Code No. : 6162

FACULTY OF ENGINEERING
B.E. 2/4 (M/P) II Semester (Main) Examination, June 2010
KINEMATICS OF MACHINES

Time : 3 Hours] [Max. Marks: 75

*Note : Answer **all** questions from Part **A**. Answer **any five** questions from Part **B**.*

PART – A **(25 Marks)**

1. Explain about the types of constrained motion. **3**
2. What is velocity of rubbing ? How is it found ? **2**
3. Differentiate between primary and secondary instantaneous centres. **2**
4. Write about kinematic pairs according to nature of relative motion. **3**
5. Differentiate brake and dynamometer. **2**
6. Derive the condition for maximum power transmission in belts. **3**
7. Discuss about the classification of cams. **2**
8. Derive the expression for path of contact of a spur gear. **3**
9. Explain about compound gear train. **2**
10. Draw the displacement diagram of a cams moving with S.H.M. **3**

PART – B **(50 Marks)**

11. a) Sketch Davis steering gear mechanism and show that it satisfies condition for correct steering. **5**

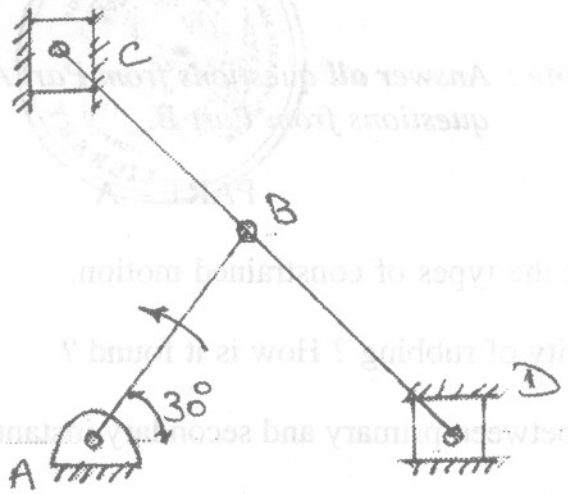
    b) Describe Hart's mechanism with a neat sketch. **5**

12. In the mechanism shown in the figure below, crank AB oscillates and drives the sliders C and D. At the instant shown in the figure the angular velocity and angular acceleration of the crank are 30 rad/sec and 6 rad/sec^2. Find the linear accelerations of blocks C and D. **10**

AB = 6 cm,

AD = 8 cm,

CB = DB



13. A load of 25 kN is supported by a conical pivot with angle of cone as 120°. The intensity of pressure is not to exceed 350 kN/m^2. The external radius is two times the interval radius. The shaft is rotating at 180 r.p.m. and coefficient of friction is 0.05. Find the power absorbed in friction assuming uniform pressure. **10**

14. A 100 mm wide and 10 mm thick belt transmits S.K.W. between two parallel shafts. The distance between the shaft centres is 1.5 m and the diameter of the smaller pulley is 440 mm. The driving and the driven shafts rotate at 60 r.p.m. and 150 r.p.m. respectively. Find the stress in the belt if the two pulleys are connected by : **10**

i) an open belt ii) a cross belt. Take $\mu = 0.22$

15. a) State and prove law of gearing. **3**

b) Following data relate to two meshing involute gears. No. of teeth on the gear wheel = 60, pressure angle = 20°, gear ratio = 1.5, speed of the gear wheel = 100 r.p.m, module = 8 mm.

The addendum on each wheel is such that the path of approach and path of recess on each side are 40% of the maximum possible length each. Determine the addendum for the pinion and the gear and the length of the arc of contact. **7**

16. Use the following data in drawing the profile of a cam in which knife edged follower is raised with uniform acceleration and deceleration and is lowered with S.H.M. **10**

Least radius of cam = 60 mm, Lift of follower is 45 mm, Angle of ascent = 60°, Angle of dwell between ascent and descent = 40°, Angle of descent = 75°.

If the cam rotates at 180 r.p.m., determine the maximum velocity and acceleration during ascent and descent.

17. Write short note on :

i) Prony brake dynamometer

ii) Epicyclic gear train.

iii) Kennedy's theorem. **10**
