NAVRACHANA UNIVERSITY

School: SET
Program/s: Mechanical Engineering
Year: 3 **Semester:** 5th
Examination: End Semester Examination
Examination year: November 2023

Course Code: ME 303 **Course Name:** Kinematics and Dynamics of Machines II
Date: 23/11/2023 **Total Marks:** 40
Time: 13:00 to 15:00 **Total Pages:** 02

Instructions:

→ Write each answer on a new page.
→ Use of a calculator is permitted.

Q. No.	Details	Marks	COs*	BTL#
Q-1	**Answer any Four (all carry equal marks)**	28		
A	The crank and the connecting rod of a single cylinder gas engine running at 1800 RPM are 60 mm and 240 mm respectively. The diameter of the piston is 80 mm and the mass of the reciprocating parts is 1.2 kg. At a point during the power stroke when the piston has moved 20 mm from the top dead center position, the pressure on the piston is 800 kN/m^2. Determine the 1. Net force on the piston 2. Thrust in the connecting rod 3. Thrust on the sides of the cylinder walls	7	CO1, CO3,	BTL1, 2,3,5
B	A damper offers resistance 0.05 N at constant velocity 0.04 m /s. the damper is used with stiffness 9 N/m. Determine the damping frequency of the system if the mass of the system is 0.10 Kg.	7	CO1,CO2	BTL 1,3,4
C	A Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the mass of the central load on the sleeve is 15 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the minimum and maximum speeds and range of speed of the governor.	7	CO2,CO3	BTL 1,2,4,5
D	In a hartnell governor the extreme radius of rotation of the balls are 80 mm and 120 mm. the ball arm and the sleeve arm of the bell crank	7	CO2,CO3	BTL 1,2,4,5

lever are equal in length. The mass of each ball is 2 kg. if the speeds at the two extreme positions are 400 and 420 rpm. Find 1. The initial compression of the spring. 2. The spring constant.

CO1,CO4   BTL 1,2,4

Find the equation of motion for the system when
1) Zeta is 1
E   2) Zeta is 0.3   7
If the mass m is displaced by a distance of 3 cm and released.

Answer the following questions (any three) (all carry equal
Q-2   **marks)**   12

A   Derive the expression for logarithmic decrement.   CO1,CO2   BTL1,2

Draw the neat vibration free body diagram for lathe machine set up.   CO3,CO4   BTL 1,2,5
Level all the elements
B   (in terms of spring, damper and masses)

Explain the following terms: CO1,CO2   BTL 1,2
Static balancing
Sensitivity of governor
C   Resonance condition in vibration
Damped Vibration

Derive the speed equation for watt governor. Mention all the   CO1,CO2   BTL 2,3,4
D   assumptions taken for the derivation.

************End of Question Paper************