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Question Paper Code: 99117

B.E./B.Tech. DEGREE EXAMINATION, MAY 2022

Elective

Civil Engineering

19UCE917- STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(Regulations 2019)

Duration: Three hours

Maximum: 100 Marks

PART A - (5x 1 = 5 Marks)

Answer All Questions

- Unit of stiffness is CO1- U
(a) Kg-m/s² (b) N-s/m (c) N/m (d) N-s/m²
- In which system requires two independent co-ordinate to describe the motion CO2- U
(a) Two degree (b) Single degree (c) Multiple degree (d) Three degree
- A ----- is the recording of ground shaking at the specific location where the location is CO3- U
(a) seismograph (b) Seismogram
(c) Seismic Instrumentation (d) None of the these
- Zero period acceleration is CO4- U
(a) Period =0 (b) Amplitude =0 (c) Resonance (d) Frequency=0
- Peak ground acceleration is measured by instrument..... CO5- U
(a) seismogram (b) seismograph (c) accelerographs (d) none of these

PART – B (5 x 3= 15Marks)

- Define logarithmic decrement CO1- U
- What is meant by mode shape? CO2- U
- Define the term focus and epicenter. CO3- R
- How to reduce earthquake effects on building? CO4- U

10. Define Ductility CO5- U
- PART – C (5 x 16= 80Marks)
11. (a) Derive the equivalent stiffness of spring in parallel and series. CO1-App (16)
 Or
 (b) Derive the equation of motion for a Free Undamped SDOF system by D alembert Method. CO1-App (16)
12. (a) Determine the natural frequency and mode shapes of the following: The storey masses are $m_1 = 1000 \text{ kg}$, $m_2 = 800 \text{ kg}$, $h_1 = 4\text{m}$ and $h_2 = 3.5\text{m}$ moment of inertia is $2I$. take $I = 6 \times 10^5 \text{ mm}^4$ and $E = 3.5 \times 10^4 \text{ N/mm}^2$ CO2- E (16)
 Or
 (b) A three storey building has seismic weights of 200 kN, 300 kN and 420 kN at I, II and III store's respectively; The corresponding stiffness's are 20000 kN/m, 25000 kN/m and 30000 kN/m. CO2- Ana (16)
 (i) Examine the model frequencies.
 (ii) Sketch the mode shapes
13. (a) Explain the measurement of earthquakes using Seismograph CO3-U (16)
 Or
 (b) Explain in detail about Elastic Rebound Theory CO3-U (16)
14. (a) Explain step by step procedure for seismic analysis of RC buildings as per IS 1893:2002 CO4-U (16)
 Or
 (b) Explain in detail about Effects of Earthquake in different types of structures CO4-U (16)
15. (a) Explain about the Design Considerations for the Earthquake Resistant Design (ERD) of Masonry structures CO5-U (16)
 Or
 (b) Describe the significance of planning considerations / architectural concepts As per Is:4326 - 1993 CO5-U (16)