Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2016

Subject Name: Machine Design & Industrial Drafting

Subject Code: 4TE03MDI1 Branch: B.Tech (Mech,Auto)

Semester:3 Date: 30/4/2016 Time: 2.30 To 5.30 Marks: 70

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 Attempt the following questions: (14)

a) The modulus of elasticity of grey cast iron is
(a) 207 000 N/mm^2 (b) 100 000 N/mm^2
(c) 50 000 N/mm^2 (d) 80 000 N/mm^2

b) A component made of carbon steel is designed on strength basis by
(a) ultimate tensile strength (b) yield strength
(c) modulus of elasticity (d) modulus of rigidity

c) In case of clamp coupling, power is transmitted by means of,
(a) friction force
(b) shear resistance
(c) crushing resistance
(d) none of the above

d) Musical instruments is produced by
(a) design by drawing (b) design by craft evolution
(c) design synthesis (d) simultaneous design

e) According to Indian standard, total number of tolerance grades are
(a) 10 (b) 20 (c) 18 (d) 8

f) A cast iron designated by FG300 is,
(a) grey cast iron with carbon content of 3%
(b) grey cast iron with ultimate tensile strength of 300 N/mm^2
(c) grey cast iron with ultimate compressive strength of 300 N/mm^2
(d) grey cast iron with tensile yield strength of 300 N/mm^2

g) In transition fit,
(a) tolerance zones of hole and shaft overlap
(b) tolerance zone of hole is completely below that of shaft
(c) tolerance zone of hole is entirely above that of shaft
(d) none of the above

h) The standard width for square or flat key in terms of shaft diameter (d) is,
(a) d (b) d/2 (c) d/4 (d) d/8

i) Oldham coupling is used to connect two shafts
(a) which are perfectly aligned (b) which are not in exact alignment
(c) which have lateral misalignment (d) whose axes intersect at a small angle

j) A cotter joint is used to transmit
(a) axial tensile force only
(b) axial tensile or compressive force
(c) axial compressive force only
(d) combined bending and torsional moment

k) The rocker arm in internal combustion engine is
(a) first type of lever (b) second type of lever
(c) third type of lever (d) none of the above

l) Flat head rivets are used in
(a) ship hulls (b) light sheet metal work
(c) structural work (d) air conditioning ducts

m) The transverse fillet welds are designed for
(a) tensile strength (b) shear strength
(c) bending strength (d) compressive strength

n) A stud is
(a) screw with long threads (b) screw with circular head
(c) screw with hexagonal head (d) headless screw with threads on both sides

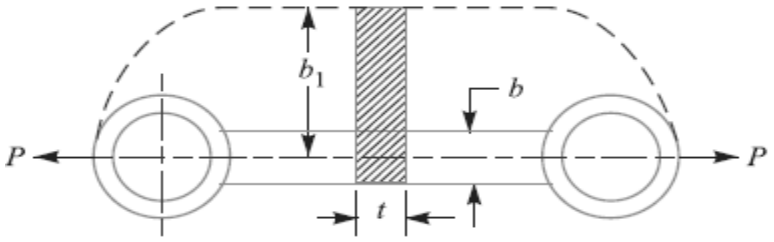
Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions**

a) What is machine design? Explain basic requirements of Machine elements. **03**

b) Explain stress concentration & methods of reducing it by sketches. **04**

c) A mild steel link, as shown in Figure-1 by full lines, transmits a pull of 80 kN. Find the dimensions b and t if b = 3t. Assume the permissible tensile stress as 70 MPa. If the original link is replaced by an unsymmetrical one, having the same thickness t, find the depth b1, using the same permissible stress as before. **07**



Q.2 (c) Figure - 1

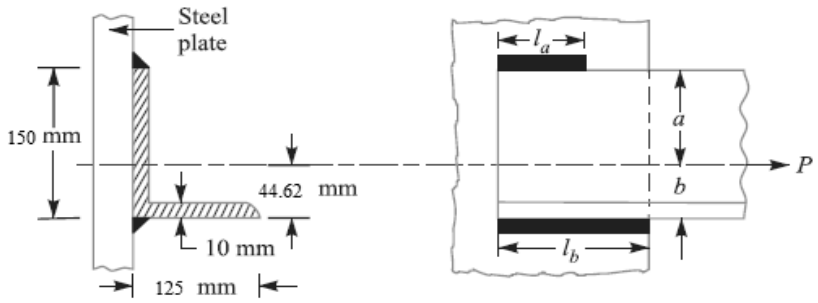
Q-3 **Attempt all questions**

a) Design a knuckle joint to transmit 25 kN. The design stresses may be taken as 65 MPa in tension, 50 MPa in shear and 83 MPa in compression **07**

b) Write design procedure for design of a socket and spigot joint, which may be subjected to an axial load. Write the design equations for different failure criteria. Draw sketches for the same. **07**

Q-4 **Attempt all questions**

a) A 150 × 125 × 10 mm angle is to be welded to a steel plate by fillet welds as shown in Figure-2. If the angle is subjected to a static load of 175 kN, Find the length of weld at the top and bottom. The allowable shear stress for static loading may be taken as 80 MPa. **07**



Q.4 (a)

Figure – 2

b) A double riveted lap jointed is to be made to join two plates 18 mm thick. The design stresses may be taken as 120 MPa in tension, 96 MPa in shear and 190 MPa in crushing. Rivet diameter is 27 mm and pitch of the rivet is 80 mm. Find efficiency of the joint. **07**

Q-5 **Attempt all questions**

a) State & Explain the various criteria on which shaft are designed? **04**

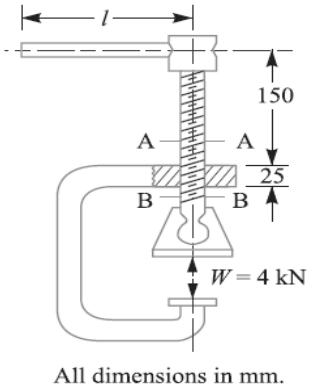
b) Explain purpose & requirement of shaft coupling. **04**

c) Compare the weight, strength and rigidity of a hollow shaft of same external diameter as that of solid shafts, both the shafts are made of same material. Assume that diameter ratio for the hollow shaft is $d_i/d_o = 0.6$ **06**

Q-6 **Attempt all questions**

a) Sketch a protective type flange coupling and indicate there on its leading dimensions for shaft size of'd'. **04**

b) A C-clamp, as shown in Figure-3 has trapezoidal threads of 12 mm outside diameter and 2 mm pitch. The coefficient of friction for screw threads is 0.12 and for the collar is 0.25. The mean radius of the collar is 6 mm. If the force exerted by the operator at the end of the handle is 80 N, find: 1. The length of handle; 2. The maximum shear stress in the body of the screw and where does this exist; and 3. The bearing pressure on the threads **10**

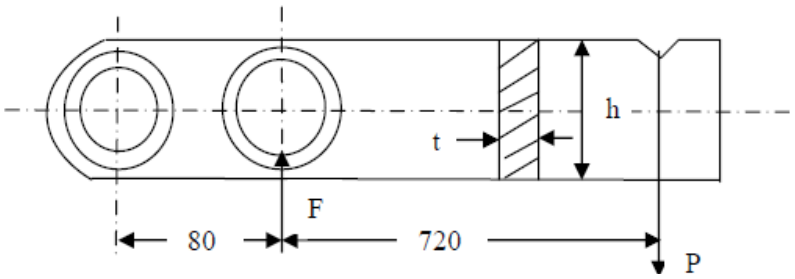


Q.6 (b) Figure – 3

Q-7 **Attempt all questions**

a) What is a key? State its function. What is the effect of keyway cut into the shaft? **04**

b) The lever of a lever loaded safety valve shown in Figure-4. The diameter of the valve is 80 mm and valve has to blow off at a pressure of 1.25 MPa. The permissible stress in tension, shear and crushing are 70 MPa, 20 MPa and 50 MPa respectively. The permissible bearing pressure for the pin may be taken as 20 MPa. Design the pins and the lever; assume rectangular cross section of the lever with height equal to three times the thickness. **10**



Q.7 (b) Figure-4

Q-8 **Attempt all questions**

a) Define limits, fits, and tolerance **03**

b) Differentiate between hole basis system & shaft basis system with necessary sketches. **04**

c) Explain following AutoCAD commands with example. **07**

1) copy 2) Trim 3) line 4) Mirror 5) Extend 6) Polyline 7) Hatch