

Roll No. Total No. of Pages: 03
Total No. of Questions: 09

B. Tech. (AE, IE, ME) (Sem.-4th)
THEORY OF MACHINES-II
Subject Code: ME-204
Paper ID: [A0809]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

- 1) *Section A is Compulsory consisting of Ten questions carrying Two marks each*
- 2) *Sections B contain five questions carrying five marks each and students have to attempt any four questions.*
- 3) *Sections C contain Three questions carrying Ten marks each and students have to attempt any two questions.*

SECTIONS - A

Q.1. Write briefly:

(10x2=20)

- a. Explain free body diagram.
- b. Define dynamically equivalent system.
- c. What is primary balancing?
- d. What is dynamic balancing?
- e. Define hammer blow.
- f. Define diametral pitch.
- g. Define transmission angle.
- h. Define module.
- i. Define angle of heel.
- j. What is the value of gyroscopic couple during rolling of ship?

SECTION- B

(4 x 5 = 20)

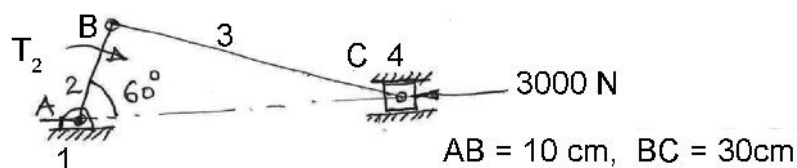
Q.2. Calculate the value of driving torque T_2 in Fig. -1.

Fig:-1

M-54037

Q.3. Find the inertia force for the following data of an I.C. engine:

Bore = 175 mm, stroke = 200 mm, engine speed = 500 rpm

Length of connecting rod = 400 mm, crank angles 60°

From TDC and mass of reciprocating parts = 180 kg

Q.4. Prove that the resultant unbalanced force is minimum when half of the reciprocating masses are balanced by rotating masses ie.

When $C = \frac{1}{2}$.

Q.5. Two spiral gear wheels of diameter ratio 1.5 are used on a machine tool. The angle between shafts is 76° and the approximate centre distance is 11.5 cm. Speed of A is 1.5 times the speed of B and normal pitch is 1 cm. Find the numbers of teeth on each wheel and spiral angle for each wheel.

Q.6. Two parallel shafts are to be connected by spur gearing. The approximate distance between the shafts is 600 mm. If one shaft runs at 120 rpm and the other at 360 rpm, find the number of teeth on each wheel if module is 8 mm. Also determine the exact distance apart of shafts.

SECTION-C

(10 x 2 = 20)

Q.7. The wheel of a motor cycle has a total moment of inertia of 2.5 kg-m^2 and the engine parts have a M. I. of 0.14 kg-m^2 . The gear ratio is 5 to 1 and the axis of rotation of the engine crank shaft is parallel to that of rear wheel, which have a diameter of 65 cm. Determine the magnitude and direction of the gyroscopic couple when motor cycle rounds a curve of 25 m radius at a speed of 50 km/hr. Total mass of the system is 180 kg and $h = 0.60 \text{ m}$.

Q.8. Synthesize a four bar linkage that will in one of its positions, satisfy the following values for the angular velocities and accelerations:

$$y = x^{1.2} \text{ for } 1 \leq x \leq 5$$

Using Chebyshev spacing for three precision

Points Take $\phi_0 = 30^\circ$, $\Psi_0 = 60^\circ$ and $\Delta\phi = \Delta\Psi = 90^\circ$ and $r_1 = 10 \text{ cm}$.

Q.9. A vertical single cylinder engine is shown in Fig-2. The lower piston is connected to the centre crank. The stroke is 80 mm for the lower piston. The upper piston operator the two outer cranks which are at 180° to the centre crank.

The reciprocating parts for the lower piston weigh 10 kg. The reciprocating parts for the upper piston weigh 20 kg. Find the stroke of the upper piston when the primary force is balanced.

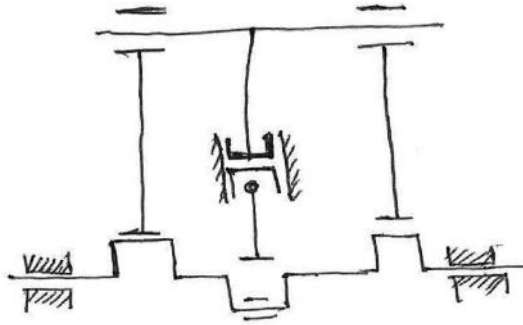


Fig:-2

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