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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III(New) • EXAMINATION - WINTER 2016 Subject Code:2130103 Date:02/01/2017 Subject Name: Analysis Of Mechanisms & Machine Elements Time: 10:30 AM to 01:00 PM **Total Marks: 70 Instructions:** 1. Attempt all questions. 2. Make suitable assumptions wherever necessary. 3. Figures to the right indicate full marks. MARKS **Short Questions Q.1** 14 1 What is the purpose of link? In kinematic chain, a ternary joint is equivalent to _____ 2 Oldham's coupling is used to connect two shafts which are 3 Ouick return motion mechanism is used in 4 5 Two kinematic links have absolute angular velocities of ω_1 (clockwise) and ω_2 (anticlockwise). The angular velocities of link 1 relative to link 2, is What are the conditions for static equilibrium of planar mechanisms? 6 7 Klein's construction is used mainly to determine the What is rigid body? 8 What is resistant body? 9 10 What is linkage? What is degree of freedom? 11 What is stress? Enlist type of stresses. 12 What is Poisson's ratio? 13 14 What is hoop stress? (a) What do you mean by centrode of the body? What are its types? 03 **Q.2** (b) What is principle of virtual work? Explain. 04 (c) A square bar of 20 mm side is held between two rigid plates and 07 loaded by an axial force P= 450 kN as shown in fig. (a). Find the reactions at the ends A and C and extension of the portion AB. Take E= 200 GPa OR A steel rod ABC firmly held at A and C has a cross sectional area of 07 (c) 1000 mm² for 400 mm length and 1500 mm2 for 600 mm length as shown in fig. (b). If the rod is heated through 10 K, find the stresses developed in part AB and BC. Take $\alpha = 12*10^{-6}$ /K. What are centripetal and tangential components of acceleration? When 03 0.3 (a) do they occur? How are they determined? (b) Sketch the free body diagram of each part of the mechanisms shown in 04

- fig. (c).
- For the four link mechanism shown in fig. (d), determine the linear 07 (c)

velocities of sliders C and D and angular velocities of the links AC and BD $\,$

		OR	
Q.3	(a) (b)	Define Coriolis component of acceleration. When it occurs?	03
	(D)	fig. (e).	04
	(c)	In a mechanism shown in fig. (f), the angular velocity of the crank OA is 15 rad/s and the slider at E is constrained to move 3 m/s downwards. The motion of both the sliders is vertical and the link BC is horizontal in position shown. Determine (a) rubbing velocity at B if the pin diameter is 15 mm. (b) velocity of slider D.	07
Q.4	(a)	Explain caulking and fullering.	03
	(b)	What fusion welding? Explain electric arc welding with neat sketch?	04
	(c)	A single riveted lap joint is made in 15 mm thick plate with 20 mm diameter rivets. Determine the strength of joint, the pitch of rivet is 60 mm. Take allowable tensile stress, shear stress, and compressive stress as 120 MPa on MPa and 160 MPa respectively.	07
		OR	
Q.4	(9)	What is nitch back nitch and margin of riveted joints?	03
	(\mathbf{u})	Explain the types of riveted joints with neat sketches	04
	(c)	A plate 100 mm wide and 10 mm thick is to be welded to another plate by means of double parallel fillets. The plates are subjected to a static load of 80 kN. Find the length of weld if the permissible shear stress in the weld does not exceed 55 MPa.	07
Q.5	(a)	What do you understand by the term lame's theory?	03
	(b)	Derive formula for the longitudinal stress in a thin cylindrical case subjected to internal pressure.	04
	(c)	A solid shaft of 100 mm diameter is to transmit 117.6 kW at 100 r.p.m. Find the maximum intensity of shear stress induced and the angle of twist for a length of 6 meters. Take $G=80 \text{ GN/m}^2$	07
0.5	(a)	Enlist physical properties of material and explain.	03
			0.4
	(b)	to internal pressure.	04
	(c)	A hollow shaft is to transmit 300 kW at 80 r.p.m. If the shear stress is not to exceed 60 MN/m^2 and internal diameter is 0.6 of external diameter, find the external and internal diameters assuming maximum	07

torque is 1.4 times the mean.







