

- V. (a) What are centrifugal governors? How do they differ from inertia governors? (8)
- (b) Explain the following : (12)
- Stability and hunting of governor.
 - Controlling force of a governor.
 - Isochronism.

OR

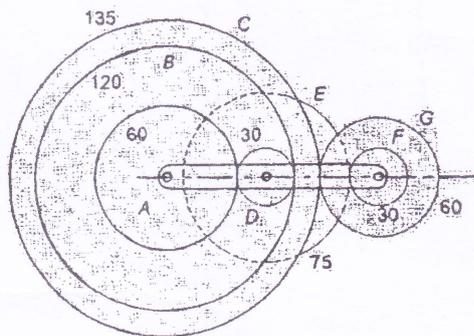
- VI. The arms of a Hartnell governor are of equal length. When the sleeve is in the mid position, the masses rotate in a circle with diameter of 150 mm (the arms are vertical in the mid-position). Neglecting friction, the equilibrium speed for this position is 360 rpm. Maximum sleeve movement is 30 mm. The sleeve mass is 5 kg and friction at sleeve is 35 N. (20)

Assuming power of governor is sufficient to overcome friction by 1% change of speed on each side of mid-position, find (neglecting obliquity effect of arms), the (i) mass of each rotating ball; (ii) spring stiffness; (iii) initial compression of spring.

- VII. (a) Make a comparison of cycloidal and involute tooth forms. (6)
- (b) What do you mean by undercutting of gears? (6)
- (c) State and derive law of gearing. (8)

OR

- VIII. Figure shows a gear train in which gears D-E and F-G are compound gears. D gears with A and B; E gears with F; and G gears with C. The numbers of teeth on each gears are $A = 60$, $B = 120$, $C = 135$, $D = 30$, $E = 75$, $F = 30$, $G = 60$. If the wheel A is fixed and the arm makes 20 revolutions clockwise, find the revolutions of B and C. If the arm is applied a turning moment of 1 kN.m, determine the turning moment on the shaft supporting the wheel C. (20)



- IX. (a) What is a clutch? Explain with neat sketches the working of any two types of clutches. (10)
- (b) A differential band brake has a drum with diameter of 800 mm. The two ends of the band are fixed to the pins on the opposite sides of fulcrum of the lever at distances of 40 mm and 200 mm from fulcrum. The angle of contact is 270° and coefficient of friction is 0.2. Determine the braking torque when a force of 600 N is applied to the lever at a distance of 800 mm from fulcrum. (10)

OR

- X. An open belt drive system connects two parallel shafts 4 m apart. The diameter of large pulley is 1.2 m and that of smaller pulley is 0.8 m. The initial tension in the belt before starting is 2 kN. The width and thickness are 110 mm and 12 mm respectively. Coefficient of friction is 0.35 and mass of belt is 1.452 kg/m length. Taking centrifugal tension into account, determine the maximum power transmitted and speed in r.p.m. of the pulleys. (20)