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D Y PATIL UNIVERSITY

EOT (December 2018)

School: School of Engineering.
Course: Theory of Machines [TOM]
Semester: V **Max Marks:** 20

Program: B-Tech- Mechatronics
Course Code: MTE302
Duration (mins): 60 mins

- Note: 1) Answers should be written in Answer Sheet Provided.
2) Figures to the right indicate full marks.
3) Neat diagrams must be drawn wherever necessary.
4) Use of only electronic pocket calculator is allowed.
5) Assume suitable data, if necessary.
6) Solve any 2 of Q1, Q2, and Q3.

Q1. A rotating shaft carries four masses A, B, C and D which are radially attached to it. The mass centres are 30 mm, 38 mm, 40 mm and 35 mm respectively from the axis of rotation. The masses A, C and D are 7.5 kg, 5 kg and 4 kg respectively. The axial distances between the planes of rotation of A and B is 400 mm and between B and C is 500 mm. The masses A and C are at right angles to each other. Find for a complete balance,

1. The angles between the masses B and D from mass A,
2. The axial distance between the planes of rotation of C and D,
3. The magnitude of mass B.

[10]

Q2 a. Write Short notes on

1. Hammer Blow.
2. Swaying Couple.

[4]

b. A single cylinder horizontal engine runs at 120 r.p.m. The length of stroke is 400 mm. The mass of the revolving parts assumed concentrated at the crank pin is 100 kg and mass of the reciprocating parts is 150 kg. Determine the magnitude of the balancing mass required to be placed opposite to the crank at a radius of 150mm which is equivalent to all the revolving and $\frac{2}{3}$ rd of the reciprocating masses. If the crank turns 30° from the inner dead centre, find the magnitude of the unbalanced force due to the balancing mass.

[6]

Q3. a. Write short notes on the following:

1. Types of Free Vibrations
2. Critical or Whirling Speed of a Shaft

[4]

b. A cantilever shaft 50 mm diameter and 300 mm long has a disc of mass 100 kg at its free end. The Young's modulus for the shaft material is 200 GN/m^2 . Determine the frequency of longitudinal and transverse vibrations of the shaft

[6]