

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Mech. (Machine Design) Examination June 2011

Subject code: 710902**Subject Name: Dynamics of Machinery****Date: 08/07/2011****Time: 10:30am to 1:00pm****Total Marks: 60****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Illustrate your answer with neat sketches wherever required.

Q.1 (a) Determine velocity, acceleration and jerk of the follower for 3-4-5 polynomial cam returning 18 mm in 60° of cam rotation. The cam rotates at 100 rad/sec. **06**

(b) An eccentric plate cam of 150 mm diameter and eccentricity of 37.5 mm provides motion to a spring loaded follower of mass 1.75 kg whose axis is perpendicular to the axis of the cam and passes through its center. The spring has stiffness of 24 N/mm. It is found that at certain speed, the follower ceases to have contact with cam, when cam has moved through 120° from its lowest position. Determine this speed. The initial compression of the spring is 31.25 mm. Determine also the limiting angular speed of the cam to avoid cam jump. **06**

Q.2 (a) Discuss the mathematical model of cam and follower considering their elasticity. **06**

(b) What are the frequency response curves? Give the significance of these curves. **06**

OR

(b) What are principle modes of vibration? What do you mean by a torsionally equivalent shaft? **06**

Q.3 (a) Explain the normal modal harmonic analysis. **06**

(b) What do you mean by stability of a control system? Explain Routh's stability criteria. **06**

OR

Q.3 (a) Explain the applications of automatic control systems in different industries. **06**

(b) Write a note on: - Noise measurement and control. **06**

Q.4 (a) State the different types of control actions used for automatic control systems. Discuss any two of them in detail with neat sketches. **06**

(b) Write short note on: - Nyquist criteria. **06**

OR

Q.4 (a) Explain briefly flexural and torsion vibrations. **06**

(b) Write a note on: - Vibration isolation of multi degree freedom system. **06**

Q.5 (a) What do you mean by Automatic Control system? Explain liquid level controller of second order with a neat sketch. **06**

(b) Explain Holzer's method with the help of a significant example. **06**

OR

Q.5 (a) Derive the expressions for the continuous vibration for the longitudinal bars and transverse beams. **06**

(b) Differentiate between a closed loop and open loop systems. Explain simple liquid level controller giving neat sketch. **06**