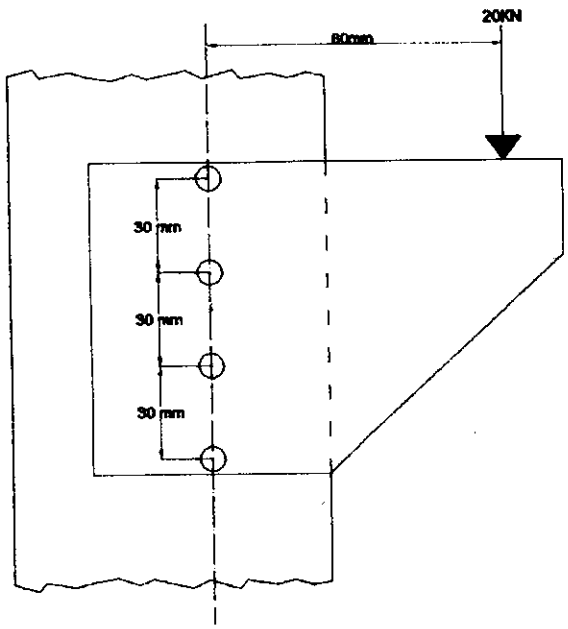
# University of Technology
# Electromechanical Engineering Dept.

Subject: Machine Design **Open Book Examination** Time: 3 hours
Class: 3rd Year (systems) First Attempt Date: 10/6/2014
**Answer all Questions** Prof. Dr. H.J.M. Alalkawi

Q1/ A bracket is supported by means of 4 rivets of the same size. Design the diameter of the rivet if $\sigma_u$ (tensile ultimate stress) for the rivet material is 560MPa. Which of the rivet has max resistance?



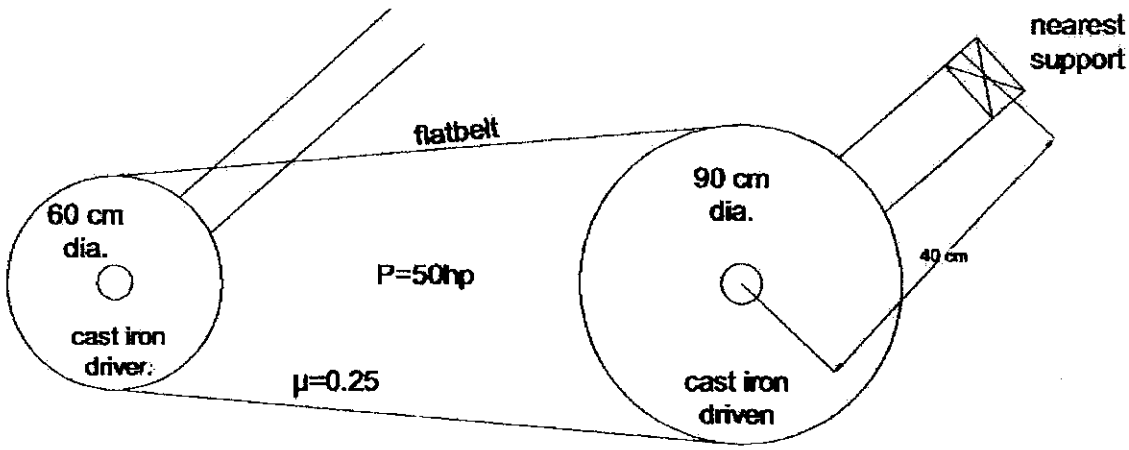

**(15 Marks)**

Q2/ A flat belt, 10mm thick and 100mm wide, transmits power between two pulleys, running at 96000 m/hr. The mass of the belt is 1 Kg/m length. The angle of lap in the smaller pulley is 160°. The allowable stress in the belt is 2 $MN/m^2$. Design max. HP transmitted, Initial tension in the belt and angle of lap in the larger pulley. Take $\mu$=0.3

**(15 Marks)**

Q3/ Design

1) Shaft diameters for drive and driven pulleys.
2) Dimensions of the keys.
3) Size of pulley arms. 6 arms for large pulley and 4 arms for small pulley.




Take $\sigma_t$=50 Kg/cm$^2$ for pulley rim

$\sigma_u$=400 MPa for shafts and keys

$\sigma_b$ for pulley arm = 100 Kg/cm$^2$

**(20 Marks)**