

Roll No.

Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(ME) (Sem-4)
THEORY OF MACHINES – II

Subject Code : BTME-402

M.Code : 59130

Date of Examination : 08-06-2023

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A** is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION–A

1. Write briefly :

- a) What do you mean by compound pendulum?
- b) Derive an expression for balancing a single rotating mass.
- c) What is the meaning of partial balancing?
- d) What do you know about an addendum of a gear?
- e) In reference with kinematic synthesis, write least square techniques
- f) What do you mean by velocity ratio in context of gear train?
- g) What are the considerations of frictional forces?
- h) Explain backlash in gears.
- i) What are power transmission elements?
- j) Write, a short note on gyroscope.

SECTION-B

2. For the static equilibrium of a mechanism as shown in the Figure (a), determine the input torque T to be applied on the link AB.

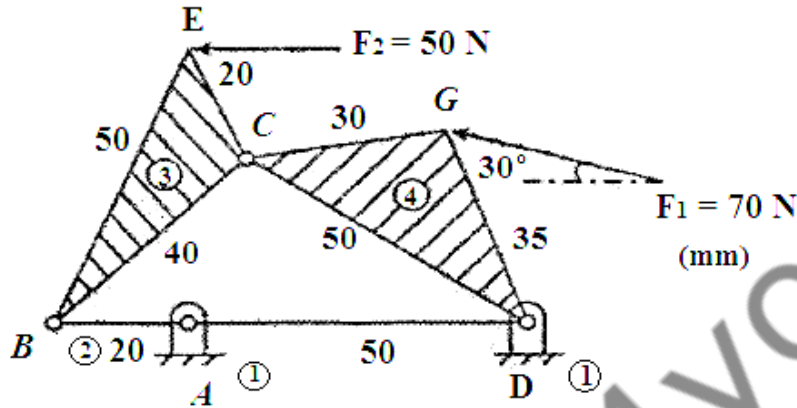


Fig. a

3. Prove that the resultant unbalanced force is minimum when half of the reciprocating Masses are balanced by rotating masses.
4. Describe the graphical method of considering the inertia of connecting rod of a reciprocating engine.
5. The following data is related to two meshing gears: Velocity Ratio= $1/3$, Module = 4mm, Pressure angle 20° and center distance = 200mm. Determine the number of teeth and base circle radius of gear wheel.
6. A compound- gear train shown in Figure (b) consist of compound gear B-C and D-Bs Alb gears are mounted on parallel shafts. The motor shaft rotating at 800 rpm is connected to gear A and the output shaft to the gear F. The number of teeth on gear A, B, C, D, E and F are 24, 56, 30, 80, 32 and 72 respectively. Determine the speed of gear F.

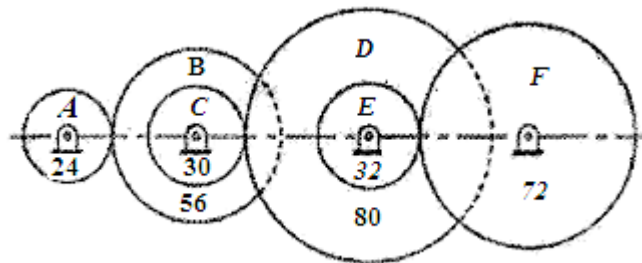


Fig. b

SECTION-C

7. The turbine rotor of a ship has a mass of 2.2 tonnes and rotates at 1800 rpm clockwise when viewed from the aft. The radius of gyration of the rotor is 320 mm. Determine the gyroscopic couple and its effect when the.
 - a) Ship turns right at a radius of 250 m with a speed of 20 km/h
 - b) ship pitches with the bow rising at an angular velocity of 0.85 rad/s
 - c) Ship rolls at an angular velocity of 0.1 rad/s
8. Describe in detail the two positions synthesis of a four bar mechanism.
9. Three masses of 8 kg, 12 kg and 15 kg attached at radial distance of 80 mm, 100 mm and 60 mm respectively to a disc on a shaft in complete balance. Determine the angular positions of 12 kg and 15 kg relative to 8-kg mass.

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