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KC-6261

B. E. - II (Sem. III) (Mech.) Examination

November / December – 2012

Theory of Machine - I

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 2 (SEM. 3) (MECH.)**

Name of the Subject :

☛ **THEORY OF MACHINE - 1**

☛ Subject Code No. : **6 2 6 1** ☛ Section No. (1, 2,.....) : **NIL**

Seat No. :

Student's Signature

(2) Attempt all questions.

(3) Figure to the right indicate full marks.

(4) Assume suitable data with justification.

1 Attempt any four : **20**

(1) Define :
Centrifugal tension
Trace Point
Length of Arc of Contact
Diametral pitch
Creep of the belt

(2) Derive the equation of slip of the belt.

(3) Explain Initial tension briefly.

(4) State and prove the law of gearing.

(5) Why roller follower is preferred over knife-edge follower ? Classify the cam.

(6) Draw the sketch of the follower motion when it moves with cycloidal motion. Displacement, velocity and acceleration diagram.

2 Attempt any **two** : **30**

(1) Draw a cam profile to driver an oscillating roller follower :

- outstroke 120° with 20° angular displacement of follower with SHM.
- next return stroke 120° with SHM
- next dwell 120°

The distance between pivot centre and roller centre = 120 mm, distance between pivot centre and cam axis = 130 mm, min. radius of cam = 40 mm, radius of roller = 10 mm.

(2) An open belt running over two pulleys 240 mm and 600 mm dia. connects two parallel shafts 3 meter aparts and transmits 4 kw from the smaller pulley that rotates at 300 rpm $\mu = 0.3$ and safe working tension is 10 N per mm width. Determine :

(i) Min. width of the belt

(ii) Initial tension

(iii) Length of the belt.

(3) Two involute gears of 20° pressure angle are in mesh. The no. of teeth on pinion is 20 and gear ratio is 2. If the pitch expressed in module is 5 mm and the pitch line speed is 1.2 m/s. cassuming addendum as standard and equal to one module find :

(i) The angle turned through by pinion when one pair of teeth is in mesh.

(ii) max. velocity of sliding.

3 Answer the following question : **10**

(1) Differentiate Kinematics and Dynamics.

(2) Explain rolling pair and screw pair.

(3) Explain first inversion of slider crank mechanism and also give its application.

(4) What do you mean by parallel- crank four bar linkage and where it is used ?

(5) What is higher pair ? Give examples of higher pair.

4 (i) The crank and connecting rod of steam engines are 0.5 m and 2 m long respectively. The crank makes 180 r.p.m. in the clockwise direction. When it has turned 45° from the inner dead centre position, determine : **20**

(i) Velocity of piston,

(ii) Angular velocity of connecting rod,

(iii) Velocity of point E on the connecting rod 1.5 m from the gudgeon pin

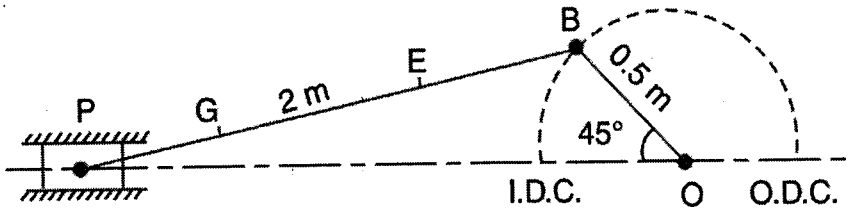

Fig. 1

OR

(ii) As shown in the fig. 2, angular velocity of the crank OA is 600 r.p.m. Determine the linear velocity of the slider D and the angular velocity of the link BD, when the crank is inclined at an angle of 75° to the vertical. The dimensions of various links are OA = 28 mm; AB = 44 mm; BC = 49 mm; and BD = 46 mm. The centre distance between the centres of rotation O and C is 65 mm. The path travel of the slider is 11 mm below the fixed point C. The slider moves along the horizontal path and OC is vertical. **20**

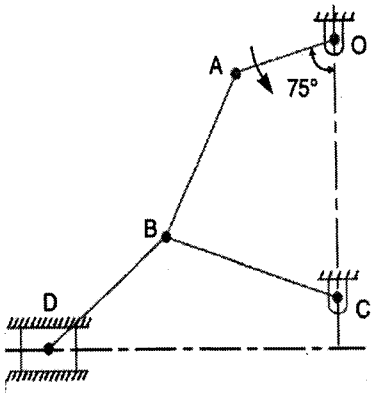

Fig. 2

5 As shown in figure 3, the slider C is moving to the right with a velocity of 1 m/s and an acceleration of 2.5 m/s^2. The dimensions of various links are AB = 3 m inclined at 45° with the horizontal. Determine : **20**

(1) The magnitude of the vertical and horizontal component of the acceleration of the point B, and

(2) The angular acceleration of the link AB and BC.

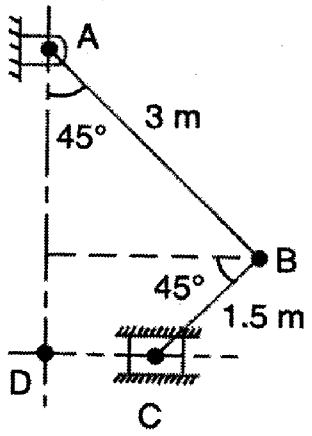

Fig. 3