

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(Automation & Robotics) (2012 & Onward) (Sem.-3)

KINEMATICS OF MACHINES

Subject Code : BTAR-305

M.Code : 63005

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**1. Answer briefly :**

- a) What do you understand by inversion of mechanism?
- b) State Kennedy's theorem.
- c) Explain the terms :
 - i) circular pitch
 - ii) clearance.
- d) Why Involute profile is preferred to cycloidal profile?
- e) What do you understand by 'gear train'? Discuss the various types of gear trains.
- f) Define spatial mechanism.
- g) Define Grashof law.
- h) What do you understand by dynamical equivalent system?
- i) What is meant by piston effort and crank effort?
- j) Explain the term point of concurrency. Write the conditions of equilibrium of two force system.

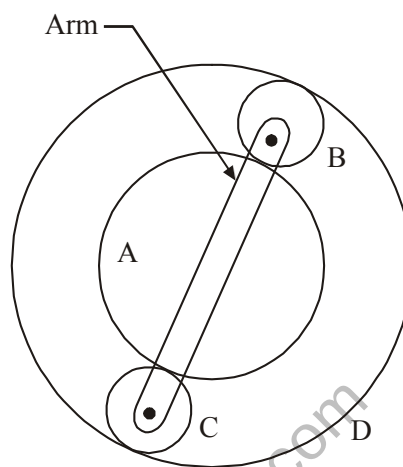
SECTION-B

2. What are quick return mechanisms? Where are they used? Discuss the functioning of any of them.
3. The path of moving point is defined by the equation $y = 2x^2 - 28$. Find the position difference from point P to point Q if $R^x_P = 4$ and $R^x_Q = -3$.
4. What is the Coriolis acceleration component? In which case does it occur? How is it determined?
5. The pitch circle diameter of the smaller of the two spur wheels which mesh externally and have involute teeth is 100 mm. The number of teeth are 16 and 32. The pressure angle is 20° and the addendum is 0.32 of the circular pitch. Find the length of the path of contact of the pair of teeth.
6. In a four bar chain ABCD, AD is the fixed link 12 cm long, Crank AB is 3 cm long and rotates uniformly at 100 r.p.m. clockwise while the link CD is 6 cm long and oscillates about D. Link BC is equal to link AD. Find the angular velocity of link DC when angle BAD is 60° .

SECTION-C

7. The crank-pin circle radius of a horizontal engine is 300 mm. The mass of the reciprocating parts is 250 kg. When the crank has travelled 60° from I.D.C., the difference between the driving and the back pressures is 0.35 N/mm^2 . The connecting rod length between centres is 1.2 m and the cylinder bore is 0.5 m. If the engine runs at 250 r.p.m. and if the effect of piston rod diameter is neglected, calculate :
 - a) Pressure on slide bars,
 - b) Thrust in the connecting rod,
 - c) Tangential force on the crank-pin,
 - d) Turning moment on the crank shaft.
8. Write note on :
 - a) Acceleration of a point on floating link.
 - b) Robotic Mechanism

9. An epicyclic train of gears is arranged as shown in Fig. 1. How many revolutions does the arm, to which the pinions B and C are attached, make:
- When A makes one revolution clockwise and D makes half a revolution anticlockwise
 - When A makes one revolution clockwise and D is stationary? The number of teeth on the gears A and D are 40 and 90 respectively.

**FIG.1**

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.