QP CODE: 171305

B.E./B.TECH. Degree Examination, September 2020

Semester - VIII

ME 16023 - VIBRATION AND NOISE CONTROL

(Regulation 2016)

Time: Three hours Maximum : 80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. When there is a reduction in amplitude over every cycle of vibration, then the body is said to have

   a) free vibration
   b) forced vibration
   c) damped vibration
   d) none of the mentioned

2. Distinguish between free and forced vibration.

3. The effects of knocking are
   a) noise and roughness
   b) mechanical damage
   c) carbon deposits
   d) all of the mentioned

4. List out the sources of Aerodynamic Noise?

5. Which of the following is a type of untuned vibration absorber?
   a. Houdaille damper
   b. Torsional vibration absorber
   c. Centrifugal pendulum absorber
   d. All of the above

6. State the importance of crankshaft damping.

7. Which of the following methods can be used to control the noise level at source?

   a. Changing design process
   b. Using sound enclosures
   c. Controlling vibration
   d. All of the above

8. What are the functions of mufflers?

PART B - (4 X16 = 64 marks)

09. (a) (i) Determine the effect of the mass of the spring on the natural frequency of the spring mass system. (8)

(ii) A verticle helical spring of length L, and stiffness k has both ends securely fixed. A mass m is attached to the spring at a distance s from one end. Determine the natural frequency of small longitudinal vibrations. Show that at s = 0.5L, frequency is minimum and hence find this frequency. (8)

(OR)

(b) (i) Using Energy method derive differential equation of motion for undamped free vibrations of single degree of freedom system (6)

(ii) A stepped shaft has three segments of diameters and lengths as follows: d_1 = 50 mm, L_1 = 0.4 m d_2 = 60 mm, L_2 = 0.5 m d_3 = 90 mm, L_3 = 0. 6 m. Find the equivalent length of shaft of uniform diameter of 60 mm. Hence find the natural frequency of Torsional vibration if G = 0.83×10^{11} N / m^2 and the mass moment of inertia of rotor is 15 kg-m^2 . (10)

10. (a) (i) With neat schematic diagrams explain the tire generated noise and suggest the methods to reduce the tire noise. (16)

(OR)

(b) (i) Explain the methods to assess the mechanical noise. (10)

(ii) Discuss various methods used in controlling combustion noise. (6)

11. (a) (i) Explain main causes of vibrations. How vibrations can be controlled or eliminated? (8)

(ii) Explain the dynamic forces generated by IC engine and explain how it can be reduced. (8)

(OR)

(b) (i) What do you mean by vibration isolation and force transmissibility? For a damped spring-mass system, derive an expression for force transmissibility. (12)

(ii) Distinguish between vibration absorber and vibration isolator. (4)

12. (a) (i) Write Short notes on Sound Enclosure and Automotive Noise Control principles (16)

(OR)

(b) (i) With neat sketch explain the sound transmission through barriers. (10)

(ii) List the factors considered in controlling the engine and mechanical noise. (6)