PVP 14

Code: ME5T1

III B.Tech - I Semester – Regular/Supplementary Examinations
October 2018

DYNAMICS OF MACHINERY
(MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks
11x 2 = 22 M

1.

a) Define uniform wear theory for single plate clutch.
b) Name various types of Absorption and Transmission Dynamometers.
c) Write the gyroscopic effects of naval ships.
d) Write the expression for inertia force and inertia torque in reciprocating engine.
e) Write the applications of Flywheel.
f) Draw neat sketch of watt governor.
g) What is sleeve lift?
h) State the necessary conditions to achieve static balancing and dynamic balancing.
i) What is primary and secondary balancing?
j) What is transverse vibration?
k) What are the causes of vibrations?

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.
16 x 3 = 48 M

2. a) Explain the working of a cone clutch, with a neat sketch.
8 M

b) A simple band brake operates on a drum of 600mm in diameter that is running at 200rpm. The coefficient of friction is 0.25. The brake band has a contact of 270^0, one end fastened to a fixed pin and the other end to the brake arm 125mm from the fixed pin. The straight brake arm is 750mm long and placed perpendicular to the diameter that bisects the angle of contact. What is the pull necessary on the end of the brake arm to stop the wheel if 35 kw is being absorbed? What is the direction for this minimum pull?
8 M

3. a) A disc with radius of gyration of 60 mm and a mass of 4 kg is mounted centrally on a horizontal axle of 80 mm length between bearings. It spins about the axle at 800 rpm counterclockwise when viewed from right hand side bearing. The axle precesses takes place about a vertical axis at 50 rpm in the clockwise direction, when viewed from above. Determine the resultant reaction at each bearing due to mass and gyroscopic effect. 8 M

b) A vertical petrol engine 120mm diameter and 140mm stroke has a connecting rod 300 mm long. The mass of the piston is l.2kg, the speed is 1000 rpm on the expansion stroke with a crank 20° from top dead centre, and the gas pressure is 700kN/m^2·

Determine: i) Net force on the piston
ii) resultant load on the Gudgeon pin
iii) Thrust on the cylinder walls. 8 M

4. a) A three cylinder single acting engine has its cranks set equally at 120^0 and it runs at 600 rpm. The torque-crank angle diagram for each cycle is a triangle for the power stroke with a maximum torque of 90 N-m at 60^0 from dead centre of corresponding crank. The torque on the return stroke is sensibly zero. Determine : i. power developed
ii. coefficient of fluctuation of speed, if the mass of the flywheel is 12 kg and has a radius of gyration of 100 mm
iii. coefficient of fluctuation of energy
iv. maximum angular acceleration of the flywheel. 8 M

b) A Proell governor has equal arms of length 300 mm. The upper and lower ends of the arms are pivoted on the axis of the governor. The extension arms of the lower links are each 80 mm long and parallel to the axis when the radii of rotation of the balls are 150 mm and 200 mm. The mass of each ball is 10 kg and the mass of the central load is 100 kg. Determine the range of speed of the governor. 8 M

5. a) 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 revolving parts are to be in balanced, determine the

i) balance mass required at a radius of 320 mm

ii) unbalanced force when the crank has turned 45^{o} from top dead center. 10 M

b) Describe the balancing of several masses in a plane. 6 M

6. a) A shaft supported freely at the ends has a mass of 120kg placed 250mm from one end. The shaft diameter is 40mm. Determine the frequency of the natural transverse vibrations if length of the shaft is 700mm, E=200GN/m^2. 8 M

b) A shaft of 100 mm diameter and 1 m long is fixed at one end and other end carries a flywheel of mass 1000 kg. Take young's modulus as 200 GN/m^2; find Natural frequency of Transverse and longitudinal vibrations. 8 M