Model Question Paper
V[th] semester B. Tech Examination (Mechanical Engg.)
08.503 Theory of Machines

Answer all

1. Explain with schematic diagrams all inversions of a double slider crank mechanism
2. Explain with schematic diagram, any one type of quick return mechanism
3. Sketch and explain six type of lower pairs
4. Explain with example loop closure equation
5. Obtain an expression for Coriolis component of acceleration
6. Explain the influence of initial tension and coefficient of friction on power transmitted by belt drive
7. Explain with neat sketch, working of an internal expanding show brake
8. Define with neat sketch (a) Prime circle (b) Pitch circle (c) Pressure angle
9. Explain the advantages of involute profile over cycloidal profile for gears
10. Explain different types of dynamometers

(10x4 marks)

Module I

11. Using Freudenstein's method, determine the proportions of a four bar linkage to generate $y=\log_{10}x$ when x varies from 1 to 10. Use Chebyshev spacing. Let $\phi_s=45^o$, $\Delta\phi=60^o$, $\psi_s=135^o$, $\Delta\psi=90^o$. Make a sketch of the linkage letting ground d be 50 mm. (20 marks)

OR

12. (a) What are coupler curves (5 marks)
    (b) Draw the schematic diagram of any 6 bar linkage chain and obtain all the instantaneous centers associated with it. (10 marks)
    (c) State and prove Kennedy's theorem (5 marks)

Module II

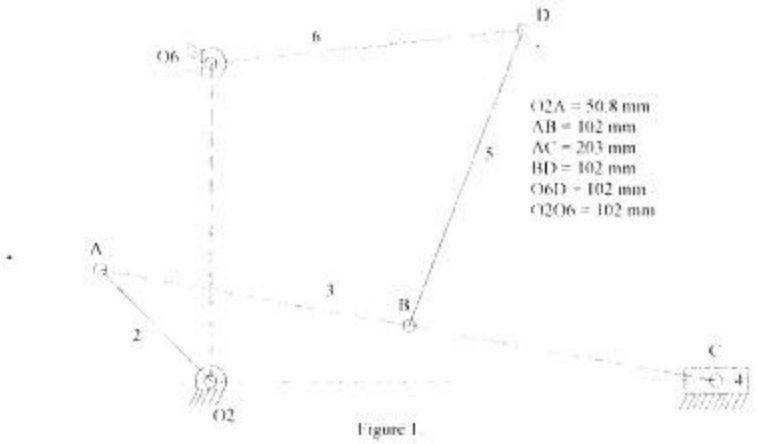

Figure 1

13. For the mechanism shown in figure 1, link 2 rotates at a constant angular velocity of 1 rad/sec, find the velocity and acceleration point D. (20 marks)

OR

14. 80 kW power is transmitted by a rope drive through a 150 mm diameter 45° grooved pulley running at 300 rpm. Angle of overlap is 140° and coefficient of friction between pulley and rope is 0.25. Mass of rope is 0.6 kg/m and it can withstand a tension of 800 N. (a) calculate the number of ropes required (b) tension in the rope before starting. (20 marks)

Module III

15. Draw the profile of a cam operating a knife edge follower having a lift of 30 mm. The cam raises the follower with SHM for 150° of its rotation followed by a period of dwell for 60°. The follower descends for next 100° rotation of the cam again followed by dwell period. The cam rotates with a uniform velocity of 120 rpm and has a least radius of 20 mm (20 marks)

OR

16. For the epicycle gear train shown in Fig. 2, wheels B and G are integral with driving shaft A. The internal Gear D is fixed and gear C rotates about a pin carried by the internal gear E. The gear F is carried by an arm which is keyed to the output shaft H. The number of teeth on each gear is given.

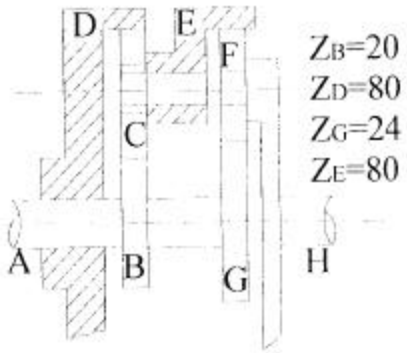

Fig. 2

Determine the speed of the output shaft when shaft A rotates at a speed of 1000 rpm CCW. If input torque is 100 Nm, what will be output torque? (20 marks)