Student Exam No. _____

# Ganpat University

## M.Tech SEM I CAD-CAM

## CBCS Regular Examination Nov / Dec 2014

## 3ME114 Advance Machine Design and Dynamics

**Duration: 3hr** **Marks: 60**

**Instructions:**

1. Assume suitable data if necessary.
2. Write your answer to the point and precisely.
3. Draw neat and clean sketch.

### SECTION - 1

**Q.1** **Attempt following questions**

**(a)** A circular cylinder of mass m and radius r is connected by a spring of modulus k as shown in figure -1. If it is free to roll on the rough horizontal surface without slipping. Find its frequency. **[06]**

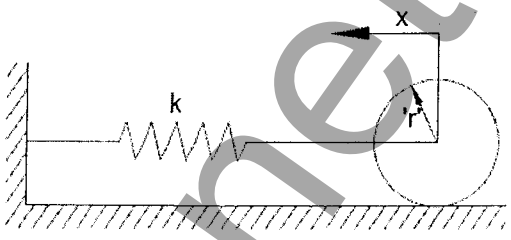



Figure - 1

**(b)** Evaluate **[04]**

1. Period and Frequency
2. Free Vibration and Forced Vibration

**OR**

**Q.1** **Attempt following questions**

**(a)** The mass of the uniform rod shown in figure – 2 is small compared to the mass attached to it. For small oscillations, calculate the natural frequency of the swing of the mass. **[08]**

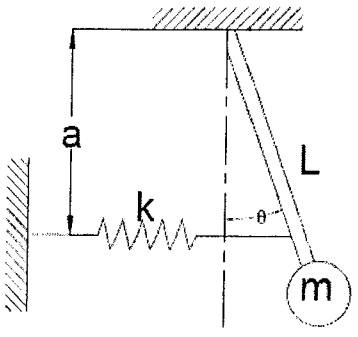



Figure - 2

**(b)** Explain Critical speed of shaft **[02]**

**Q.2** **Attempt following questions**

**(a)** Two equal masses are attached to a string having high tension is shown in figure -3. Determine the natural frequencies of the system. **[08]**

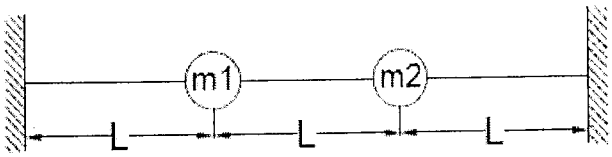



Figure - 3

**(b)** Explain Dynamic Vibration Absorber. **[02]**

**OR**

**Q.2** **Attempt following questions**

Determine the equation of motion and the natural frequencies of the two degree of freedom spring mass system shown in figure – 4. **[10]**

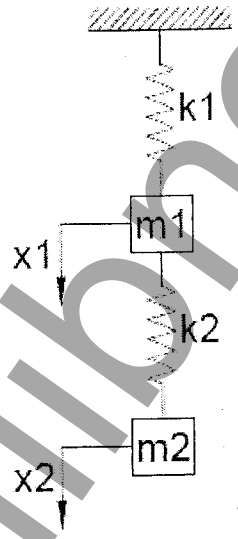



Figure - 4

**Q.3** **Attempt following questions**

**(a)** Explain at least three two degree of freedom system with neat sketch. **[05]**

**(b)** Explain two multi degree of freedom system with neat sketch. **[05]**

**SECTION – 2**

**Q.4** **Attempt following questions** **[10]**

**(a)** Explain the working of hydrostatic step bearing with neat sketch

**(b)** Derive Petroff's equation for lightly loaded bearing.

**OR**

**Q.4** **Attempt following questions** **[10]**

**(a)** Explain the air/gas bearing in detail with Application.

**(b)** Explain Lubrication Systems. Enlist different types of lubrication system used

in I. C. Engine

**Q.5** **Attempt following questions**

**(a)** A rectangular plate with center hole is subjected to completely reversed axial load of 25 kN as shown in Figure -5. The notch sensitivity can be assumed as 0.8. Determine the plate thickness for infinite life, if the factor of safety is 2. **[08]**

Assume the ultimate tensile strength as 450 MPa. The surface factor is 0.8, size factor is 0.85 and the calculations are expected at 90% reliability, for which the reliability factor is 0.897. The theoretical stress concentration factor is 2.5.

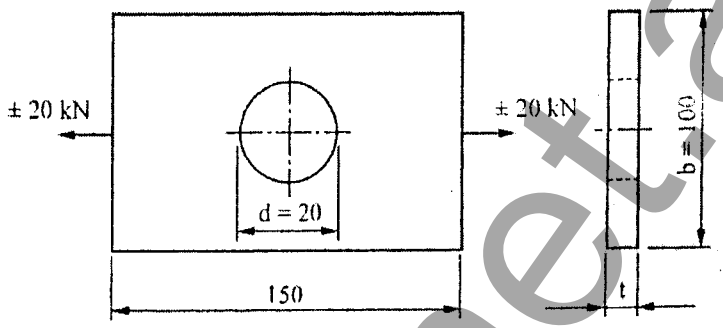



Figure - 5

**(b)** Define the term 'Tribology'. Discuss the application of it in day to day life. **[02]**

**OR**

**Q.5** **Attempt following questions**

**(a)** A flat plate subjected to tensile force of 10 kN is shown in figure-6. The plate material is gray cast iron FG 250 and the factor of safety is 2. Determine the thickness of plate. **[10]**

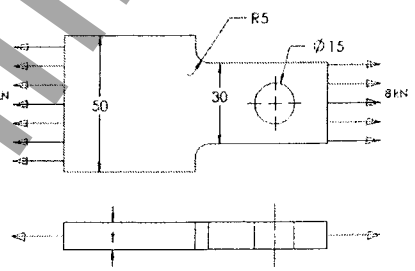
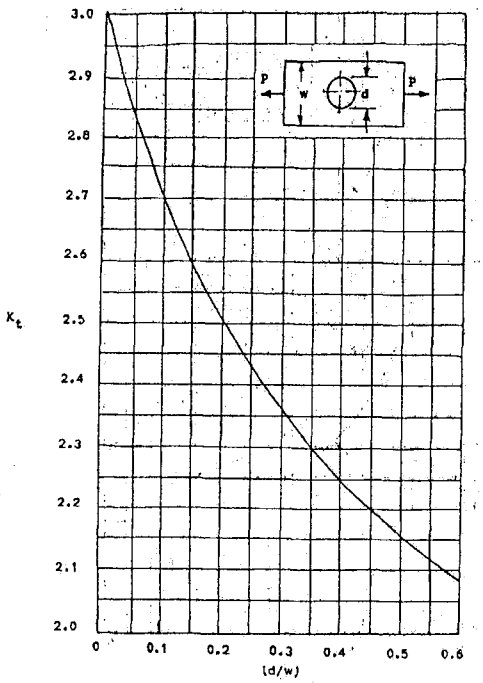
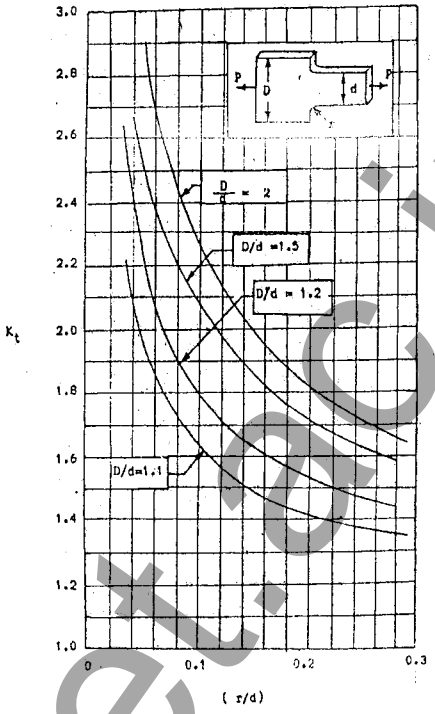



Figure – 6




Graph – 1 Rectangle plate with transverse Hole




Graph – 2 Plate with Shoulder

**Q.6 Attempt following questions**

**(a)** Explain the EHD (elasto hydrodynamic) lubrication in detail. State the different examples of it. **[05]**

**(b)** State the different functions of the lubricants. Explain grease as lubricant in detail. **[05]**