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

II B. Tech II Semester Supplementary Examinations, April/May - 2019
KINEMATICS OF MACHINERY
(Com. to ME, AME, MM)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain about types of kinematic pairs with neat diagrams. [8M]

   b) Describe about the inversions of quadric cycle? [7M]

2. a) What do you mean by a Pantograph? With a neat sketch explain the principle and working of the pantograph. What are its uses? [8M]

   b) Explain with neat sketches the exact and approximate straight line motion mechanisms? [7M]

3. a) Explain the term coriolis component of acceleration and derive a relation for coriolis component of acceleration. [6M]

   b) A link AB of four bar linkage ABCD resolves uniformly at 120 r.p.m in a clock wise direction. Find the Angular acceleration of the links BC and CD and acceleration of the point E in the link BC. Given: AB = 7.5 cm, BC = 17.5 cm, EC = 5 cm, CD= 15 cm, DA = 10 cm and $\angle$BAD = 90° [9M]

4. a) What is the function of a steering gear? What are the conditions for correct steering? [5M]

   b) Two shaft P & Q connected together by Hooke's joint have their axes inclined at 20^0. The shaft P revolves at uniform speed of 1500 r.p.m and the shaft Q carries a fly wheel of weight 150 N, radius of gyration 100 mm. Find the maximum torque in shaft Q, if it is assumed that the shafts are torsionally rigid. [10M]

5. a) With the help of neat sketches explain the types of cams and followers. [7M]

   b) Draw the profile of a cam operating a knife-edge follower having a lift of 30mm. The cam raises the follower with SHM for 150^0 of the rotation followed by a period of dwell for 60^0. The follower descends for the next 100^0 rotation of the cam with uniform velocity, again followed by a dwell period. The cam rotates at a uniform velocity of 120rpm and has a least radius of 20mm. What will be the maximum velocity and acceleration of the follower during the lift and the return? [8M]

6. a) Define and explain the terms with a neat sketch; Helical gears, helix angle, normal pitch and circular pitch. [7M]

   b) A pair of spur gears with involute teeth is to give a gear ratio of 3:1. The arc of approach is not to be less that the circular pitch and the pinion is the driver. The pressure angle is 20^0. What is the least number of teeth that can be used on each gear? [8M]

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7. a) Classify the belt drives?   [6M]

   b) Two parallel shafts, connected by a crossed-belt, are provided with pulleys 480mm and 640mm in diameters. The distance between the centre lines of the shafts is 3m. Find by how much the length of the belt should be changed if it is desired to alter the direction of rotation of the driven shaft.   [9M]

8. In a reverted gear train, as show in Figure:1, two shafts A and B are in the same straight line and are geared together through an intermediate parallel shaft C. The gears connecting the shafts A and C have a module of 2 mm and those connecting the shafts C and B have a module of 4.5 mm. The speed of shaft A is to be about but greater than 12 times the speed of shaft B, and the ratio at each reduction is same. Find suitable number of teeth for gears. The number of teeth of each gear is to be a minimum but not less than 16. Also find the exact velocity ratio and the distance of shaft C from A and B.   [15M]
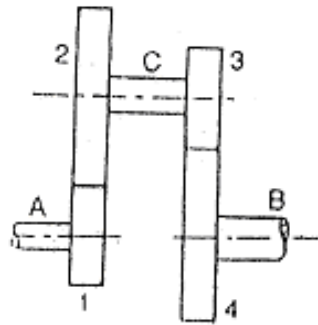

Figure: 1