[This question paper contains 3 printed pages.]

3064 *Your Roll No.* .....

MEC **J**

Paper – CE.606

INSTRUMENTATION

Time : 3 Hours *Maximum Marks : 100*

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. **1** *is compulsory.*
Attempt any **four** *questions from the rest.*
Assume suitable missing data, if any.

1. (a) Discuss the instruments by which vacuum levels lower than 1 micron can be measured. Give its principal of working and application also.

   (b) A right angled V notch is employed to measure the discharge. If the head H above the sill is measured as 0.25±0.01 m estimate the discharge if $c_d = 0.60$.

   (c) A thermistor has a resistance of 9000Ω at the ice point and 500Ω at 100°C. Find its constant and its resistance at 50°C.

P.T.O.

(d) What are the basic component of an instruments ? Discuss them with flow diagram. Write down the different measurement techniques based on signals.

(e) With suitable example define the terms Sensitivity precision and accuracy of an instrument. (4×5)

2. (a) Discuss the uses of Gas chromatography for qualatative analysis of samples. Describe in brief all the important units of a gas chromatography. (10)

(b) Briefly discuss the factors governing in selecting the detection system in Chromatographic technique. Describe with application some of the detection system that can be used in gas-chromatography. (10)

3. Write explainatory notes on the following :

(i) Nephlometer

(ii) N.D.I.R.

(iii) pH meter

(iv) Coulometer (4×5)

4. (a) Discuss the instruments used for volumetric analysis of flue gas. Also discuss the working of the instruments with neat diagram. (10)

(b) What are the different method used for level measurement in the industries ? Discuss the principal, working and application of there method. (10)

5. (a) With a neat diagram describe the principal working and application of selective radiation pyrometer. (10)

(b) With a neat diagram describe the principal working and application of rotameter. (10)

6. Write short notes on any **four** :

(a) Mass Spectrometer

(b) Chemilumination method

(c) N.M.R.

(d) Electrolytical Analysis

(e) Electrical method for measurement of temperature (5×4)

[This question paper contains 2 printed pages.]

3067 *Your Roll No.* .....

ME Civil (Structural Engg.) **J**

Paper CE.663 – STRUCTURAL DYNAMICS

Time : 3 hours *Maximum Marks : 100*

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any **FIVE** *questions.*

Marks allotted to questions are written against them.

Assume any missing required data suitably.

1. (a) Write equation of motion for a single degree of freedom damped system. What shall be its solution if it is critically damped ? (10)

   (b) Explain the behaviour of an over damped system, under free vibration stage, and compare it with that of a similar critically damped system. (10)

2. A vibrating system consisting of a weight of 10N and with a spring of stiffness 20 N/cm is viscously damped. Ratio of its two consecutive amplitudes is 1 to 0.80. Determine the following for the system.

   (i) The natural frequency of the system

   (ii) The logarithmic decrement

   (iii) The damping ratio

   (iv) The damped natural frequency

   (v) The damping coefficient (20)

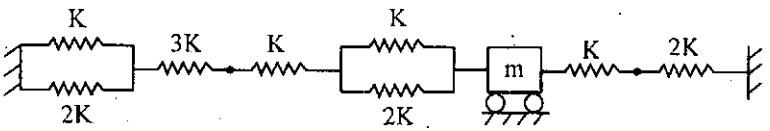
P.T.O.

3. (a) What do you understand by 'Dynamic Magnification factor' ? Explain briefly. (10)

(b) Discuss how an evaluation of damping can be made, at resonance condition, using dynamic magnification factor. (10)

4. (a) Explain D'Alembert's principle briefly. (10)

(b) Calculate the equivalent stiffness for a model shown below. (10)



5. (a) What are different types of waves ? Describe briefly. (10)

(b) Discuss the half power bandwidth method to evaluate damping of a SDOF system. (10)

6. (a) Discuss how effect of dynamic loading is considered using the Duhamel's integral. (10)

(b) What is the difference between the forced vibration stage and the free vibration stage ? Discuss taking an example. (10)

7. Write short notes on any **two** of the following :–

(i) Earthquake excitations of buildings

(ii) Principle of virtual work

(iii) Damping coefficient (2×10=20)