R.No								

B.E / B. Tech (Full -Time) Degree End Semester Examinations Apr /May 2011
THIRD SEMESTER MECHANICAL ENGINEERING BRANCH R-2008

ME 9203 KINEMATICS OF MACHINES

Time : 3 hr Max .Mark : 100

Part- A (10 X 2 = 20 mark)

1. List any two differences between mechanism and machine.
2. Define the term kinematic chain. Give two examples for the same.
3. What is the need for finding acceleration details in machine parts?
4. What do you understand by Coriolis acceleration? When it will exist?
5. What do you understand by acceleration image of a link?
6. What are the merits and limitations of constant acceleration and deceleration motion for a translating follower?
7. Define the following in cam mechanism: i. pitch curve ii. Prime circle
8. State the significance of pressure angle in gear mesh.
9. What is meant by reverted gear train? Give one application of such gear train.
10. What is difference between the simple and differential band brake?

Part –B (5 X 16 = 80 mark)

11. (a). Explain with neat sketches all the inversions of a single slider crank mechanism.

12. (a) i. Describe with sketch the principle and working of pantograph mechanism. (8 mark)
ii. What is condition for correct steering? Explain any one type of steering mechanism? (8mark)

Or

(b) The crank of a slider crank mechanism is 150 mm and connecting rod is 750 mm. The crank rotates at a constant speed of 300 rpm clockwise. Find the velocity and acceleration of the slider when the crank has turned 30 ° from the inner dead centre position.

13 (a) A cam operates a reciprocating roller follower of 25 mm radius. The follower axis is offset by 25 mm to the right of the cam rotation axis. The least radius of the cam is 50 mm and the stroke of the follower is 50 mm. Accent and descent both take place with uniform acceleration and deceleration . Ascent takes place during 75 ° of cam rotation and descent during 90 ° of cam rotation. Dwell between ascent and descent is 60° . Draw the profile of the cam . Use 1:1 scale.

Or

(b) The following data is related to a symmetrical circular arc cam operating a flat faced follower: least radius of the cam : 27.5 mm, total lift = 12,5 mm, angle of lift = 55° , nose radius = 3 mm speed of the cam = 600 rpm.

Find i. distance between cam centre and nose centre

ii. radius of the circular flank

iii. angle of contact on the circular flank

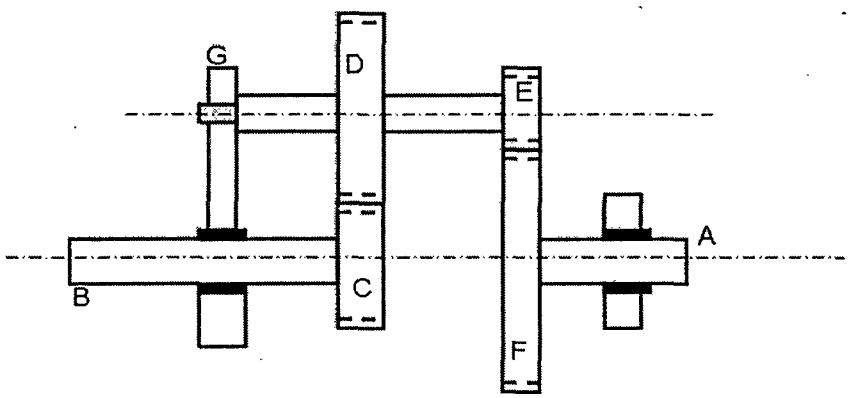
14 (a) i A pair of spur gears with involute teeth is to give a gear ratio of 4 : 1 . The module is 4 mm and arc of approach is not to be less than the circular pitch and the smaller wheel is driving gear. The pressure angle is 14 ½ ° . Find least number of teeth in each gear and addendum of the wheel.

(8mark)

ii. Describe with neat sketch the working of a automotive rear axle differential gear train (8 mark)

or

(b) In an epicyclic gear train shown in **below** ,the wheel C is keyed to the shaft B and the wheel F is keyed to shaft A. The wheels D and E rotates together on a pin fixed to the arm G. The number of teeth on wheels C.D E and F are 35, 65, 32 and 68 respectively. If the shaft A rotates at 60 rpm and shaft rotates at 28 rpm in the opposite direction, find the speed and direction of rotation of arm G.



15(a) The cross-sectional area of a V-belt driving a 300mm diameter pulley (angle of groove 30^0) is 750mm^2. The angle of lap is 180^0 and the pulley runs at 1500rpm.The density of belt material is 1.2×10^{-6} kg/mm^3 and μ=0.12. If the safe working stress in the belt is 7.135N/mm^2, calculate the power which can be transmitted. (b). In the above problem, calculate the speed at which the transmitted power would achieve its maximum. What is the value of the maximum power?

Or

(b) . The cutter of a broaching machine is pulled by square threaded screw of 55mm external diameter and 10mm pitch. The operating nut takes the axial load of 400N on a flat surface of 69 mm internal diameter and 90mm external diameter. If the coefficient of friction is0.15 for all contact surfaces of the nut, determine the power required to rotate the operating nut when the cutting speed is 6m/min.