cotter is made from a steel plate of 15 mm thickness. Calculate the dimensions of the socket end making the following assumptions: [8]

- i) The yield strength in compression is twice of the tensile yield strength; and
- ii) The yield strength in shear is 50% of the tensile yield strength. The factor of safety is 6.

OR

Q2) a) An offset link subjected to a force of 25 kN is shown in Fig It is made of grey cast iron FG300 and the factor of safety is 3. Determine the dimensions of the cross section of the link. [6]



b) It is required to design a knuckle joint to connect two circular rods subjected to an axial tensile force of 65 kN. The rods are co-axial and a small amount of angular movement between their axes is permissible. Design the joint and specify the dimensions of its components. Select suitable materials for the parts. [9]

P.T.O.

- Q3) a)** Explain the different types of Key along with Sketch. [4]
- b) List out the various types coupling used in Machine Design. [4]
- c) The standard cross-section for a flat key, which is fitted on a 50 mm diameter shaft, is 1610 mm. The key is transmitting 475 N-m torque from the shaft to the hub. The key is made of commercial steel ( $S_{yt} = S_{yc} = 230 \text{ N/mm}^2$ ). Determine the length of the key, if the factor of safety is 3. [7]

OR

- Q4) a)** A Flange coupling is held together by four M 24 Bolts, and arranged on bolt circle of 150 mm each bolt is initially tightened to a load of 50 k N to make a tight joint the power transmitted by the coupling is 50kw at a speed of 600 r.p.m. Estimate the maximum normal and shear stresses in the bolt material. [8]
- b) Explain Steps involved in Design of Flange of Type Coupling along with Diagram. [7]

