

Code: ME4T4

**II B.Tech - II Semester – Regular Examinations - JUNE 2014**

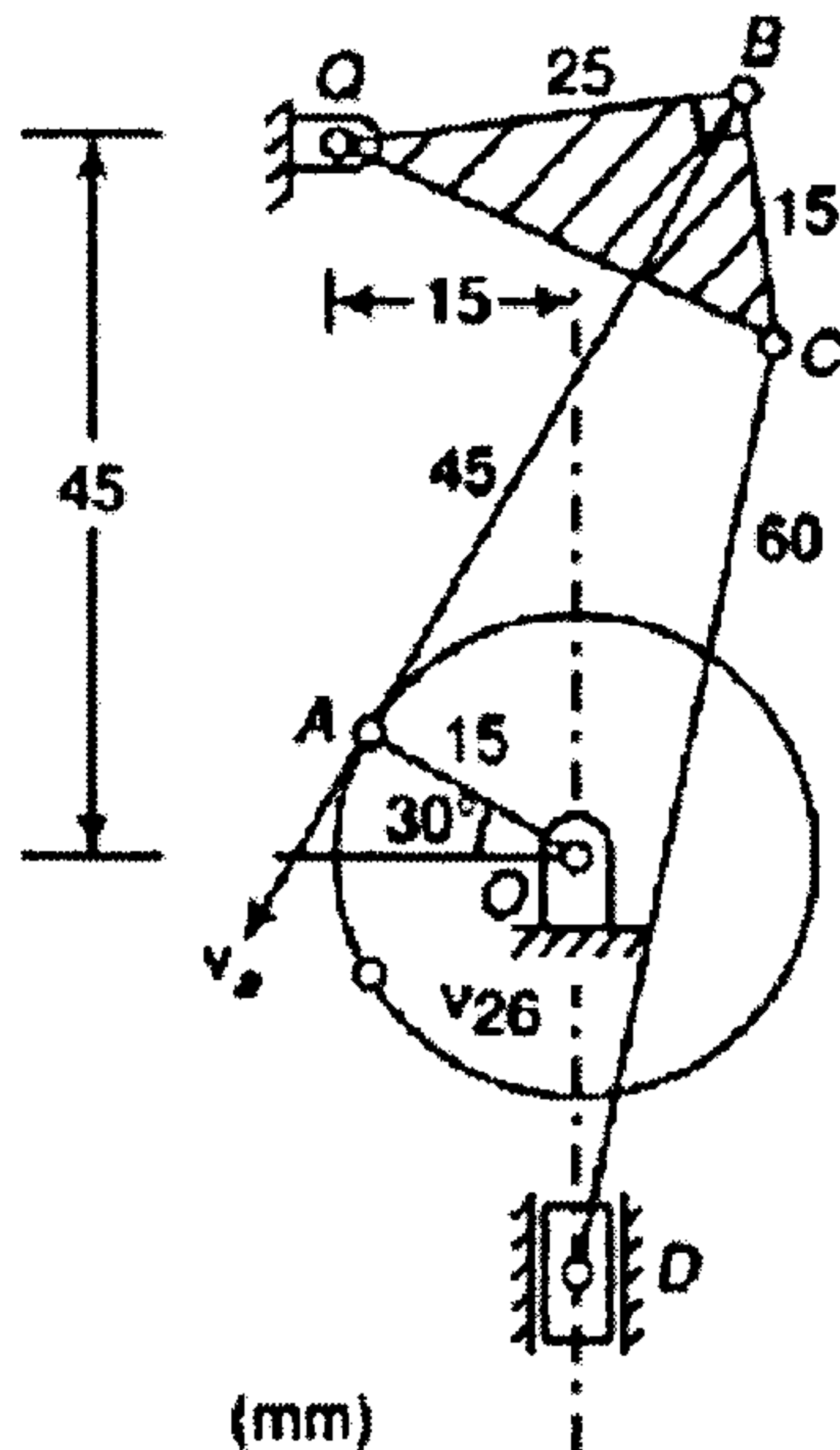
**KINEMATICS OF MACHINERY  
(MECHANICAL ENGINEERING)**

Duration: 3 hours

Marks:  $5 \times 14 = 70$

Answer any FIVE questions. All questions carry equal marks

1. a) What is degrees of freedom (DOF)? Explain different types of kinematic pairs with suitable diagrams? 8 M
- b) Explain any two quick return motion mechanisms with sketches? 6 M
2. a) Sketch Hart mechanism and show that it can trace a straight line motion? 10 M
- b) Explain the condition for straight line motion mechanism? 4 M
3. a) The mechanism, as shown below is in a sewing machine needle box. For the given configuration, find the velocity of the needle fixed to the slider D when the crank OA rotates at 40 rad/s using instantaneous centre method. 10 M



b) What is Coriolis component of acceleration? Name any four mechanism for which it will present? 4 M

4. a) For a single Hooke's joint, derive an expression for ratio of angular velocities of input shaft to output shaft and also find the coefficient of fluctuation of speed? 8 M

b) The track of a Davis steering gear is at a distance of 10 cm from the front main axle where as the difference between their lengths is 5 cm. if the distance between steering pivots of the main axle is 1.2 m, determine the length of the chassis between the front and the rear axle wheels. 3 M

- c) Explain Universal coupling and its applications? 3 M
5. Draw the displacement, velocity and acceleration diagrams for a follower when it moves with simple harmonic motion. Derive expression for velocity and acceleration during outstroke and return stroke of the follower. 14 M
6. a) Explain the following: 6 M
- (i) law of gearing
  - (ii) Path of contact
  - (iii) Arc of contact
- b) With the help of suitable figures, derive an expression to find out the minimum number of teeth to avoid interference in the involute profile teeth gears. 8 M
7. a) Briefly, explain the following: 8 M
- (i) Slip in belt
  - (ii) Creep in belt
  - (iii) angle of contact
  - (iv) centrifugal tension
- b) Derive the expression for maximum tension in the belt drive? 6 M

- 8) An internal wheel **B** with 80 teeth is keyed to a shaft **F**.  
A fixed internal wheel **C** with 82 teeth is concentric with **B**.  
A compound gear **D-E** meshed with the two internal wheels.  
**D** has 28 teeth and meshes with internal gear **C** while **E**  
meshes with **B**. The compound wheels revolve freely on pin  
which projects from an arm keyed to a shaft **A** co-axial with  
**F**. Represent the gear train?. If the wheels have the same  
pitch and the shaft **A** makes 800 rpm, what is the speed of the  
shaft **F**? 14 M