PRESIDENCY UNIVERSITY, BENGALURU
SCHOOL OF ENGINEERING

Max Marks: 30 | Max Time: 55 Mins | Weightage: 15 % | **Set A**

TEST 3

II Semester 2016-2017 | **MEA202: Machine Design & Drawing** | 17 April 2017

Instructions:

i. Write legibly
ii. Scientific and non programmable calculators are permitted
iii. Design Data Handbook is permitted

Part A

(1 Q x 5 M= 5 Marks)

1. Why the efficiency of self locking square threaded power screw is less than 50%.

Part B

(1 Q x 10 M= 10 Marks)

2. A square thread power screw has a major diameter of 32-mm and a pitch of 4-mm with double threads, and it is to be used in an application similar to that of the figure below. Applicable data are thread and collar coefficient of friction equal to 0.08, collar diameter of 40-mm, and a load of 6.4-kN per screw. Determine:
   a. Thread depth, thread width, mean or pitch diameter, minor diameter, and lead.
   b. Torque required to rotate the screw against the load.
   c. Torque required to rotate the screw with the load.
   d. Overall efficiency.

Part C

(1Q x 15 M= 15 Marks)

3. It is required to design a rigid type of flange coupling to connect two plain carbon steel of grade 40C8 ($S_{yt} = 380\ N/mm^2\ and\ fs = 2.5$) shafts. The input shaft transmits 37.5 kW power at 180 r.p.m. to the output shaft through the coupling. The service factor for the application is 1.5 i.e. the design torque is 1.5 times of rated torque. Select suitable material for various parts of the coupling, design the coupling & specify the dimensions of its components.

   Key and Bolt made of plain carbon steel of grade 30C8 ($S_{yt} = 400\ N/mm^2\ and\ fs = 2.5$)
   Flanges are made of Grey cast iron of grade FG200. ($S_{ut} = 200\ N/mm^2$)

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TEST 2

II Semester 2016-2017 | **MEA202: Machine Design & Drawing** | 20 March 2017

Instructions:

i. Write legibly
ii. Scientific and non programmable calculators are permitted
iii. Design Data Handbook is permitted. Photocopy or exchange of data book is not allowed

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Part A

(2 Q x 2 M= 4 Marks)

1. What is stress concentration and what are the causes of stress concentration.
2. How the maximum shear stress theory differentiate from maximum normal stress theory.

Part B

(1 Q x 7 M= 7 Marks)

3. A flat plate subjected to a tensile force of 5 *kN* is shown below in fig.1. The plate material is grey cast iron FG 200 and the factor of safety is 2.5. Determine the thickness of plate.

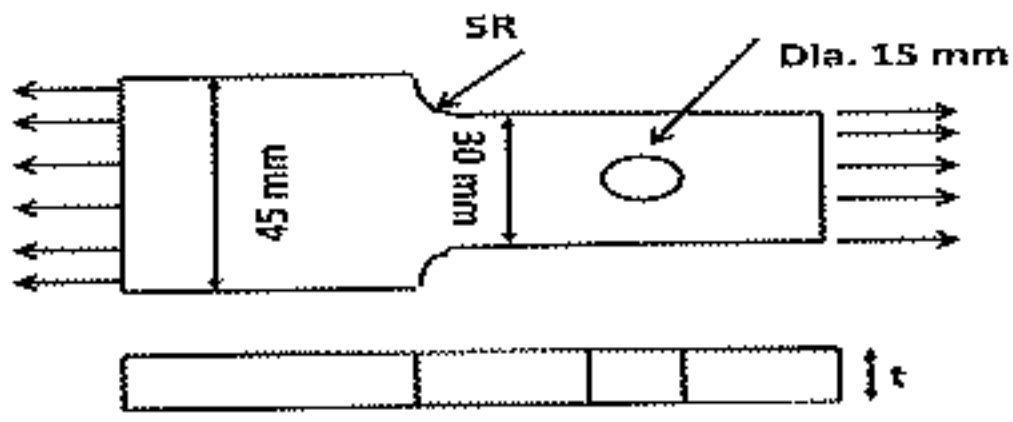

Fig.1

Part C

(1Q x 15 M= 15 Marks)

4. A curved link of the mechanism made from round steel bar as shown below in fig.2. The link is made of plain carbon steel 30C8 ($S_{yt} = 400\ N/mm^2, FoS = 3.5$. Determine the dimension of link.

5. The dimension of overhang crank is given below in fig.3. The force P acting at the crankpin is 1kN. The crank is made of steel 30C8, ($S_{yt} = 400\ N/mm^2, FoS = 2$. Use maximum shear stress theory of failure; determine the diameter d at section XX.

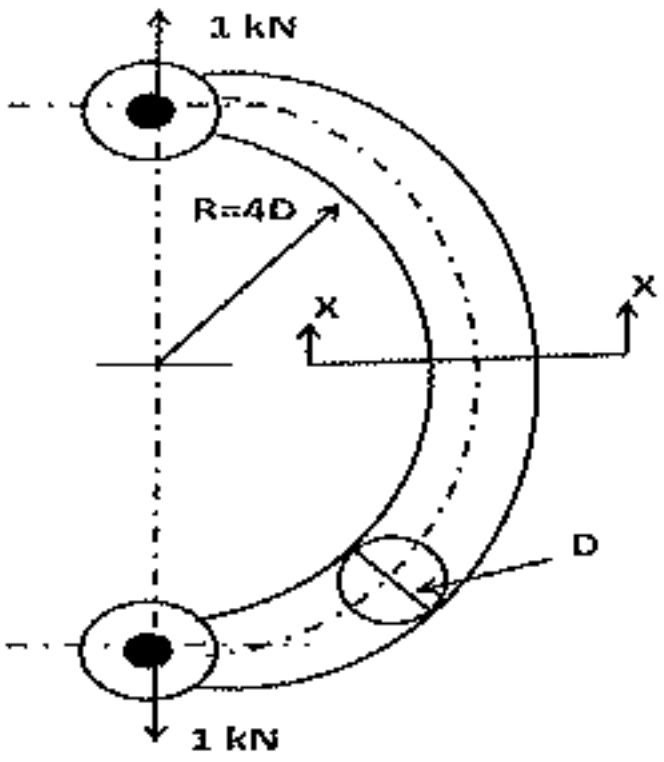

Fig.2

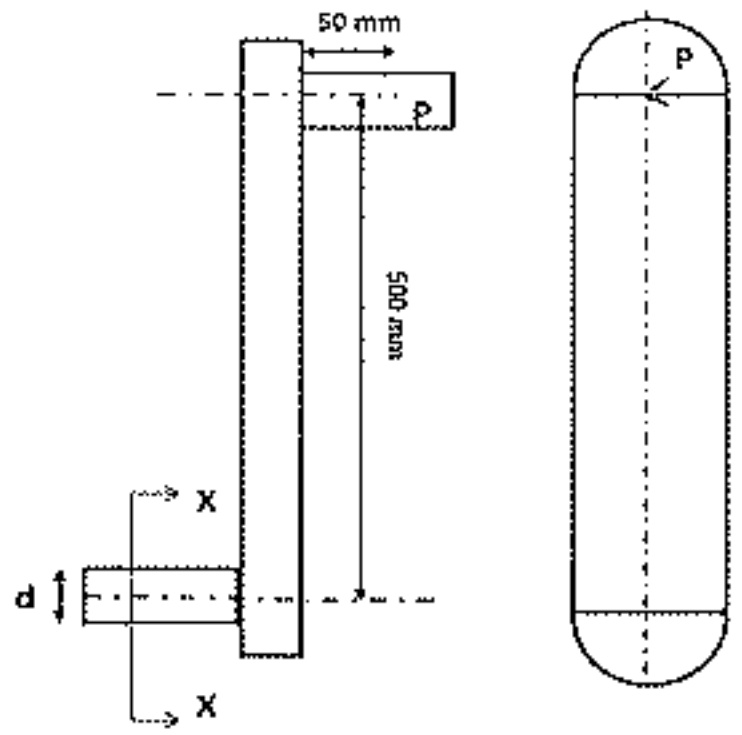

Fig.3

PRESIDENCY UNIVERSITY, BENGALURU
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Max Marks: 30 | Max Time: 55 Mins | Weightage: 15 % | **Set B**

TEST 1

II Semester 2016-2017 | **MEA202: Machine Design & Drawing** | 20 October 2017

Instructions:

i. Write legibly
ii. Scientific and non programmable calculators are permitted
iii. Design Data Handbook is permitted

Part A

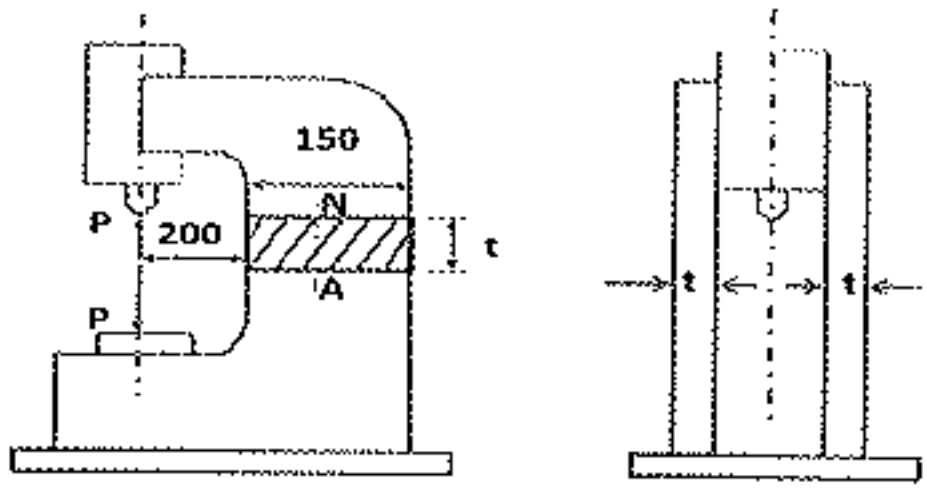
(2 Q x 4 M= 8 Marks)

1. Explain the stress strain diagram for ductile material.
2. Draw and explain the flow chart for design procedure of machine elements.

Part B

(1 Q x 7 M= 7 Marks)

3. The frame of a hydraulic press consisting of two identical steel plates is shown below in fig.1. The maximum force acting on frame is $20\,kN$. The yield strength is $380\ N/mm^2$, $FoS = 2.5$. Determine the plate thickness. All dimensions are in mm and not to the scale.



Frame of Hydraulic Press

Fig.1

Part C

(1Q x 15 M= 15 Marks)

4. Design a Knuckle joint which connect two circular rods subjected to an axial tensile load of 50 kN. The joint is made of graded steel with yield strength of 400 $N/mm^2$and $FoS = 5$. Specify the dimensions of its components.