Code No: R22032   **R10**   SET - 1

II B. Tech II Semester Supplementary Examinations, April-2018
KINEMATICS OF MACHINERY
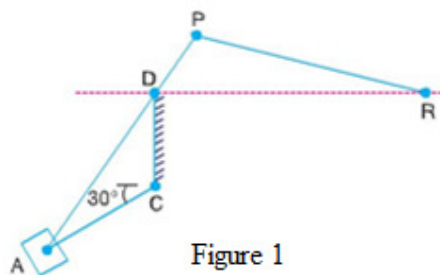(Com. to ME, AME, MM)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Show that slider crank mechanism is a modification of the basic four bar mechanism (7M)

   b) In a Whitworth quick return motion mechanism, as shown in Figure 1, the distance between the fixed centers is 50 mm and the length of the driving crank is 75 mm. The length of the slotted lever is 150 mm and the length of the connecting rod is 135 mm. Find the ratio of the time of cutting stroke to the time of return stroke and also the effective stroke. (8M)

Figure 1

2. State the principle of exact straight line and explain with sketches the different types of mechanisms which produces exact straight line. (15M)

3. An engine mechanism is shown in Figure 2. The crank CB = 100 mm and the connecting rod BA = 300 mm with centre of gravity G, 100 mm from B. In the position shown, the crankshaft has a speed of 75 rad/s and an angular acceleration of 1200 rad/s^2. Find: i) velocity of G and angular velocity of AB, and ii) acceleration of G and angular acceleration of AB. (15M)

Figure 2

Code No: R22032   **R10**   SET - 1

4. a) Two shafts are connected by a Hooke's joint. The driving shaft revolves uniformly at 500 r.p.m. If the total permissible variation in speed of the driven shaft is not to exceed $\pm$ 6% of the mean speed, find the greatest permissible angle between the centre lines of the shafts (7M)

    b) Write short notes on Ackermans steering gear. (8M)

5. Derive expressions for displacement, velocity and acceleration for a tangent cam operating on a radial-translating roller follower : (15M)
    (i) when the contact is on straight flank, and
    (ii) when the contact is on circular nose

6. a) Prove that for two involute gear wheels in mesh, the angular velocity ratio does not change if the centre distance is increased within limits, but the pressure angle increases (7M)

    b) A pair of spur gears with involute teeth is to give a gear ratio of 4 : 1. The arc of approach is not to be less than the circular pitch and smaller wheel is the driver. The angle of pressure is 14.5°. Find: i) the least number of teeth that can be used on each wheel, and ii) the addendum of the wheel in terms of the circular pitch. (8M)

7. a) Derive the condition for transmitting the maximum power in a flat belt drive. (7M)

    b) What are different types of chains? Explain, with neat sketches, the power transmission chains. (8M)

8. In an epicyclic gear train, the internal wheels A and B and compound wheels C and D rotate independently about axis O. The wheels E and F rotate on pins fixed to the arm G. E gears with A and C and F gears with B and D. All the wheels have the same module and the number of teeth is: $T_C = 28$; $T_D = 26$; $T_E = T_F = 18$. (15M)
    i) Sketch the arrangement; ii) Find the number of teeth on A and B; iii) If the arm G makes 100 r.p.m. clockwise and A is fixed, find the speed of B; and iv) If the arm G makes 100 r.p.m. clockwise and wheel A makes 10 r.p.m. counter clockwise ; find the speed of wheel B.