

Q5: (Answer two only)

A- A Conical clutch has an included angle of 114° . The outer diameter is 120mm and inner diameter is 58mm , respectively. Calculate the force required to press the two halves together if it is to transmit 180W at 500 rpm. The coefficient of friction is 0.3. Use both the uniform pressure theory and uniform wear theory.

B- A plate clutch has three discs on the driving shafts and two discs on the driven shaft ,providing four pairs of contact surfaces each of 240mm external diameter and 120mm internal diameter. Assuming uniform pressure, find the total spring load pressing the plates together to transmit 25 KW at 1575 r.p.m. Take $\mu=0.3$.

C- An epicycle gear box has a fixed sun gear D as shown in figure (4), and the internal gear C is the output with 400teeth. The planet gears B have 50 teeth. The input is the arm /cage A. Calculate the number of teeth on the sun gear and the ratio of the gear box.

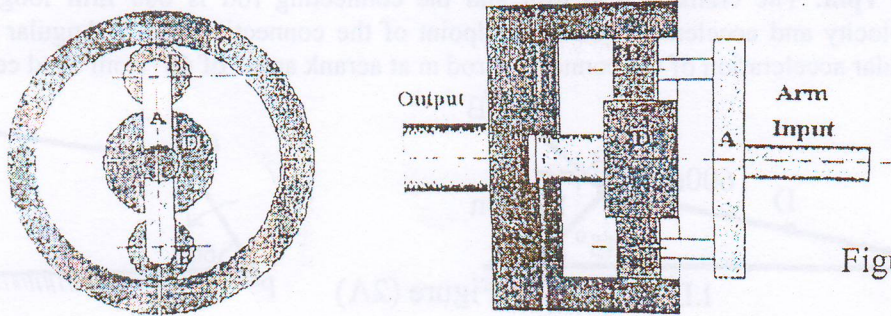


Figure (5)

(20 marks)

Q6 : In a Hartnell governor shown in figure (5), the length of the ball arm is 190mm , that of the sleeve arm is 140 mm, and the mass of each ball is 2.7 kg. The distance of the pivot of each ball-crank lever from the axis of rotation is 170mm, and the speed, when the ball arm is vertical, is 300 r.p.m. The speed is to increase 0.6percent for a lift of 12mm of the sleeve. find the necessary stiffness of the spring and the required initial compression(neglecting the dead load on sleeve).

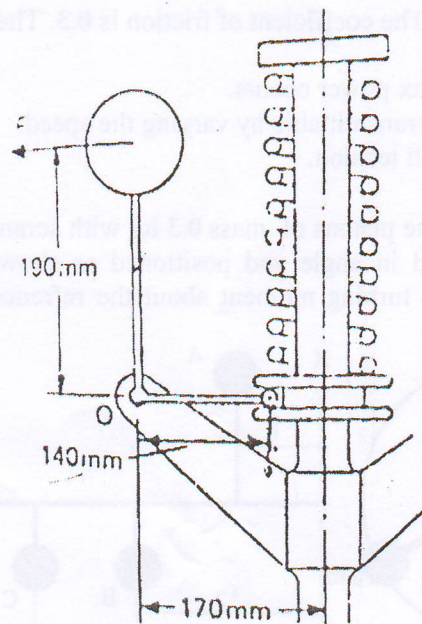
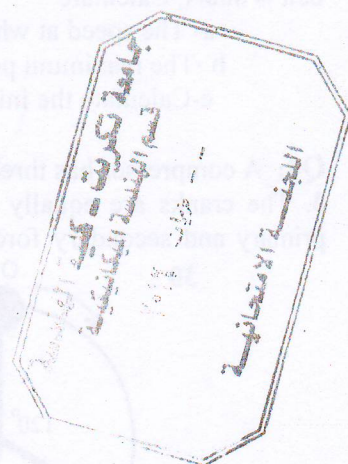


Figure (6)

(Good luck)

(10marks)



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