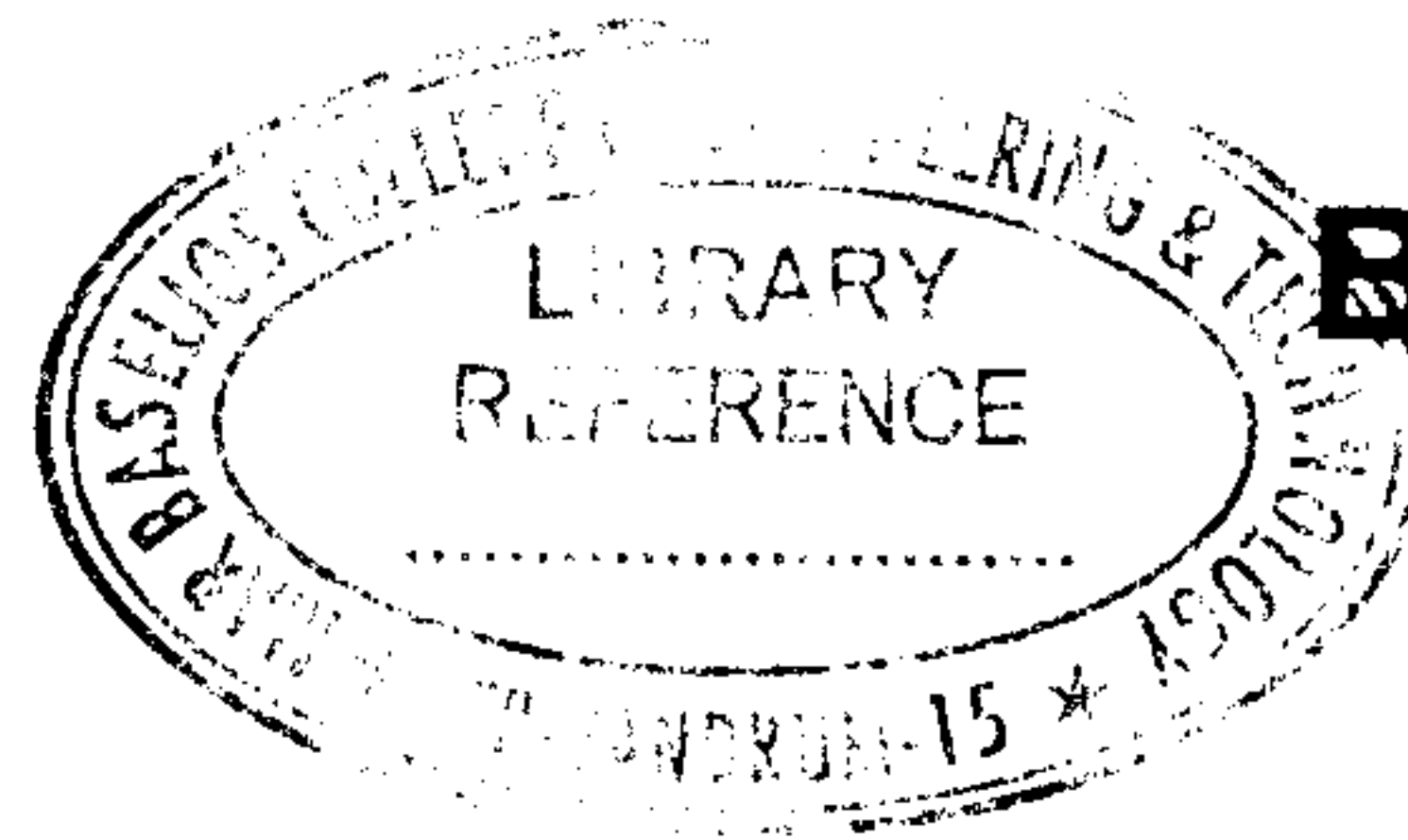




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B – 3290

Reg. No. :

Name :

**Fifth Semester B.Tech. Degree Examination, December 2016
(2013 Scheme)**

13.502 : THEORY OF MACHINES (MP)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions (**each** question carries **2** marks).

1. What is meant by kinematic inversion of a chain ?
2. State Grashoff's Law.
3. What is meant by Chebyshev's spacing ?
4. State the applications of Kennedy's Theorem.
5. Define instantaneous centre.
6. Explain the spur gear terminology.
7. Write short notes on gear tooth forms.
8. List out the types of gear train.
9. State the typical applications of friction.
10. Write short notes on rope drives.

PART – B

Answer **any one** question from **each** Module (**Each** question carries **20** marks).

Module – I

11. The crank of a slider crank mechanism is 15 cm and the connecting rod is 600 mm. long. The crank makes 300 rpm in the clockwise direction when it has turned 45° from the inner dead centre position. Determine :
 - i) Velocity of slider
 - ii) Angular velocity of connecting rod and
 - iii) Linear velocity of the mid-point of the connecting rod.
12. With the help of a diagrams, explain the following :
 - a) Davis mechanism.
 - b) Hart mechanism.

P.T.O.

**Module – II**

13. Explain the Coriolis acceleration component and state the conditions for the acceleration component to be positive.
14. Analyse the crank and slotted link mechanism based on the Coriolis acceleration component.

Module – III

15. From the following data, draw the profile of cam in which the follower moves with simple harmonic motion during ascent while it moves with uniformly accelerated and decelerated motion during descent.

Least radius of cam = 50 mm,

Angle of ascent = 48° ,

Angle of dwell between ascent and descent = 42° .

16. A pair of 20° full depth involute spur gears have 30 and 50 teeth respectively. The module is 4 mm. The smaller gear rotates at 1000 rpm.

Determine :

- a) Sliding velocities at engagement and disengagement of pair of a teeth and
- b) Contact ratio.

Module – IV

17. Determine the external and internal radii of the friction plate of a single clutch if maximum torque transmitted is 90 Nm. The external radius of the friction plate is 1.5 times the internal radius and the maximum intensity of pressure at any point of contact surface should not exceed $0.83 \times 10^5 \text{ N/m}^2$. Take both sides of the plate as effective and coefficient of friction = 0.3. Assume uniform wear. Also, calculate the axial force exerted by the spring.
18. A belt embraces the shorter pulley by an angle of 165° and runs at a speed of 1700 m/min. Dimension of the belt are : Width = 20 cm and Thickness = 0.8 cm. Its density is 1 gm/cm^3 . Determine the maximum power that can be transmitted at the above speed, if the maximum permissible stress in the belt is not to exceed 250 N/cm^2 and $\mu = 0.25$.

