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M. TECH.
ODD SEM THEORY EXAMINATION 2017-18
EARTHQUAKE RESISTANT DESIGN OF RC BUILDING

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt any four questions. **4 x 5 = 20**

a. Discuss the need of seismic zoning
b. How is the epicenter of an earthquake Located?
c. What are the direct and indirect effects of an earthquake?
d. Define infill walls with neat sketch.
e. Discuss the ductile failure and Flexural Failure.

SECTION B

2. Attempt any *two* of the following: **10 x 2 = 20**

a. Derived equation of motion for a three storey shear building.
b. A soil profile consists of a 4 mtr thick surface layer of sand (γ = 18.5 KN/m^3) overlying a 2 mtr thick layer of sand (γ = 16.5 KN/m$^{3)}$. The water table is at ground surface. During an earthquake water in a driven stand pipe rises 2 mtr above the ground surface. Determine the effective dynamic stress at depth of 6 mtr from the ground surface.
c. Discuss Concentric and eccentric braced frames and What is Load Combination?

SECTION C

3. Attempt any *two* parts of the following: **10 x 2 = 20**

(a) Define Saturation. How is moment magnitude a better measure of earthquake size than other magnitude?
(b) Determine the frequency and Design seismic coefficient for an ordinary masonry shear walls in a primary health centre at Nanintal given the following Data ; Roof Load =20 KN/m , Height of wall =3mtr, Width of wall =0.3m, Unit weight of wall =20KN/m^3, The building is situated on rocky soil
(c) Discuss about the behavior of Bracing under cyclic Loading.

4. Attempt any *two* parts of the following: **10 x 2 = 20**

(a) In a cross bore hole test the shear velocity was observed to be 110 m/s. determine the value of dynamic shear modulus if the density of soil is 17.2 KN/m^3.
(b) Why is it important to take suitable measure prevention of NON structural failure rather than to undertake repairs after damage?
(c) State the advantages of using concrete over brick masonry for buildings in seismic areas.

5. Attempt any *two* parts of the following: 10 x 2 = 20

(a) Show that for an undamped MDOF system in free vibration the mode shapes are orthogonal. The equation $m\ddot{x} + kx = 0$

(b) Give an expression for the condition under which a structure will sink during an earthquake.

(c) Design a rectangular beam for 8mtr span to support a dead Load of 10 KN/m and live load of 12 KN/m inclusive of its self-weight, moment due to earthquake load is 110KNm and Shear Force is 80 KN. Use M20 concrete and Fe415 steel.