

GANPAT UNIVERSITY
B.TECH. SEM. III MECHANICAL ENGINEERING
REGULAR EXAMINATION NOVEMBER / DECEMBER – 2011,
2ME-304 KINEMATICS OF MACHINES

Time: 3 Hours

Total Marks: 70

Instruction:

1. Attempt all questions.
2. Assume suitable data if necessary.
3. Figure to the right indicate full marks.

SECTION – I

Que.-1 Attempt the following questions.

- (A) Explain Reverted gear train with neat sketch. [04]
- (B) What is Train Value? How is related to the velocity ration? [02]
- (C) In an epicyclic gear train, an Arm C carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 rpm in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed makes 300 rpm in clockwise, what will be the speed of gear B? (Apply Tabular Method Only) [06]

OR

Que.-1 Attempt the following questions.

- (A) Define gear train? Explain various types of gear trains. [05]
- (B) In an epicyclic gear train, as shown in figure -1, the number of teeth on wheel A, B and C are 48, 24 and 50 respectively. If the arm rotates 400 rpm clockwise, find
1. Speed of the wheel C when A is fixed and
 2. Speed of wheel A when C is fixed.

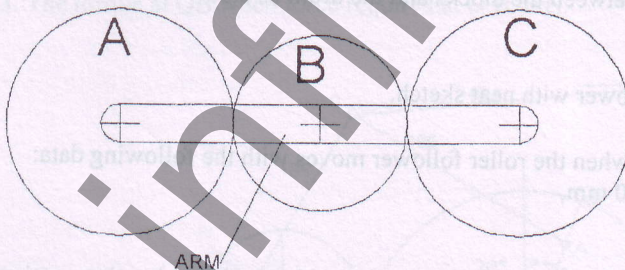


Figure – 1.

Que.-2 Attempt the following questions.

- (A) Explain Bevis Gibson flash light torsion dynamometer. [07]
- (B) Explain difference between the Brake and Dynamometer. [03]
- [01]

- (C) A differential band Brake as shown in figure – 2. The band has compressed woven lining and bears against a cast iron drum of 350 mm diameter. The brake is to sustain a torque of 350 N.m and co-efficient of friction is 0.3. Find
1. Necessary force for clockwise and anti clockwise rotation of drum.
 2. Value of 'OA' for the brake to be self locking when the drum rotates clockwise.

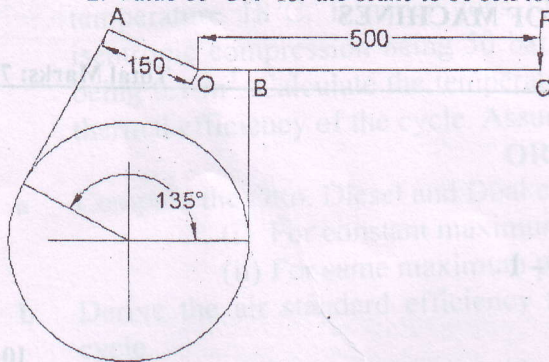


Figure – 2.

[07]

OR

Que.-2 Attempt the following questions.

- (A) Explain the construction and derive the equation of prony brake dynamometer.

[04]

- (B) A band and block brake having 10 blocks, each of which subtends an angle of 18° at the centre, is applied to a rotating drum of diameter 600 mm. The blocks are 75 mm thick. The drum and the flywheel mounted on the same shaft have a mass of 1800 kg and have a combined radius of gyration of 600 mm. The two ends of the band are attached to pins on the opposite sides of the brake fulcrum at distances of 40 mm and 150 mm from the fulcrum. If a force of 250 N is applied at a distance of 900 mm from the fulcrum, find:

1. The maximum braking torque
 2. The angular retardation of the drum
 3. The time taken by the system to be stationary from the rated speed of 300 rpm.
- Take coefficient of friction between the blocks and the drum as 0.3.

[07]

Que.-3 Attempt the following questions.

- (A) Explain various types of follower with neat sketch.

[03]

- (B) Draw the profile of the cam when the roller follower moves with the following data:

Maximum radius of cam = 30 mm,

Lift = 20 mm,

Roller Diameter = 15 mm.

The cam lifts the follower for 90° with uniform acceleration and deceleration motion by a dwell period 30° , then the follower lower down during 120° of the cam rotation with SHM followed by the dwell period.

[09]

SECTION - II

Que.-4 Attempt the following questions.

- (A) Define Inversion? State all inversion of single slider crank mechanism? [06]
- (B) Define correct steering? Prove that $\tan \alpha = C / 2b$ for Davis steering gear mechanism. [06]

OR

Que.-4 Attempt the following questions.

- (A) Explain Hart's mechanism with neat sketch. Also Prove that the tracing point describes a straight line path. [06]
- (B) Evaluate followings:
 1. Machine and Structure
 2. Lower Pair and Higher Pair
 3. Exact and Approximate Straight line motion mechanism [06]

Que.-5 Attempt the following questions.

- (A) Define instantaneous centre. Classify it and locate it for four bar chain mechanism. [04]
- (B) A link AB of four bar linkages ABCD rotates uniform at 2 rps in clockwise direction. If AB = 75 mm, CD = 150 mm, BC = 175 mm, DA = 10 cm and angle BAD = 90°. Compute angular velocity of link BC and CD and velocity of point E. [07]

OR

Que.-5 Attempt the following questions.

- (A) Figure 3 shows an Andrew variable stroke engine mechanism. The lengths of the cranks OA and QB are 90 mm and 45 mm respectively. The diameters of wheels with centers O and Q are 250 mm and 120 mm respectively. Other lengths are shown in diagram in mm. There is a rolling contact between the two wheels. If OA rotates at 100 rpm, determine
 1. The angular velocity of the slider D
 2. The angular velocities of links BC and CD
 3. The torque at QB when force required at D is 3kN.

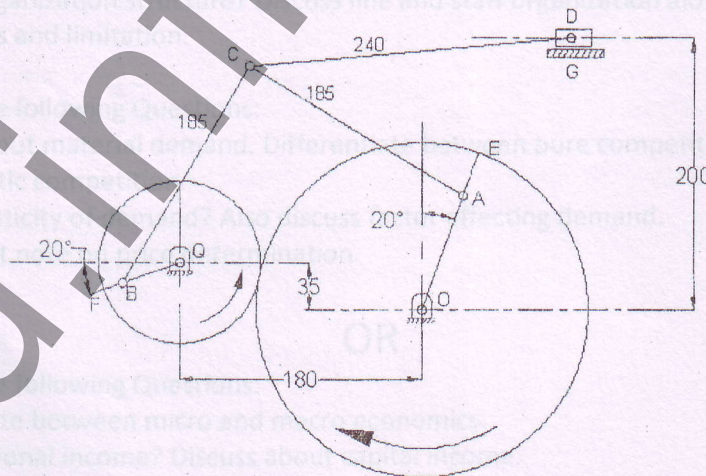


Figure - 3

[11]

Que.-6 Attempt the following questions.

- (A) Evaluate Film friction and Dry Friction. [02]
- (B) Evaluate Static friction and Dynamic Friction. [02]
- (C) Derive an expression for torque acting on the conical pivot bearing for uniform pressure condition. [04]
- (D) A load of 20 KN is supported by a conical pivot. The angle of cone is 120° and intensity of pressure is not exceed 3.5 bar. The external radius is three times the internal radius. Find the diameter of the bearing surface. If $\mu = 0.06$, speed of shaft is 120 rpm. What power in KW is absorbed by friction? [04]

END OF PAPER