
Class	: III Year	Semester	: VI
Topic	: Static Force Analysis	Max Marks	: 50
Duration	: 50 Minutes	Date	: 15-08-13

Part A (Answer all Questions)

1. What is meant by balancing of rotating masses?
2. Why balancing is necessary for rotors of high speed engines.

Part B (Answer all Questions)

1. A rotating shaft carries three unbalanced masses of 4kg, 3kg and 2.5kg at radial distances of 75mm, 85mm and 50mm and at the angular positions of 45° , 135° and 240° respectively. The second and third masses are in the planes at 200mm and 375mm from the plane of the first mass. The angular positions are measured counter-clockwise from the reference line along x axis and viewing the shaft from the first mass end.

The shaft length is 800mm between bearings and the distance between the plane of the first mass and the bearing at that end is 225mm. Determine the amount of the counter masses in the planes at 75mm from the bearings for the complete balance of the shaft. The first counter mass is to be in a plane between the first mass and the bearing and the second mass in a plane between the third mass and the bearing at that end.

2. A shaft carries four masses A,B,C and D of magnitude 200kg,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° and C to D 120° . The balancing masses are to be 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 magnitudes and angular positions.
3. Four masses A, B, C and D as shown below are to be completely balanced.

	A	B	C	D
Mass (kg)	-	30	50	40
Radius (mm)	180	240	120	150

The planes containing masses B and C are 300mm apart. The angles between planes containing B and C is 90° , B and C makes angles of 210° and 120° respectively with D in the same sense. Find,

- a. The magnitude and the angular position of mass A
 - b. The position of planes A and D
4. A shaft carries four rotating masses A, B, C and D which are completely balanced. The masses B, C and D are 50 kg, 80 kg and 70 kg respectively. The masses C and D make angles of 90° and 195° respectively with mass B in the same sense. The masses A, B, C and D are concentrated at radius 75 mm, 100 mm, 50 mm and 80 mm respectively. The plane of rotation of masses B and C are 250 mm apart. Determine
 - (i) The magnitude of mass A and its angular position and
 - (ii) The position planes A and D.