Seat No.: __

Subject Code:2151907 Date:20/11/2018 Subject Name:Design of 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 Q.1 (a) Explain series of preferred number (b) State the advantages of chain drive over belt drive (c) Explain important design considerations for casting products 07 Q.2 (a) Explain leaf spring with neat sketch (b) Explain springs in series and parallel connections with sketch (c) A spring having outer diameter of coil as 72 mm, deflects for 50 mm at the maximum load of 700 N. Calculate the wire diameter and number of turns for the spring if the shear stress is 300 MPa and modulus of rigidity 84 KN/mm2. Take spring index of 8 (c) Design a helical compression spring with plain ends made out of bronze for operating load range of 100 N to 150 N. The deflection of the spring is 6 mm and spring index = 9. The allowable shear stress for spring is 300 MPa and modulus of rigidity is 80 KN/mm². Determine (1) Diameter of spring wire (2) Mean coil diameter (3) Total number of turns (4) Stiffness of spring (2) Mean coil diameter (3) Total number of turns (4) Stiffness of spring (2) Mean coil diameter (3) Total number of turns (4) Stiffness of spring (2) Mean coil diameter (3) Total number of turns (4) Stiffness of spring in the spring pulley having 350 mm diameter is rotating with 1800 RPM. Driven pulley is rotating with 600 RPM. Considering slip of 5% determine outer diameter of driven pulley and belt length for (1) open belt drive (2) crossed belt drive DR (2) Staplain working of (1) Compound belt drive (2) Fast and loose pulley belt drive with neat sketch (b) Explain working of (1) Compound belt drive (2) Fast and loose pulley belt drive with neat sketch (c) Design a V-belt drive from the given data. Motor power = 3.75 KW, Belt Width = 17 mm, Speed of motor = 1440 RPM, Belt thickness = 11 mm, Speed reduction = 4, Belt area = 140 mm², Density of belt= 1.5 x			GUJARAT TECHNOLOGICAL UNIVERSITY		
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TO INICHIAL DICSSUIC OF L.2 IN/HIII . DETERMINE THE HIICKHESS OF THE SHELL.		(D)	i i i i i i i i i i i i i i i i i i i		
Take allowable stress for shell material = 75 N/mm ² consider joint			<u>*</u>		

(c) Derive the equation of hoop stress and longitudinal stress for thin

efficiency 75%.

cylinder

07

		OR	
Q.4	(a)	Explain any two types of end covers used in pressure vessels	03
	(b)	An accumulator is required to store 175 litres of water at a pressure of	04
		25 N/mm ² . Assume the length of the stroke to be 3 meter. Determine	
		(1) The diameter of the Ram (2) The internal diameter of the cylinder	
		(3) The thickness of the cylinder if the allowable stress of the cylinder	
		made of cast iron is 60 N/mm ²	
	(c)	Determine the maximum load using Soderberg equation simply supported 50 mm diameter beam centrally loaded as P to 3P N. The	mm.07
		ultimate strength is 690 MPa, yield strength = 400 MPa, factor of	
		safety = 1.5 . Use size correction factor of 0.85 and surface finish factor	
		of 0.9. consider length as 600mm.	
Q.5	(a)	Find out the number of R5 basic series from 1 to 10	03
	(b)	What is stress concentration? Discuss any two methods of reducing it	04
	(c)	Explain Goodman line design criteria for fluctuating stresses	07
		OR	
Q.5	(a)	It is required to standardize 11 shafts from 100 to 1000 mm diameter.	03
		Specify their diameters.	
	(b)	Explain fluctuating stress in detail	04
	(c)	Explain S-N diagram for steels with neat sketch	07
