

**GUJARAT TECHNOLOGICAL UNIVERSITY****PDDC - SEMESTER-V • EXAMINATION – WINTER • 2014****Subject Code: X51901****Date: 29-11-2014****Subject Name: Theory of Machines****Time: 10:30 am - 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Describe the working of a band and block brake with the help of a neat sketch. Deduce the relation for tight and slack side tensions. **07**
- (b) Explain the term height of governor. Derive an expression for height in case of Watt governor. What are the limitations of Watt governor ? **07**
- Q.2** (a) (1) What are the turning moment diagrams ? Why are they drawn ? **07**
- (2) Find a relation for the coefficient of fluctuation of speed in terms of maximum fluctuation of energy and the kinetic energy of the fly wheel at mean speed.
- (b) What is Freudenstein's equation? How is it helpful in designing the four-bar mechanism when three positions of the input ( $\theta_1, \theta_2, \theta_3$ ) and the output link ( $\phi_1, \phi_2, \phi_3$ ) are known? **07**
- OR**
- (b) What is a function of dynamometer? List out the different types of dynamometers. Explain any one with neat sketch. **07**
- Q.3** (a) How do the effects of gyroscopic couple and of centrifugal force make the rider of a two-wheeler tilt on one side? Derive a relation for the angle of heel. **07**
- (b) Explain inertia force analysis of a reciprocating engine using Klen's construction. **07**
- OR**
- Q.3** (a) Explain gyroscopic effect in case of naval ships with a diagram. Show the terminologies used to indicate sides, front and back of ship. Explain effect of steering, pitching and rolling, assuming ship moves left and right direction sequentially. **07**
- (b) Define the flywheel and state its importance. What are the functions of a flywheel? **07**
- Q.4** (a) (1) State: D'Alembert's principle. **07**
- (2) Explain: Dynamically equivalent system.
- (b) (1) Explain the terms: Function generation, path generation and motion generation. **07**
- (2) What is Chebychev spacing? What is its significance?
- OR**
- Q.4** (a) Explain the turning moment diagram for 4 cylinder four stroke cycle internal combustion engine. **07**
- (b) Explain Bloch's Synthesis Method for synthesizing a 4 bar mechanism. **07**

- Q.5** (a) Distinguish between brakes and dynamometer. **07**  
(b) Differentiate between Flywheel and Governor. **07**
- OR**
- Q.5** (a) (1) What is a brake? What is the difference between a brake and a clutch? **07**  
(2) What is meant by a self locking and self energized brake?  
(b) Explain in brief the working of flywheel in punching Press. **07**

\*\*\*\*\*