Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

Term Evaluation (Odd) Semester Examination September 2025

Roll no.....

Name of the Course: **B.Tech**
Semester: **V**
Name of the Paper: **Theory of Machines**
Paper Code: **TME508**
Time: 1.5 hour **Maximum Marks: 50**

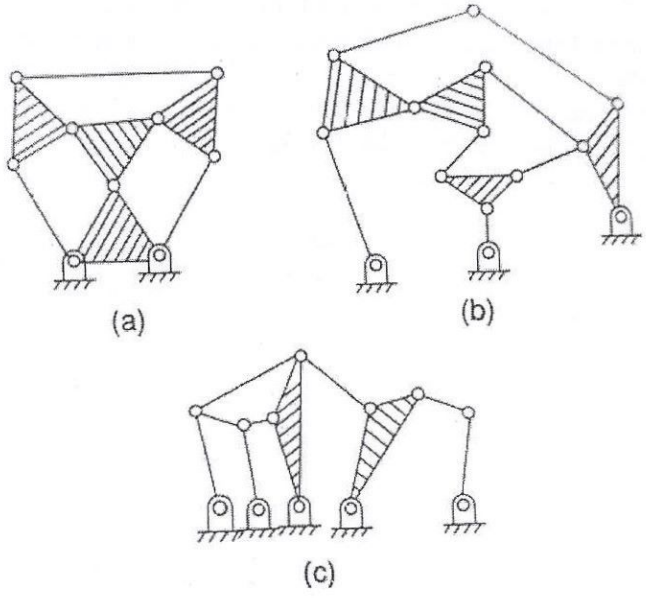
Note:
(i) Answer all the questions by choosing any one of the sub-questions
(ii) Each question carries 10 marks.

Q1. (10 Marks)

a. Explain the following terms: CO1
   i. Kinematic Link
   ii. Kinematic Pair
   iii. Mechanism
   iv. Machine
   v. Constrained Motion

OR

b. Find Degree of freedom of the given kinematic linkages: CO1



Q2. (10 Marks)

a. Describe various inversions of a slider-crank mechanism giving examples. CO1

OR

b. Define Grashof's law. State how is it helpful in classifying the four-link mechanisms into different types. CO1

Q3. (10 Marks)

a. Describe the procedure to construct the velocity diagram of a four-link mechanism with example. CO2

OR

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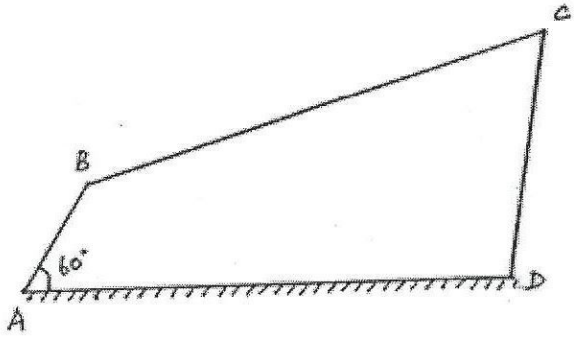
b. In a four-bar chain ABCD, AD is fixed and is 15 cm long. The crank AB is 4 cm long and rotates at 120 rpm clockwise, while the link CD (whose length is 8 cm) oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60°. CO2



Q4. (10 Marks)

a. What is instantaneous centre of rotation? How do you know the number of instantaneous centres in a mechanism? CO2

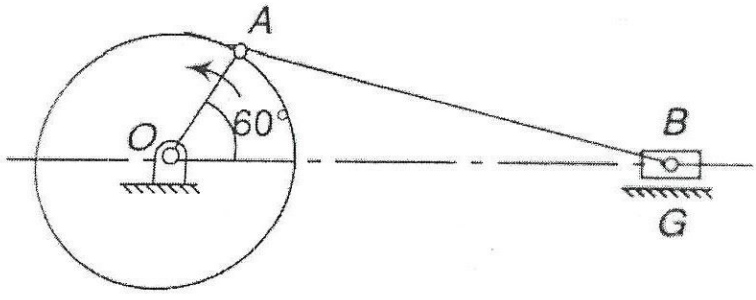
OR

b. For the configuration of a slider-crank mechanism shown in figure (OA=480mm, AB=1600mm). OA rotates at a uniform velocity of 20 rad/s counter-clockwise.CO2

Calculate:

(i) Acceleration of the slider at B

(ii) Angular acceleration of the link AB



Q5. (10 Marks)

a. Give a detailed classification of gears. CO3

OR

b. An epicyclic gear train consists of an arm and two gears A and B having 30 and 40 teeth respectively. The arm rotates about the centre of the gear A at a speed of 80_rpm counter-clockwise. Determine the speed of the gear B if (i) the gear A is fixed, and (ii) the gear A revolves at 240 rpm clockwise instead of being fixed. CO3

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