Oct-22/BE/Insem-55

B.E. (Mechanical)

DYNAMICS OF MACHINERY

(2019 Pattern) (Semester - VII) (402042)

Time : 1 Hour]   *[Max. Marks : 30*

Instructions to the candidates :

1) *Answer Q1 or Q2, Q3 or Q4.*
2) *Neat diagrams must be draw whenever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

UNIT - I

Q1) a) Explain with neat diagram direct and reverse cranks method -radial and V engines. **[7]**

b) A shaft carries four masses A, B, C and D of magnitude 200 kg. 300kg, 400kg and 200kg respectively and revolving at radii 80mm, 70mm, 60mm and 80mm in planes measured from A at 300mm, 400mm and 700mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70°, C to D 120°, The balancing masses are to placed in planes X and Y. The distance between the planes A and X is 100mm, between X and Y is 400mm and between Y and D is 200mm if the balancing masses revolve at a radius of 100mm, find their magnitude and angular positions.

Solve using either analytical or graphical method. **[8]**

OR

Q2) a) Explain condition for static and dynamic balancing and need for balancing. **[7]**

b) A,B,C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150mm respectively. The planes in which the masses revolve are spaced 600mm apart and the masses of B, C and D are 100kg, 5kg and 4kg respectively. Find the required mass A and the relative angular setting of the four masses so that the shaft shall be in complete balance.

Solve using either analytical or graphical method. **[8]**

P.T.O.

UNIT - II

Q3) a) Explain with a neat sketch the stability of four wheeler vehicle negotiating turn and derive the limiting speed to maintain stability. **[5]**

b) A ship propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 r.p.m. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic effects in the following conditions: 1. The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius. 2. The ship pitches 6 degree above and 6 degree below the horizontal position. The bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 20 seconds. 3. The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from stern. Determine also the maximum angular acceleration during pitching. Explain how the direction of motion due to gyroscopic effect is determined in each case. **[10]**

OR

Q4) a) Explain the effect of gyroscopic couple on a naval ship during steering, pitching and rolling. **[7]**

b) An aeroplane makes a complete half circle of 50 meters radius, towards left, when flying at 200 km per hr. The rotary engine and the propeller of the plane has a mass of 400 kg and a radius of gyration of 0.3 m. The engine rotates at 2400 r.p.m. clockwise when viewed from the rear. Find the gyroscopic couple on the aircraft and state its effect on it. **[8]**

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