C.U.SHAH UNIVERSITY
Winter Examination-2019

Subject Name: Machine Design & Industrial Drafting
Subject Code: 4TE03MDI1   **Branch: B.Tech (Mechanical)**
Semester : 3   **Date : 22/11/2019**   **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) Stress concentration occurs due to
(a) abrupt change in cross-section(b) discontinuities in component (c) internal cracks and flaws (d) any one of the above

b) The basic series of preferred numbers are
(a) R10, R20, R30, R40 and R50 (b) R5, R10, R20, R40 and R80
(c) R5, R10, R15, R20 and R25   (d) All of the above

c) Modern automobile cars is produced by
(a) sequential design (b) design by craft evolution (c) design synthesis
(d) simultaneous design

d) In hole-basis system, the basis size is equal to (a) maximum hole size (b) minimum hole size (c) upper deviation is zero (d) none of the above

e) A screw is said to be self-locking if its efficiency is
(a) equal to 50% (b) more than 50% (c) less than 50% (d) none of the above

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

g) Which of following statement is correct, for the two shafts connected in parallel
(a) torque in each shaft is the same (b) shear stress in each shaft is the same
(c) angle of twist of each shaft is same (d) torsional stiffness of each shaft is same

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

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

j) A power screws is specified by
(a) major diameter *length (b) major diameter * pitch (c) mean diameter * pitch (d) mean diameter * length

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

l) Hooke's law holds good up to

(a) breaking point (b) yield point (c) elastic limit (d) plastic limit

m) In levers, (a) mechanical advantage = leverage (b) mechanical advantage < leverage (c) mechanical advantage > leverage (d) none of the above

n) The railway carriage couplings have
(a) square threads (b) acme threads (c) knuckle threads (d) buttress threads

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

Q-2		**Attempt all questions**	
	a)	Explain general consideration of designing of machine parts.	**(07)**
	b)	What are aspects of standardization in design & why aesthetic and ergonomics consideration in design.	**(07)**

Q-3		**Attempt all questions**	
	a)	Explain the various types of failures of riveted joints with neat sketches.	**(07)**
	b)	A double riveted double riveted lap joint is to be made two plates 10 mm thick. Take:	**(07)**

$$\sigma t = 75 \text{ MPa}, \tau = 60 \text{ MPa}, \tau c = 140 \text{ MPa}$$

Using chain riveting. Find rivet diameter, pitch of rivet, transverse pitch and efficiency of joint.

Q-4		**Attempt all questions**	
	a)	Comparison between cotter joint and knuckle joint.	**(07)**
	b)	Design a knuckle joint for a tie rod of a circular section to sustain a maximum pull of 70 kN. The ultimate strength of the material of the rod against tearing is 420 MPa. The ultimate tensile and shearing strength of the pin material are 510 MPa and 396 MPa respectively. Determine the tie rod section and pin section. Take factor of safety = 6	**(07)**

Q-5		**Attempt all questions**	
	a)	Write the full form of ASME code and why it is important while designing the shaft & derive the expression for the design of shaft on strength & torsional rigidity basis.	**(07)**
	b)	A shaft is required to transmit 7.5kW at 1200 rpm. The shaft carries an overhung pulley, situated at a distance of 0.25m from the nearest bearing. The belt tensions are 2100N and 1000N on tight and slack side of the vertical belt drive. The mass of pulley is 40kg. If the allowable stresses in tension and shear are 70MPa and 42 MPa respectively. Find the size of shaft, neglect shock and fatigue loads.	**(07)**

Q-6		**Attempt all questions**	
	a)	Define keys. Classify various types of keys and explain the design procedure of any key with neat sketch.	**(07)**
	b)	The nominal diameter of triple threaded square screw is 50 mm, while the pitch is 8 mm. It is used with a collar having an outer diameter of 100 mm and inner diameter as 65 mm. The coefficient of friction at the thread surface as well as at the collar surface can be taken as 0.15. The screw is used to raise the load of 15 kN. Calculate:(i) torque required to raise the load (ii) torque required to lower the load (iii) the force required to raise the load, if applied at a radius of 500 mm.	**(07)**

Q-7		**Attempt all question**	
	a)	Explain the general design procedure of lever.	**(07)**
	b)	Discuss self-locking and overhauling conditions of power screw and write the merits, demerits and applications of power screw.	**(07)**

Q-8		**Attempt all questions**	

a) Classify & discuss various types of fits & tolerances and their significance in machine drawing. **(07)**

b) Explain the various types of commands used for AUTO CAD software & write its applications for industrial drafting. **(07)**