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**Presidency University**

**Bengaluru**

**SCHOOL OF ENGINEERING**

**SUMMER TERM END TERM EXAMINATION AUGUST 2024**

**Summer Term: 202**3-24

**Course Code: MEC** 4004

**Course Name: Dynamics of Machines**

**Programme & Sem: B.Tech & V SEM**

**Date: 05 AUG 202**4

**Time: 1pm to 4pm**

**Max Marks: 100**

**Weightage: 50%**

**Instructions:**

1. ***The question paper consists of 3 parts(A,B and C)***
2. ***All questions are compulsory.***
3. ***Read the questions carefully and answer accordingly.***
4. ***Non Programmable scientific calculators are allowed***

**Part A [Memory Recall Questions]**

**Answer any 5 Questions. Each question carries 2 marks.** **(5Qx2M=10M)**

**1.** Define the Pitching in ships. (C.O.No.3)[Knowledge]

**2**. Enlist the expression for energy stored in the flywheel. (C.O.No.2)[Knowledge]

3. Draw the diagram of Porter Governor. (C.O.No.5)[Knowledge]

4. Differentiate between static and Dynamic Balancing. (C.O.No.4)[Knowledge]

5. Define Constraint Forces. (C.O.No.1)[Knowledge]

6. Define Steering in ships. (C.O.No.3)[Knowledge]

7. Define Applied Forces. (C.O.No.1)[Knowledge]

**Part B [Thought Provoking Questions]**

**Answer any 5 questions. Each question carries 10 marks.**  **(5Qx10M=50M)**

**8**. Airbus A-320 neo is a globally accepted passenger aircraft. If the Aircraft is flying from Bengaluru to Hyderabad and engine is rotating in clockwise direction (when seen from rear). The Aircraft Engineer wants to identify the effect of Different forces due to engine rotation while aircraft is taking a turn. Assuming suitable parameters suggest the effect.

(C.O.No.3)[Comprehension]

**9.** Atlanta Systems are expert in manufacturing of the Speed Governors and are located in Delhi, A porter governor is to be designed but company faces an issue with height of the governor. From the above statements, As a support engineer Identify the expression and derive the results.

(C.O.No.4)[Comprehension]

**10.** Mr. Sajan John, an Engineer of Maruti Suzuki Pvt. Ltd. handles all the quality issues in the Governors installed in their new Prototype Design. Sajan has noticed that the governor is fluctuating above and below the mean speed drastically. Identify the condition Sajan is witnessing and explain the same.

(C.O.No.5)[Comprehension]

**11.** Volvo Eicher Commercial Ltd. have their Production plant at Pithampur, Indore. The Company wants to reduce the total fluctuation in energy for their product Volvo 9400. Suggest a solution for it and establish a relationship for solution in terms of Moment of inertia, mean speed.

(C.O.No.2)[Comprehension]

**12**. Mahindra & Mahindra wants to conduct dynamic analysis of a horizontal single cylinder I.C Engine for their new product to calculate Displacement of the engine. Imagine suitable parameters and as an Engineer suggest the expression for velocity of piston and steps to justify the same.

(C.O.No.1)[Comprehension]

**13.** Derive the expression for energy stored in a flywheel. (C.O.No.2)[Comprehension]

**14.** Explain the rolling phenomenon in ships. (C.O.No.3)[Comprehension

**Part C [Problem Solving Questions]**

**Answer any 2 Questions. Each question carries 20 marks.**  **(2Qx20M=40M)**

**15.** Four masses m1, m2, m3 and m4 are 200 kg, 300 kg, 240 kg and 260 kg respectively in a same plane. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45°, 75° and 135°. Identify the parameters that can be calculated by given data if balancing mass is be rotated at 0.2 m radius and also calculate the same by suitable methods.

(C.O.No.4)[Application]

**16**. 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 25 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. Identify the parameters that may be calculated from above data and calculate the same.

(C.O.No.5)[Application]

**17**. Indian Railways wants to conduct the partial balancing analysis of their newly developed locomotives WDP-3A. As an Engineer suggest suitable parameters for partial balancing and derive the same in terms of traction force, swaying couple and Hammer Blow.

(C.O.No.4)[Application]