Enrollment No: _____

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech Mid Semester Exam

Semester: 6 | **Date: (01/02/2024)**
Subject Code: (203102359) | **Time: (1hr: 30min)**
Subject Name: (Machine Dynamics) | **Total Marks: 40**

Sr. No.		Marks
Q.1	**(A) Five One-line Questions** 1) Write importance of balancing? 2) List the effects of partial balancing of locomotives? 3) Define Dynamic Balancing. 4) Define Variation tractive force. 5) Define Swaying couple.	**05**
	(B) Five Fill in the blanks 1) Often an unbalance of forces is produced in rotary or reciprocating machinery due to the _____. 2) The mass used to balance the mass defect is known as _____ 3) The effect of hammer blow in a locomotive can be reduced by _____ 4) When the primary direct crank of a reciprocating engine makes an angle θ with the line of stroke, then the secondary direct crank will make an angle of _____with the line of stroke. 5)The primary unbalanced force is maximum when the angle of inclination of the crank with the line of stroke is _____.	**05**
Q.2	**Attempt any four (Short Questions)** 1) Two masses in different planes are necessary to correct the dynamic unbalance – Justify. 2) What are the effect of hammer blow and swaying couple on locomotive? 3) Why balancing of dynamic forces is necessary? 4) Give the reason of coupling the locomotive. 5) Explain the inside and outside cylinder locomotives with neat sketch.	**12**
Q.3	**Attempt any two questions** 1) A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. 2) A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70° and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions. 3) The following data apply to an outside cylinder uncoupled locomotive: Mass of rotating parts per cylinder = 360 kg; Mass of reciprocating parts per cylinder =	**08**

300 kg ; Angle between cranks = 90° ; Crank radius = 0.3 m ; Cylinder centres = 1.75 m ; Radius of balance masses = 0.75 m ; Wheel centres = 1.45 m. If whole of the rotating and two-thirds of reciprocating parts are to be balanced in planes of the driving wheels, find:

1. Magnitude and angular positions of balance masses,

2. Speed in kilometers per hour at which the wheel will lift off the rails when the load on each driving wheel is 30 kN and the diameter of tread of driving wheels is 1.8 m, and

3. Swaying couple at speed arrived at in (2) above.

Q.4 (A) A, B, C and D are four masses attached on a shaft at radii 0.1 m, 0.225 m, 0.15m and 0.15 m respectively. Planes in which masses revolve are spaced 0.6 m apart and the weights of B, C and D are 10kg, 5.5kg and 3.6kg respectively. Find the required mass at A and the relative angular positions of all the four masses so that the shaft is in complete balance. Use Graphical Method. 05

(B) Discuss how a single revolving mass is balanced by two masses revolving in different planes. 05

OR

(B) Write a short note on Partial balancing of unbalanced primary force in a Reciprocating engine. 05

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