C.U.SHAH UNIVERSITY
Summer Examination-2017

Subject Name: Machine Design & Industrial Drafting

Subject Code: 4TE03MDI1   **Branch: B.Tech (Automobile,Mechanical)**

Semester: 3   **Date: 31/03/2017**   **Time: 10:30 To 01:30**   **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) Hooke's law holds good up to   **(01)**
(a) breaking point (b) yield point (c) elastic limit (d) plastic limit

b) A screw is specified by its (a) pitch diameter (b) minor diameter (c) major   **(01)**
diameter (d) pitch

c) A muff coupling is a   **(01)**
(a) rigid coupling (b) flexible coupling (c) shock absorbing coupling(d) none

d) The factor of safety for cast iron component, subjected to static force, is   **(01)**
(a) 1.5 to 2 (b) 3 to 5 (c) 1.3 to 1.5 (d) 5 to 10

e) Which of the following screw thread is used for jacks, vices and clamps   **(01)**
(a) square threads (b) trapezoidal threads (c) buttress threads (d) acme threads

f) A cotter joint is used to connect……..rods   **(01)**
(a) parallel (b) perpendicular (c) inclined (d) co-axial

g) The transverse fillet welds are designed for   **(01)**
(a) tensile strength (b) shear strength (c) bending strength (d) compressive strength

h) A feather key is generally……. in shaft and ……….. in hub.   **(01)**
(a) loose, tight(b) tight, loose (c) tight, tight (d) loose, loose

i) In levers, leverage is the ratio of   **(01)**
(a) load lifted to the effort applied (b) mechanical advantage to the velocity ratio
(c) load arm to the effort arm (d) effort arm to the load arm

j) The pin in knuckle joint is subjected to   **(01)**
(a) double shear stress (b) torsional shear stress (c) axial tensile stress (d) axial
compressive stress

k) A screw is said to be over hauling screw, if the efficiency is   **(01)**
(a) less than 50% (b) more than 50 % (c) equal to 50 % (d) none of these

l) A coupling used to connect two perfectly aligned shafts is   **(01)**
(a) muff (b) compression coupling (c) flange coupling (d) all of these (e) none

m) Rivets are usually made of   (a) high carbon steel (b) alloy steel (c) cast iron   **(01)**
(d) mild steel

n) In shaft-basis system, the basis shaft is one **(01)**
    (a) whose upper deviation is zero (b) whose upper and lower deviations are zero
    (c) whose lower deviation is zero (d) none of the above

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

Q-2   **Attempt all questions**

a) Define standardization in design and its types also write about the standards are used in mechanical engineering design. **(07)**

b) Explain general considerations in designing a machine components. **(07)**

Q-3   **Attempt all questions**

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

b) Design a knuckle joint to transmit 150 kN. The design stresses may be taken as 75 MPa in tension, 60 MPa in shear and 150 MPa in compression. **(07)**

Q-4   **Attempt all questions**

a) Define caulking & fullering and write about the failures of riveted joints. **(07)**

b) A double riveted lap joint with zig-zag riveting is to be designed for 13mm thick plates. Assume **(07)**
$$\sigma_t = 80 \text{ MPa}, \tau = 60 \text{ MPa}, \sigma_c = 120 \text{ MPa}$$
State how the joint will fail and find the efficiency of the joint.

Q-5   **Attempt all questions**

a) Derive the expression for the design of shaft on strength & torsional rigidity basis. **(07)**

b) Design a muff coupling which is used to connect two steel shafts transmitting 40 kW at 350 rpm. The material for the shaft and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 40 MPa and 80 MPa respectively. The material for the muff is cast iron for which the allowable shear stress may be assumed 15 MPa. (take width & thickness of key = 18 mm) **(07)**

Q-6   **Attempt all questions**

a) Illustrate types of keys with sketch and their applications in shaft design. **(07)**

b) Explain design of flange coupling with neat sketch. **(07)**

Q-7   **Attempt all question**

a) Define lever and discuss general procedure for the design of lever. **(07)**

b) Discuss self-locking, over hauling & efficiency of power screw. **(07)**

Q-8   **Attempt all questions**

a) Explain various types of fits & tolerances and why its importance in production drawing. **(07)**

b) Explain the role of AUTO CAD software in industrial drafting & design & write its applications in modifying & creating of 3-D objects. **(07)**