TE MTRX | SEM –VI | CBSGS | 22/5/2019.

Q.P. Code : 39967

[Time: 3 Hours]   [Marks: 80]

Please check whether you have got the right question paper.

N.B: 1. Question No.1 is compulsory
    2. Attempt any THREE questions from remaining questions.
    3. Assume suitable data whenever required.

Q.1   Attempt any four: 20
 a) What is governor? How they are classified?
 b) What do you mean by Gyroscopic couple? Derive a relation for its magnitude.
 c) What is do you meant by Degree of Freedom?
 d) Explain various types of damping.
 e) Draw a graph between the magnification factors against the phase angle for various values of damping ratios.

Q.2 a) A simple U table manometer filled with Liquid is shown in Fig. 2(a). Calculate the Frequency of   10
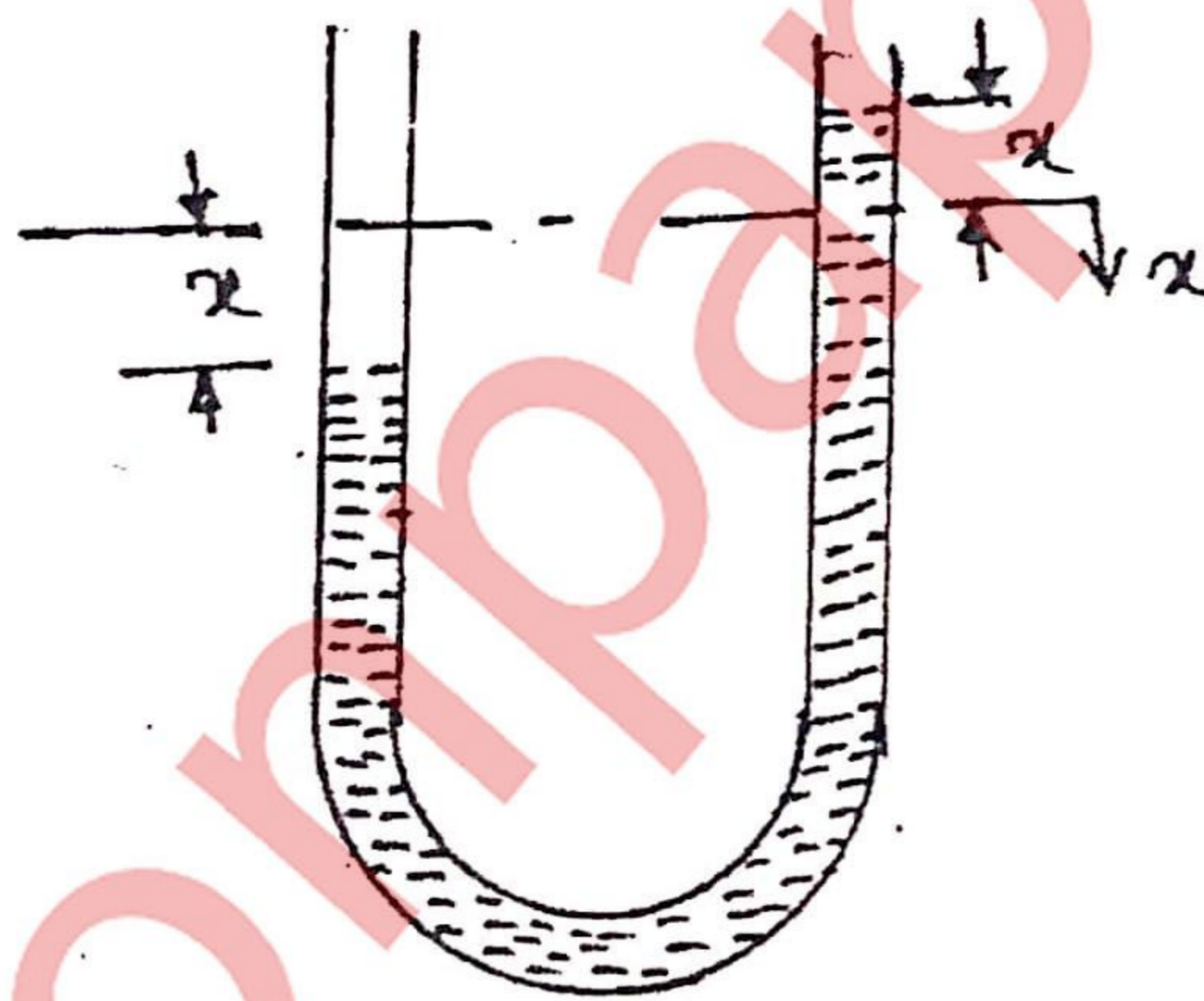   resulting motion if the minimum length of a manometer tube is 0.15m.

Fig - 2(a)

 b) What is meant by effort and power of a governor? Find the expression for the same in porter   10
    governor.

Q.3 a) Define the following terms: 08
    i)   Undamped free vibration
    ii)   Damped Free vibration
    iii) Resonance
    iv)   Causes of vibration

 b) A 45 kg machine is mounted on four parallel spring each of stiffness 2×10^5 N/m. when the machine   06
    operates at 32Hz, the machine's steady-slate amplitude is measured as 1.5mm. What is the
    magnitude of the excitation provided to the machine at this speed?

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c) Explain basic working principle of vibrometer. **06**

Q.4 a) The rotor of a marine turbine has a moment of inertia of 750 kg-m² and rotates at 3000rpm **10** clockwise when viewed from aft. If the ship pitches with angular S.H.M having a periodic time of 16 seconds and an amplitude of 0.1 radian, find the
   i) Maximum Angular Velocity of rotor axis.
   ii) Maximum Value of the gyroscopic couple.
   iii) Gyroscopic effect as the bow dips.

b) A vibrating system having mass 1kg is suspended by a spring of stiffness 1000 N/m and it is put **10** to harmonic excitation of 10N. Assuming viscous damping, determine:
   i) The resonant frequency
   ii) The phase angle at resonance
   iii) The amplitude of resonance
   iv) Damped frequency
Take C = 40 N-sec/m.

Q.5 a) A vibrating system is defined by the following parameters: **10**
   m = 3kg, k = 100N/m, C = 3N-sec/m
   Determine (i) the daming factor   (ii) the natural frequency of damped vibration
                 (iii) Logarithmic decrement   (iv) the ratio of two successive amplitude
   b) Enlist machine conditioning monitoring & Fault diagnosis technique & explain any two in details. **10**

Q.6 a) Four masses A,B,C and D carried by a rotating shaft at radii 80mm, 100mm, 160mm and 120mm **14** respectively are completely balanced. Masses B, C and D are 8kg, 4kg and 3kg respectively. Determine the mass A and the relative angular position of the four masses if the planes are spaced 500mm apart.
   b) Explain the terms: i) Variation in tractive force   ii) Swaying couple   iii) hammer blow in case **06** of uncoupled two cylinder locomotive engine.

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