

SECTION-B

2. What are the free body diagrams of a mechanism? Explain the implementation of this concept for a slider-crank mechanism.
3. In an epicyclic gear train, as shown in Fig.1, the number of teeth on wheels A, B and C are 48, 24 and 50 respectively. If the arm rotates at 400 r.p.m., clockwise, find:
 - a) Speed of wheel C when A is fixed
 - b) Speed of wheel A when C is fixed

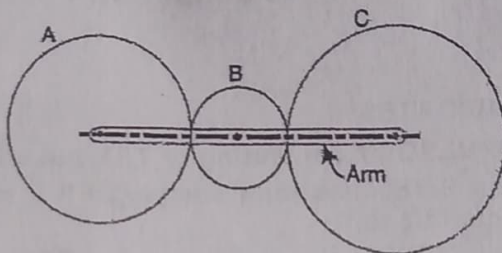


Fig-1

4. The following data refer to a steam engine : Diameter of piston = 240mm; stroke = 600mm; length of connecting rod = 1.5m; mass of reciprocating parts = 300kg; speed = 125 r.p.m. Determine the magnitude and direction of the inertia force on the crankshaft when the crank has turned through 30° from inner dead centre.
5. Explain the 'direct and reverse crank' method for determining unbalanced forces in radial engines.
6. Discuss the least square technique. How is it useful in designing a four link mechanism when three positions of the input and output link are known?

SECTION-C

7. A four crank engine has the two outer cranks set at 120° to each other, and their reciprocating masses are each 400kg. The distance between the planes of rotation of adjacent cranks are 450mm, 750mm and 600mm. If the engine is to be in complete primary balance, find the reciprocating mass and the relative angular position for each of the inner cranks.

If the length of each crank is 300mm, the length of each connecting rod is 1.2m and the speed of rotation is 240 r.p.m., what is the maximum secondary unbalanced force?

8. Explain the effect of the gyroscopic couple on the reaction of the four wheels of a vehicle negotiating a curve with neat and clean diagram.
9. a) Derive an expression for minimum number of teeth required on a pinion to avoid interference when it gears with a rack.

b) Two gear wheels mesh externally and are to give a velocity ratio of 3. The teeth are of involute form of module 6. The standard addendum is 1 module. If the pressure angle is 18° and pinion rotates at 90 r.p.m., find:

- i) The number of teeth on each wheel, so that the interference is just avoided
- ii) The length of the path of contact
- iii) The maximum velocity of sliding between the teeth.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.