Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Machine Design & Industrial Drafting

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

Semester: 3 **Date: 02/04/2018** **Time: 02:30 To 05:30** **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)	Guest's theory is used for which material?	**(1)**
(b)	Explain the term 'Resilience'.	**(1)**
(c)	Why feedback is more important in design procedure?	**(1)**
(d)	What is mechanical advantage?	**(1)**
(e)	What do you mean by factor of safety?	**(1)**
(f)	Two shafts A and B are made of the same material. The diameter of the shaft A is twice as that of shaft B. How much times the power transmitted by the shaft A will be of the shaft B?	**(1)**
(g)	Define: "Bulk Modulus"	**(1)**
(h)	Write the condition for two shafts having equal strength.	**(1)**
(i)	What do you understand by leverage?	**(1)**
(j)	What are the applications of a cotter joint?	**(1)**
(k)	Which type of lever is used in the rocker arm in internal combustion engine?	**(1)**
(l)	Differentiate between tolerance and allowance.	**(1)**
(m)	Draw atleast four weld symbols with notations.	**(1)**
(n)	What is the meaning of 100 H6/g5, according to Indian standard specification?	**(1)**

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

Q-2 **Attempt all questions** **(14)**

(a)	State the assumptions made in deriving a bending formula.	**(04)**
(b)	Explain the importance of selection of materials in machine design.	**(03)**
(c)	Classify the different types of riveted joints? Explain the terms with the Sketches- Pitch, Margin, Transverse pitch, Diagonal pitch.	**(07)**

Q-3 **Attempt all questions** **(14)**

(a)	A mild steel rod of 12 mm diameter was tested for tensile strength with the gauge length of 60 mm. Following observation were recoded : Final length = 80 mm, Final diameter = 7 mm, Yield load = 3.4 kN and Ultimate load = 6.1 kN.	**(06)**

Calculate :

1. Yield Stress
2. Ultimate tensile stress,
3. Percentage reduction in area, and
4. Percentage elongation.

(b) What do you mean by eccentric loaded welded joint? Write the detail design procedure for designing such a joint. **(06)**

(c) What do you understand by self-locking and overhauling of screw? **(02)**

Q-4 **Attempt all questions** **(14)**

(a) A solid circular shaft is subjected to a bending moment of 3 kN-m and a torque of 10 kN-m. the shaft is made of 45 C 8 steel having ultimate tensile stresses of 700 MPa and a ultimate shear stress of 500 MPa. Assuming a factor of safety as 6, determine the diameter of the shaft. **(07)**

(b) What is meant by 'hole basis system' and 'shaft basis system'? Which one is preferred and why? **(07)**

Q-5 **Attempt all questions** **(14)**

(a) What are different types of keys used to connect shaft to pulley or a gear? Explain by drawing sketch and Compare the strengths of square key and rectangular key. **(06)**

(b) Draw a neat sketch of a protected type flanged coupling and write the design procedure with the design equations for different failure criteria. **(08)**

Q-6 **Attempt all questions** **(14)**

(a) A vertical two start square threaded screw of a 100 mm mean diameter and 20 mm pitch supports a vertical load of 18 kN. The axial thrust on the screw is taken by a collar bearing of 250 mm outside diameter and 100 mm inside diameter. Find the force required at the end of a lever which is 400 mm long in order to lift and lower the load. The coefficient of friction for the vertical screw and nut is 0.15 and that for collar bearing is 0.20. **(07)**

(b) The dimensions of the mating parts are given below: **(04)**

Hole $\text{Ø } 40^{+0.20}_{0.0}$ Shaft $\text{Ø } 40^{-0.008}_{-0.025}$

Find tolerance, shaft tolerance, Maximum clearance, Minimum clearance, types of fit.

(c) What do you understand by preferred numbers? Explain fully. **(03)**

Q-7 **Attempt all questions** **(14)**

(a) An electric motor driven power screw moves a nut in a horizontal plane against o force of 75 kN at a speed of 300 mm/ min. the screw has a single square thread of 6 mm pitch on a major diameter of 40 mm. The coefficient of friction at screw threads is 0.1. Estimate power of the motor. **(07)**

(b) A double riveted lap joint with chain riveting is to be made for joining two plates 10 mm thick. The allowable stresses are: σ_t = 60 MPa, τ = 50 MPa and σ_c = 80 MPa. Find the rivet diameter, pitch of rivets and distance between rows of rivets. Also find the efficiency of the joint. **(07)**

Q-8 **Attempt all questions** **(14)**

(a) Explain any four editing commands of AUTOCAD. **(04)**

(b) Design and draw a cotter joint to support a load varying from 30 kN in compression as well as in tension. The material used is carbon steel for which the following allowable stresses may be used. The load is applied statically. **(10)**

Tensile stress = compressive stress = 50 MPa, shear stress stress = 35 MPa and Crushing stress = 90 MPa.