

7. (a) With a neat sketch describe the principle and working of torsion dynamometer. 10
- (b) Explain the working of Rope brake dynamometer. 10

#### SECTION – D

8. (a) Explain the stability of four wheels and two wheel vehicles moving on curve path. 10
- (b) Derive the expression of gyroscopic couple. 10
9. The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 r.p.m. clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship :
- (a) When the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h.
- (b) When the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees. 20

Roll No. ....

**24257**

### B. Tech. 5th Semester (ME) (Common with Special Chance) Examination – December, 2019

#### DYNAMICS OF MACHINES

Paper : ME-301-F

Time : Three Hours ]

[ Maximum Marks : 100

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Attempt any *five* questions in all. Question number *one* is *compulsory* and select *one* question from each Section.

1. (a) What is Static Balancing ?
- (b) What do you mean by Dynamic Balancing ?
- (c) What is the meaning of Closed Couple Polygon ?
- (d) Write the formula of Primary Unbalanced Force.
- (e) What is the relation b/w  $h$  and  $N$  in case of Watt Governor ?

- (f) What is the formula used for acceleration of Piston ?
- (g) What is effect of Gyroscopic Couple on a Naval Ship during rolling ?
- (h) What is the formula used in Prony Brake Dynamometer ?

### SECTION - A

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 degree. The balancing masses are to be placed in plane X and Y. The distance between the 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 magnitude and angular position. 20
3. What do you mean by Partial Balancing of Primary Unbalanced Force in Reciprocating Engine ? Describe the following terms with respect to an engine (1) Hammer blow (2) Variation of tractive force (3) Swaying couple. 20

### SECTION - B

4. (a) Define and explain the term Balancing of Rotating masses. What will be harm if the rotating parts of high speed engine are not properly balanced ? 10
- (b) A mass is attached to a shaft which is rotating at an angular speed of  $w$  rad/s. describe the procedure of balancing this mass by : (1) a single mass only (2) two masses in different plane. 10
5. (a) Explain the Balancing of multi-cylinder engines. 10
- (b) Describes all types of engines shaking force in brief. 10

### SECTION - C

6. In an engine governor of the Porter type, the upper and lower arms are 200 mm and 250 mm respectively and pivoted on the axis of rotation. The mass of the central load is 15 kg, the mass of each ball is 2 kg and friction of the sleeve together with the resistance of the operating gear is equal to a load of 24 N at the sleeve. If the limiting inclinations of the upper arms to the vertical are 300 and 400, find, taking friction into account, range of speed of the governor. 20