

SANT GADGE BABA AMRAVATI UNIVERSITY
BACHELOR OF ENGINEERING SEMESTER V (CGS) EXAMINATION S-2020

H.V.P.Mandal's College of Engineering and Technology, Amravati
Department Of Mechanical Engineering

Academic Session:2019-2020

Semester : V

Unit : I,II,III,IV,V,VI

Date: 29/10/2020

Subject Name : Theory Of Machines-I

Subject Code : 5ME 04

Max Marks 20

Note: Solve any 2 questions out of 4 questions.

All Questions Carry Equal Marks.

- Q.1st**
- a) Explain different kinds of kinematic pairs giving example for each one of them. **3 Marks**
 - b) In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60°. **3 Marks**
 - c) Explain Freudenstein's method of three point synthesis of mechanisms **1 Marks**
 - d) Distinguish between brakes and dynamometers. **1 Marks**
 - e) Why a roller follower is preferred to that of a knife-edged follower ? **1 Marks**
 - f) Derive an expression for the minimum number of teeth required on the pinion in order to avoid interference in involute gear teeth when it meshes with wheel. **1 Marks**
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- Q. 2nd**
- a) Sketch slider crank chain and its various inversions, **3 Marks**
 - b) The direction of linear velocity of any point on a link with respect to another point on the same link is
 - (a) parallel to the link joining the points
 - (b) perpendicular to the link joining the points
 - (c) at 45° to the link joining the points
 - (d) none of these**3 Marks**
 - c] Explain synthesis of mechanism with examples. What do you understand by
 - (a) Type synthesis ;
 - (b) Number synthesis ;
 - (c) dimensional synthesis.**1 Marks**
 - d] Describe with the help of a neat sketch the principles of operation of an internal Expanding shoe. **1 Marks**
 - e] Draw the displacement, velocity and acceleration diagrams for a follower when it moves with simple harmonic motion. **1 Marks**
 - f] Derive an expression for minimum number of teeth required on a pinion to avoid interference when it gears with a rack. **1 Marks**
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- Q.3rd**
- a)Sketch and explain any two inversions of a double slider crank chain. **1 Marks**
 - b) Define rubbing velocity at a pin joint. What will be the rubbing velocity at pin joint when the two links move in the same and opposite directions ? **1 Marks**
 - c)Write an expression for determining the precision points. **1 Marks**
 - d) What is the difference between absorption and transmission dynamometers? What are torsion dynamometers. **1 Marks**
 - e) Derive expressions for displacement, velocity and acceleration for a tangent cam operating on a radial-translating roller follower **3 Marks**
 - f) What do you understand by 'gear train'? Discuss the various types of gear trains. **3 Marks**
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- Q 4th**
- a) Sketch and describe the four bar chain mechanism. **1 Marks**
 - b) Explain how the velocities of a slider and the connecting rod are obtained in a slider crank mechanism. **1 Marks**
 - c) Describe the classifications of synthesis problem. **1 Marks**
 - d) Describe the construction and operation of a prony brake or rope brake absorption Dynamometer . **1 Marks**
 - e) Define the following terms as applied to cam with a neat sketch :-
 - (a) Base circle, (b) Pitch circle, (c) Pressure angle, and (d) Stroke of the follower**3 Marks**
 - f) explain with a neat sketch the 'sun and planet wheel'. **3 Marks**