Sanjay Ghodawat University, Kolhapur

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

2020-21

EXM/P/09/00

Year and Program: 2020-21 ESE	**School of Technology**	**Department: Mechanical**
Course Code: MET-302	**Course Title: Design of Machine Elements**	**Semester : VI**
Day and Date: 07/6/2021 Monday	**End Semester Examination**	**Time:2 Hrs. Max Marks:50**

Instructions: 1) All Questions are compulsory.

Q.1		**Solve the following (any Two)**	**Marks**	**Bloom's Level**	**CO**
	a)	Explain the factors that influence selection of material for mechanical component	8	II	302.1
	b)	Explain step by step the design procedure of knuckle joint	8	II	302.2
	c)	Explain step by step the design procedure of bell crank lever	8	II	302.2
Q.2		**Solve the following (any two)**			
	a)	A hollow shaft having inside diameter 0.6 times the outside diameter, made of 40C8 (Syt=400 N/mm^2) and factor of safety is 3. A belt pulley of 900 mm in diameter is mounted on the shaft, which overhangs the left hand bearing by 200 mm. the belts are vertical and transmit power to the machine shaft below the pulley. The tension on the tight and slack sides are 3 kN& 1 kN respectively, while the weight of the pulley is 500 N. The angle of wrap of the belt on the pulley is 1800. Calculate the outside and inside diameters of the shaft.	8	III	302.3
	b)	Explain various types of keys in brief with neat sketches	8	II	302.4
	c)	Explain the stresses induced while designing helical compression spring of circular cross section	8	II	302.4
Q.3		**Solvethe following (any two)**			
	a)	i) Drawsketches of various forms of threads with used in power screws&show nomenclature. ii) Explain self-locking and overhauling properties of a power screw	9	II	302.5

	b)	Give step by step procedure for the selection of V-belt from manufacturer's catalogue	9	II	302.6
	c)	It is required to select a flat belt drive to connect two transmission shafts rotating at 800 and 400 rpm respectively. The centre distance between the shafts is approximately 3 m and the belt drive is open-type. The power transmitted by the belt is 30 kW & the load correction factor is 1.3. The belt should operate at a velocity between 17.8 to 22.9 m/s. The power transmitting capacity of the belt per mm width per ply at 180^0 arc of contact and at a belt velocity of 5,08 m/s is 0.0147 kW. Select preferred pulley diameters and specify the belt. (Use the charts given below)	9	III	302.6

Series of preferred values for pitch diameters (in mm) are as follows:

Pitch diameter (min) :	125	132	140	150	160	170	180	190
200	212	224	236	250	265	280	300	315	355	375
400	425	450	475	500	530	560	600	630	670	710
750	800	900	1000							

Arc of contact factor (F_d)

α_s (degrees)	120	130	140	150	160	170	180	190	200
F_d	1.33	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard widths of these belts (in mm)

3 - Ply	25	40	50	63	76					
4 - Ply	40	44	50	63	76	90	100	112	125	152
5 - Ply	76	100	112	125	152					
6 - Ply	112	125	152	180	200					

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