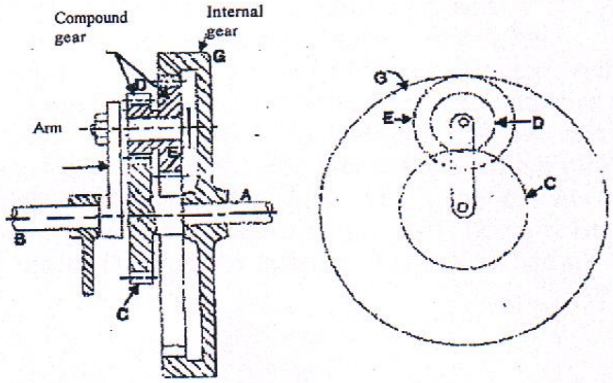
TOM-2

Q.P. Code : 14809

Q4 A. Two shafts A and B are co-axial. A gear C having 50 teeth is rigidly mounted on shaft A. A compound gear D-E gears with C and an internal gear G. D has 20 teeth and gears with C and E has 35 teeth and gears with an internal gear G. The gear G is fixed and is concentric with the shaft axis. The compound gear D-E is mounted on a pin which projects from an arm keyed to the shaft B. Find the number of teeth on the internal gear G assuming that all the gears have the same module. If the shaft A rotates at 110 rpm find the speed of the shaft B. **(7)**



B. A riveting machine is driven by a constant torque 3 kW motor. The moving parts including the flywheel are equivalent to 150 kg at 0.6 m radius. One riveting operation takes 1 second and absorbs 10000 N-m of energy. The speed of the flywheel is 300 rpm before riveting. Find the speed immediately after riveting. How many rivets can be closed per minute? **(7)**

C. Derive the equation for the correction couple to be applied to make two mass systems dynamically equivalent. **(6)**

Q5 A. The turning moment diagram for a four stroke gas engine may be assumed for simplicity to be represented by four triangles, the areas of which from the line of zero pressure are as follows: **(10)**

Suction stroke = 0.45×10^{-3} m^2; Compression stroke = 1.7×10^{-3} m^2; Expansion stroke = 6.8×10^{-3} m^2; Exhaust stroke = 0.65×10^{-3} m^2. Each m^2 of area represents 3 MN-m of energy. All the areas except expansion stroke are negative. Assuming the resisting torque to be uniform, find the mass of the rim of a flywheel required to keep the speed between 202 and 198 rpm. The mean radius of the rim is 1.2 m.

B. A centrifugal clutch transmits 20 kW of power at 750 rpm. The engagement of the clutch commences at 70 % of the running speed. The inside diameter of the drum is 200 mm and the distance of the centre of the mass of each shoe is 40 mm from the contact surface. Determine the **(10)**

i) mass of each shoe
ii) net force exerted by each shoe on the drum surface
iii) power transmitted when the shoe is worn 2 mm and is not readjusted.

Assume μ to be 0.25, number of shoes equal to 4 and the stiffness of the spring 150 kN/m.

[TURN OVER