Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – March 2026

Date: 12- 03- 2026 **Time:** 09:30am – 11.00am

School: SOE	**Program:** B. Tech. (Mechanical Engg.)	
Course Code: MEC3085	**Course Name:** Dynamics of Machines	
Semester: VI	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**29**	**21**	**-**	**-**	**-**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

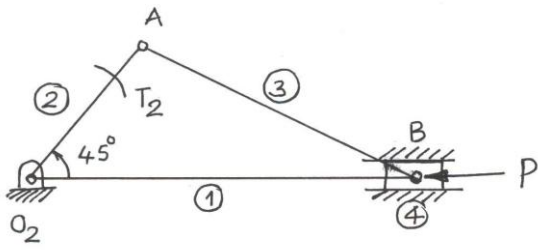
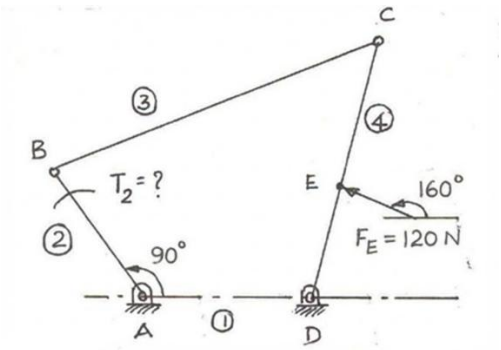
Answer ALL the Questions. Each question carries 2marks. **5Q x 2M=10M**

1	What is static force analysis?	**2 Marks**	**L1**	**CO1**
2	Define a Flywheel.	**2 Marks**	**L1**	**CO2**
3	State D' Alembert's principle.	**2 Marks**	**L1**	**CO1**
4	Illustrate why do high speed machines require dynamic force analysis?	**2 Marks**	**L2**	**CO2**
5	Show how does inertia torque help in converting a dynamic problem to a static one?	**2 Marks**	**L2**	**CO2**

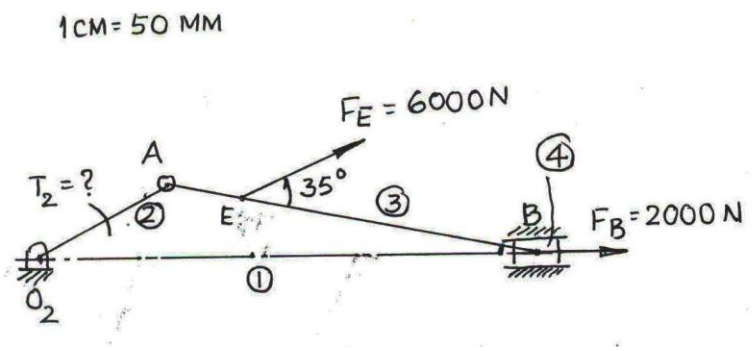
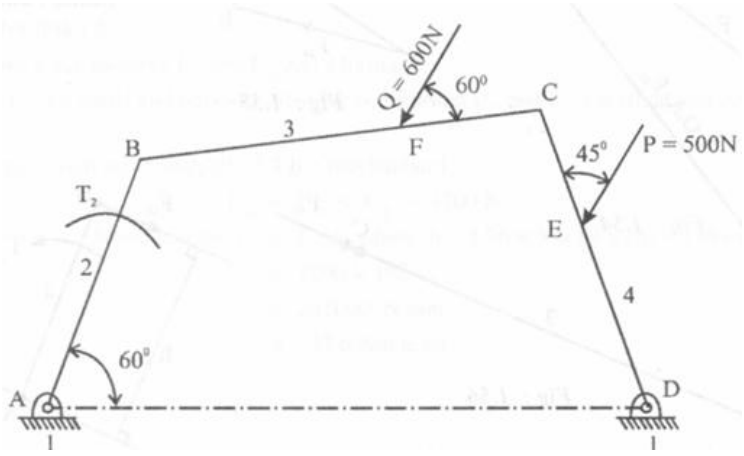
Part B

Answer the Questions. **Total Marks 40M**

6.	Figure 1. shows a slider crank mechanism in which the resultant gas pressure 8×10^4 Nm^{-2} acts on the piston of cross-sectional area 0.1 m^2. The system is kept in equilibrium because of the couple applied to	**10 Marks**	**L3**	**CO1**

	crank 2, through the shaft at O_2. Determine forces acting on all the links and the couple on link 2. O_2A=100mm, O_2B=350mm & AB=250mm.  **Fig. 1.**			
	Or			
7.	A four-link mechanism is acted upon by forces as shown in figure 2. Determine the torque T_2 to be applied on link 2 to keep the mechanism in equilibrium. AD=50mm, AB=40mm, BC=100mm, Dc=75mm & DE= 35mm.  **Fig. 2.**	**10 Marks**	**L3**	**CO1**

8.	Analyze the kinematic characteristics of a steam engine utilizing a slider-crank mechanism with a crank radius of 0.25 m and a connecting rod length of 1.25 m rotating at 240 rpm clockwise by determining the velocity and acceleration of the piston when the crank is at 50 degrees from the Inner Dead Centre, and further investigate the mechanism's motion to identify the precise crank angle required for the piston to experience zero acceleration.	**15 Marks**	**L4**	**CO2**
	Or			
9.	Analyze the dynamic forces in a horizontal engine featuring a crank-pin radius of 300 mm and a connecting rod length of 1.2 m with a cylinder bore of 0.5 m by calculating the pressure on the slide bars, the thrust in the connecting rod, the tangential force on the crank-pin, and the turning moment on the crankshaft when the crank is positioned at 60 degrees from the Inner Dead Centre, given that the reciprocating mass is 250 kg, the engine speed is 250 rpm, and the net pressure difference acting on the piston is 0.35 N/mm^2.	**15 Marks**	**L4**	**CO2**

10.	Analyse the static equilibrium conditions of the illustrated slider-crank mechanism to determine the magnitude and direction of the required input torque T_2 on the crank O_2A by evaluating the combined effects of the 6000 N force applied at point E inclined at 35 degrees and the 2000 N resisting force at the slider, given the configuration where the crank length O_2A is 160 mm, the connecting rod length AB is 240 mm with point E located 80 mm from A, and the crank angle is 30 degrees.  **Fig. 3.**	**15 Marks**	**L4**	**CO1**
	Or			
11.	Analyse the static equilibrium conditions of the specified four-bar mechanism to determine the magnitude and direction of the balancing torque required on link AB by evaluating the moment effects produced by the external forces acting at the defined geometric positions (CE = 35 mm and CF = 40 mm), given the structural constraints where link AB = 60 mm, BC = 70 mm, CD = 55 mm, AD = 110 mm, and the input crank angle BAD is 60°.  **Fig. 4.**	**15 Marks**	**L4**	**CO1**