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PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations - March 2026

Date: 13- 03-2026

Time: 11.45am to 01.15pm

School: SOE	Program: B. TECH (Mechanical Engineering)		
Course Code: MEC4007	Course Name: DESIGN OF MACHINE ELEMENTS- II		
Semester: VI	Max Marks: 50	Weightage: 25%	

CO - Levels	C01	C02	C03	C04	C05
Marks	14	12	24		

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number
- (iii) Use of Design Data handbook allowed.

Part A

Answer ALL the Questions. Each question carries 2marks.

5Q x 2M=10M

1	Explain the terms slip and creep in belt drives.	2 Marks	L2	C01
2	What are the common materials used for flat belts?	2 Marks	L1	C01
2	Explain how the pitch of a chain affect its performance in power transmission system?	2 Marks	L2	C02
3	What is the formula for shear stress in a helical coil spring with a circular cross-section?	2 Marks	L1	C03
4	List few advantages of leaf springs in vehicle suspension systems?	2 Marks	L1	C03

Part B

Answer the Questions.

Total Marks 40M

6.	An electric motor is to drive an exhaust fan. A flat leather belt is used in this drive. The thickness of the belt is 6.25 mm and the maximum permissible stress in the belt is 2.1 MPa. The belt weighs 9.708	10 Marks	L3	C01
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	kN/m ³ . What is the width of belt required. Power transmitted by the motor is 22kW.				
	Particulars	Motor pulley	Fan pulley		
	Pulley diameter	300 mm	1600 mm		
	Angle of lap	2.5 radians	3.78 radians		
	Co efficient of friction	0.3	0.25		
	Speed of rotation	900	-		

Or

7.	Select a V- belt drive to transmit 8 kW from a shaft running at 1000 rpm to a parallel shaft to be run at 400 rpm. Limit the pitch diameter of smaller pulley to 150 mm. Assume center distance as 700 mm.	10 Marks	L3	C01
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8.	Design a roller chain to transmit 200 kW from an engine to generator. The speeds of generator and engine are respectively 500 rpm and 90 rpm. Assume Ultimate load as 22.3 kW and FOS as 5.	10 Marks	L3	C02
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or

9.	A chain drive is used for reduction of speed from 300 rpm to 100 rpm. The number of teeth on driving sprocket is 18. Determine the number of teeth on driven sprocket. If PCD of the driven sprocket is 600 mm and Centre to Centre distance between the sprockets is 700 mm. Determine the pitch and length of the chain.	10 Marks	L3	C02
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10.	A spring-loaded safety valve for a boiler is required to blow off at a pressure of 1.5 N/mm ² . The diameter of the valve is 60 mm. Using the spring index as 6, initial compression of 10MPa, maximum lift of the valve = 150 mm, permissible shear stress = 450 MPa, G= 0.84× 10 ⁵ MPa, design a suitable helical spring?	20 Marks	L3	C03
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Or

11.	A locomotive spring has an overall 1100 mm and sustains load of 75 kN at its Centre. The spring has three full length leaves and 15 graduated leaves with central band of 100 mm. All the leaves are to be stressed at 0.4 GPa when fully loaded. The ratio of total depth of the spring to its width is to be 2. Determine: (a) the width and thickness of the leaves (b) initial gap between full length and graduated leaves.	20 Marks	L3	C03
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