Exam.Code:0939
Sub. Code: 33843

2124

B.E. (Mechanical Engineering)
Third Semester
MEC-303: Kinematics of Machines

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.

x-x-x

Q1a)Classify different types of links.
b)What is Grashof's law.
c)Explain briefly the function of flywheel.
d)What is the function of clutch.
e)Define creep in belt drive. (10)

Part-A

Q2a)Explain the working of pantograph and oldham coupling with the neat sketches. (4)
b)A crank and slotted lever mechanism used in shaper has a centre distance of 300 mm between the centre of oscillation of the slotted lever and the centre of rotation of the crank .The radius of the crank is 120 mm. Find the ratio of time of cutting to the time of return stroke. (3)
c)Differentiate between the primary and secondary instantaneous centres. (3)

Q3a)Explain least square technique for synthesis of the mechanism. (4)
b)A 4-bar mechanism is required such that the input and the output angles are co - ordinated as given in the table below:

Input crank angle(Θ)	15°	30°	45°
Output follower angle(φ)	30°	40°	55°

Synthesize the 4-bar mechanism (6)

Q4a)Define: i)Coefficient of fluctuation of speed ii)Coefficient of fluctuation of energy. (4)
b)The equation of turning moment curve of a three crank engine is 2500 +750 Sin3Θ N-m, where Θ = is the crank angle in radians. The mean speed of the engine is 300 rpm. The flywheel and other rotating parts attached to the engine have a mass of 500 kg at a radius of gyration of 1m.Calculate
i)the power of the engine
ii)the total fluctuation of the speed of flywheel in percentage when:
A)the resisting torque is constant
B)the resisting torque is 2500 + 300 Sin Θ N-m (6)

Part-B

Q5a)Sketch and explain the working of a Porter governor. Also derive the relation for the height of porter governor. (5)
b)In a spring loaded Hartnell type governor, the extreme radii of rotation of the balls are 80 mm and 120 mm. The ball arm and the sleeve arm of the bell crank lever are equal in length. The mass of each ball is 2 kg. If the speeds at the two extreme positions are 400 and 420 r.p.m., find : 1) the initial compression of the central spring, and 2) the spring constant. (5)

P.T.O.

Q6a)A band brake acts on the 3/4th of circumference of a drum of 450 mm diameter which is keyed to the shaft. The band brake provides a braking torque of 225 N-m. One end of the band is attached to a fulcrum pin of the lever and the other end to a pin 100 mm from the fulcrum. If the operating force is applied at 500 mm from the fulcrum and the coefficient of friction is 0.25, find the operating force when the drum rotates in the (a) anticlockwise direction and (b) clockwise direction. (5)

b)The mean diameter of a bolt having V-threads is 25 mm. The pitch of the thread is 5 mm and the angle of threads is 55°.The bolt is tightened by screwing a nut whose mean radius of bearing surface is 25 mm. The coefficient of friction for nut and bolt is 0.1 and for nut and bearing surface is 0.15. Find the force required at the end of a 0.5 m lever when the load on the bolt is 15 kN. (5)

Q7a)Prove that $T_1/T_2 = e^{\mu\theta}$ for flat belt drive where T_1=Tight side tension,T_2=Slack side tension, μ=coefficient of friction between belt and pulley and θ=angle of contact. (5)

b)A chain drive is used for reduction of speed from 240 r.p.m. to 120 r.p.m. The number of teeth on the driving sprocket is 20. Find the number of teeth on the driven sprocket. If the pitch circle diameter of the driven sprocket is 600 mm and centre to centre distance between the two sprockets is 800 mm, determine the pitch and length of the chain. (5)

x-x-x