TE | MTRX | sem VI | CBSGS | SH-2018   Q.P. Code :13526   30/11/2018

[Time: Three Hours]   [Marks:80]

Please check whether you have got the right question paper.

N.B: 1. **Question.No.1** is **compulsory**.
        2. From **Question No.2 to 6** attempt **any three** Questions.
        3. Figures to the right indicate full marks.
        4. Draw a suitable diagram wherever necessary.
        5. Assume suitable data if necessary and mention clearly.

Q.1 a) Explain the term effort and power of a porter governor.   04
     b) Write short note on stability of an Automobiles.   04
     c) Explain the various vibration parameters with neat sketch.   04
     d) Explain the terms : i) damping ratio   04
                            ii) logarithmic decrement
                            iii) coulomb damping
     e) Explain the following terms: i) Magnification factor   04
                                       ii) Force Transmissibility
                                       iii) Vibration isolators

Q.2 a) Each arm of a porter governor is 250 mm long and is pivoted on the axis of rotation. The mass of each ball   10
         is 5 kg and the sleeve is 25 kg. The sleeve begains to raise when the radius of rotation of the ball is 150
         mm and reaches the top when it is 200 mm. Determie the range of speed, lift of sleeve, effort and power
         of the governor. In what ways are these values changed if friction at the sleeve is equivalent to 10N?

     b) Find the natural frequency of system shown in Fig(I):   06

pulley of Mass Moment
of Inertia J_O
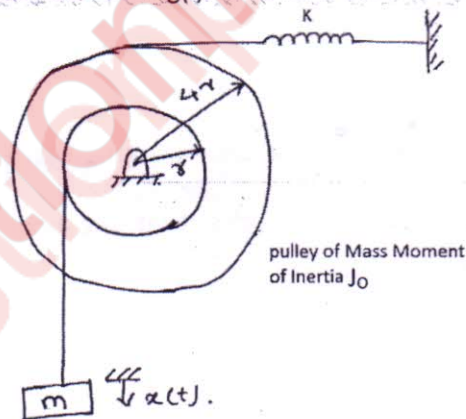
Fig(I)

     c) A Spring-mass system has spring stiffness K N/m and mass of M kg. It has Natural frequency of vibration   04
         as 12Hz. An extra 2kg mass is coupled to M and the natural frequency reduced by 2Hz. Find K & M.

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                                                                                          [P.T.O]

Q.3 a) Explain in details steps involved in vibration analysis. 08
 b) A Refrigerator unit of mass 35 kg is to be supported by three spring of stiffness K N/cm each. If the unit 06 operates at 480 r.p.m; what should be the value of spring constant K; If only 10% of the shaking force of the unit is to be transmitted to the supporting structure?
 c) Explain basic principles of vibration pickups. 06

Q.4 a) The turbine rotor of a ship has a mass of 2000 kg and rotates at a speed of 3000 r.p.m clockwise when 10 looking from a stern. The radius of gyration of the rotor 0.5 m. Deteremine the gyroscopic couple and its effects upon the ship when the ship is steering to the right in a curve of 100 m radius at a speed of 16.1 knots (1 knot=1855 m/hr). Calculate also the torque and its effects when the ship is pitching in simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 50 seconds and the total angular displacement between the two extreme positions is 12°. Find the maximum acceleration during pitching motion.
 b) A Single cylinder vertical petrol engine of total mass 320 kg is mounted upon a steel chassis frame and 10 causes a vertical static deflection of 0.2cm. The reciprocating parts of the engine have a mass of 24 kg and move through a vertical stroke of 15cm with S.H.M. A dashpot is provided, the damping resistance of which is directly proportional to the velocity and amouts to 490 N at 0.3 m/s. Determine.
 a) the speed of the driving shaft at which resonance will occur, and
 b) the amplitude of steady state forced vibration when the driving shaft of the engine rotates at 480 r.p.m

Q.5 a) A vibrating system consists of a mass of 7 kg, a spring of stiffness 50 N/cm and damper of dampig 10 coefficient 0.3 Nsec/cm. Find the damping factor, the logarithmic decrement and ratio of any two successive Amplitudes.
 b) Explain machine conditioning monitoring & fault diagnosis of rotating masses. 10

Q.6 a) Four masses are attached to shaft at plane A, B, C and D at equal radii. The distance of the planes B, C and 12 D from A are 50 cm, 60 cm and 130 cm respectively. The masses at A, B and C are 60 kg, 55 kg and 80 kg respectively. If system is in complete balance, determince the mass at D and the position of masses B,C and D with respect to A.
 b) Explain the vibration measurement scheme with suitable diagram. 08

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