**Lukhdhirji Engineering College, Morbi**

**Department of Mechanical Engineering**

**Assignment 3 - Balancing (CO2)**

**Subject: Dynamics Of Machinery (3151911) Semester: 5th**

**Year : 2022-23**

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|  | List the Conditions which must be satisfied to call a system to be:   1. In Static Balancing 2. In Dynamic Balancing |
|  | “*The problems due to unbalanced masses are more serious for the system rotating at high speed compared to low speed*” - Justify the statement |
|  | Four masses 150 kg, 200 kg, 100 kg and 250 kg are attached to a shaft revolving at radii 150 mm, 200 mm, 100 mm and 250 mm ; in planes A, B, C and D respectively. The planes B, C and D are at distances 350 mm, 500 mm and 800 mm from plane A. The masses in planes B, C and D are at an angle 105o, 200o and 300o measured anticlockwise from mass in plane A. It is required to balance the system by placing the balancing masses in the planes P and Q which are midway between the planes A and B, and between C and D respectively.  If the balancing masses revolve at radius 180 mm, find the magnitude and angular positions of the balance masses. |
|  | Solve *problem 03* with graphical method. |
|  | Show the reason why the primary for forces in reciprocating engine is not fully balanced. |
|  | Derive the following expressions, for an uncoupled two cylinder locomotive engine:   * Variation is tractive force * Swaying couple * Hammer blow. |
|  | The following data relate to a single - cylinder reciprocating engine:   * Mass of reciprocating parts = 40 kg * Mass of revolving parts = 30 kg at crank radius * Speed = 150 rpm * Stroke = 350 mm   If 60% of the reciprocating parts and all the revolving parts are to be balanced, determine   1. balance mass required at a radius of 320 mm 2. Unbalanced force when the crank has turned 45° from top dead centre. |
|  | An inside cylinder locomotive has its cylinder centre lines 0.7 m apart and has a stroke of 0.6 m. The rotating masses per cylinder are equivalent to 150 kg at the crank pin, and the reciprocating masses per cylinder to 180 kg. The wheel centre lines are 1.5 m apart. The cranks are at right angles. The whole of the rotating and 2/3 of the reciprocating masses are to be balanced by masses placed at a radius of 0.6 m. Find the magnitude and direction of the balancing masses.  Find   1. fluctuation in rail pressure under one wheel (Hammer Blow) 2. variation of tractive effort 3. the magnitude of swaying couple at a crank speed of 300 r.p.m. |