D 51634 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2008

ME 04 504—MECHANICS OF MACHINERY

(2004 admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

I. 1 Explain about Geneva mechanism.

2 Explain the different types of joints in a chain.

3 Define the following terms of related to cams :

(a) Pressure angle.

(b) Pitch curve.

(c) Pitch point.

(d) Trace point.

4 Draw the displacement, velocity and acceleration diagrams for a follower when it moves with uniform acceleration and retardation.

5 What is meant by interference in gears ?

6 Discuss the various types of gear trains.

7 What do you understand by dimensional synthesis ?

8 Compare 2 position synthesis with 3 position synthesis.

(8 × 5 = 40 marks)

Part B

II. (a) Explain the inversions of single slider-crank chain. (15 marks)

Or

(b) An engine mechanism is shown in figure 1. The crank CB = 100 mm and the connecting rod BA = 300 mm with centre of gravity G, 100 mm from B. In the position shown, the crankshaft has a speed of 75 rad/sec and an angular acceleration of 1,200 rad/sec^2. Find (1) velocity of G and angular velocity of AB ; and (2) acceleration of G and angular acceleration of AB.

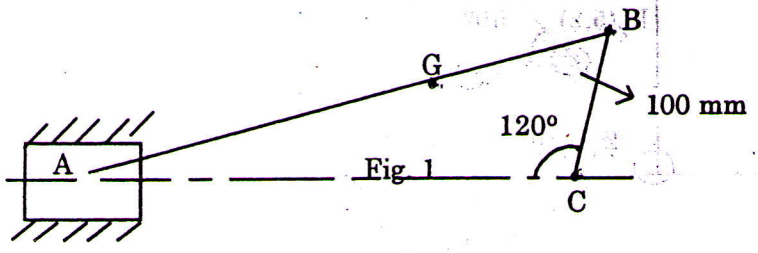

Fig. 1

(15 marks)

Turn over

III. (a) Construct the profile of a cam to suit the following specifications :

Cam shaft diameter = 40 mm ; least radius of cam = 25 mm ; diameter of roller = 25 mm ; angle of lift = 120° ; angle of fall = 150° ; lift of the follower = 40 mm ; number of pauses are two of equal interval between motions.

During the lift ; the motion is SHM. During the fall the motion is uniform acceleration and deceleration. The speed of the cam shaft is uniform. The line of stroke of the follower is offset 12.5 mm from the centre of the cam.

(15 marks)

Or

(b) Draw the displacement, velocity and acceleration diagrams for a follower when it moves with uniform acceleration and retardation. Derive the expression for velocity and acceleration during outstroke and return stroke of the follower.

(15 marks)

IV. (a) (i) The number of teeth on each of the two equal spur gears in mesh are 40. The teeth have 20° involute profile and the module is 6 mm. If the arc of contact is 1.75 times the circular pitch, find the addendum.

(8 marks)

(ii) Derive the expression for minimum number of teeth on the pinion in order to avoid interference.

(7 marks)

Or

(b) (i) Explain simple and compound gear train and obtain train value for compound gear train.

(8 marks)

(ii) Explain about sun and planet gears and mention two applications of sun and planet gears.

(7 marks)

V. (a) (i) Obtain Freudenstein's equation for four bar mechanism. (10 marks)

(ii) State the advantages of complex number modelling. (5 marks)

Or

(b) Synthesize a four bar mechanism to guide a rod AB through three consecutive positions A_1B_1, A_2B_2 and A_3B_3 as shown in Fig. 2.

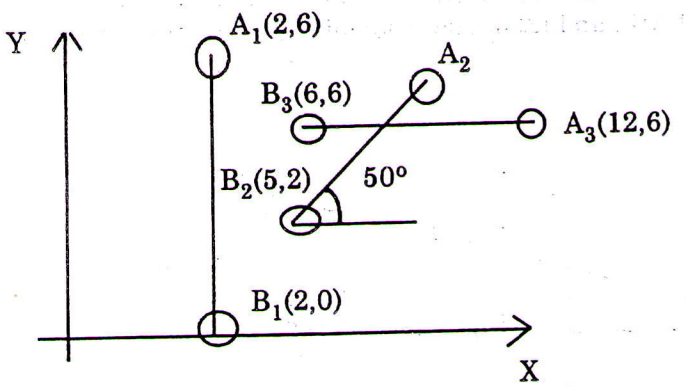

Fig. 2

(15 marks)

[4 × 15 = 60 marks]