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Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, March 2015
(2008 Scheme)
08.602 : DYNAMICS OF MACHINERY (MP)
(Special Supplementary)

Time : 3 Hours Max. Marks : 100

Instructions : *1) Answer **all** questions from Part – A.*
*2) Answer **one** question from **each** Module in Part – B.*

PART – A

1. State and explain D' Alembert's principle.
2. Differentiate between structural damping and coulomb damping.
3. Explain the conditions for a continuous mass system to be equivalent to a lumped mass system.
4. Explain the concept of direct and reverse crank methods in balancing of reciprocating masses.
5. What is the significance of correction couple in the inertia force analysis of connecting rod ? Derive an equation for finding the correction couple of a connecting rod.
6. Find the work done per cycle for an engine whose torque curve is given by $T = (25000 + 5000 \sin 2\theta - 10000 \cos 2\theta)$ Nm.
7. The engine of an aeroplane rotates in clockwise direction when seen from the tail end and the aeroplane takes a turn to the left. What will be the effect of gyroscopic couple on the aeroplane ?
8. With a neat sketch explain various forces acting on a Proell governor.
9. With a sketch explain the working and theory of accelerometer.
10. Explain a method for finding out the natural frequency of a system acted upon by a number of point loads.

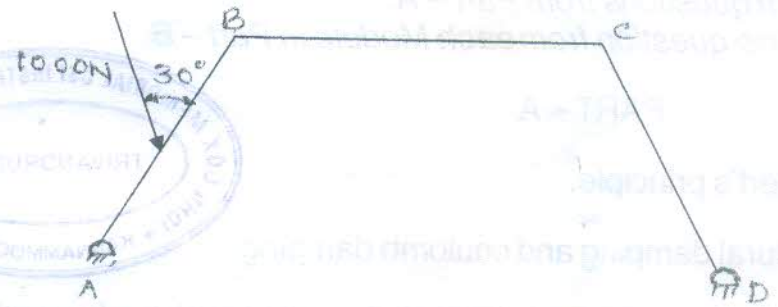
(4×10= 40 Marks)

P.T.O.

PART – B

Module – I

11. In a four bar mechanism AB = 50 mm, BC = 60 mm, CD = 50 mm and AD = 100 mm. Radius of all journals are 10 mm and coefficient of friction is 0.5. For the configuration shown find the force required at mid point of link CD to keep the system under equilibrium. 20



OR

12. Following are the dimensions of a four bar mechanism. AB = 600 mm, BC = 900 mm, CD = 550 mm, AD = 1100 mm. The link AB has a uniform angular velocity of 20 rad/s. Mass of all links are 10 Kg/m. Determine the torque required to overcome inertia forces at link AB, at an instant when the link AB makes an angle 50° with link AD. 20

Module – II

13. An inside cylinder uncoupled locomotive has its cylinder centerlines 0.7 m apart and has a stroke of 0.6 m. The rotating mass per cylinder is 150 Kg and the reciprocating mass per cylinder are 180 kg. The wheel center lines are 1.5 m apart. The cranks are at right angles. The whole of the rotating and 2/3rd of the reciprocating masses are to be balanced by masses placed at a radius of 0.6 m. Find the fluctuation of rail pressure under one wheel, variation of tractive effort and magnitude of swaying couple at a crank speed of 300 rpm. 20

OR

14. A Hartnell governor balls are 30 N weight each. The balls radius is 120 mm in the mean position when the ball arms are vertical and the speed is 150 rpm, with sleeve rising. The length of the ball arms is 150 mm and the sleeve arm is 100 mm. The stiffness of the spring is 8 N/mm and the total sleeve movement is 15 mm from mean position. Allowing a constant frictional force of 15 N acting at the sleeve, determine speed range of governor in the lowest and the highest sleeve position. Neglect the obliquity of ball arms. 20

Module – III

15. A trailor is moving over a road which has an approximately sinusoidal profile with a wavelength of 5 m and amplitude of 50 mm. The trailor weighs 1000 Kg and is pulled along the road with a velocity of 60 kmph. Determine the spring constant to give vibration amplitude of 10 mm. Also find the most unfavourable speed of the vehicle.

20

OR

16. A shaft carries a motor at one end and pinion at he other end. The length and diameter of the shaft is 500 mm and 60 mm respectively. Another shaft of 900 mm length and 100 mm diameter carries a gear wheel at one end and centrifugal pump at the other end. The pump is run by a motor. If the inertia of the gear and shaft is neglected and pump speed is one third of the motor. Find the frequency of torsional vibration of the system. Modulus of rigidity is 80 kN/mm^2. 20