B. Tech. Sem – VIII (Civil Engg.) (2014 COURSE) (CBCS) :
SUMMER - 2019
SUBJECT : EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Day : Thursday
Date : 23/05/2019
S-2019-2874
Time : 02.30 PM TO 05.30 PM
Max. Marks : 60

N. B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate full marks.
3) Draw neat and labeled diagrams **WHEREVER** necessary.
4) Assume suitable data, if necessary.
5) Use of I.S. 1893 Part – I, I.S. 13920, I.S. 456 is allowed.

Q. 1 **a)** What is an earthquake? How they are caused? **(05)**

b) What is 'Theory of plate Tectonics'? **(05)**

OR

Q. 1 **a)** What is meant by the focus and epicenter of an earthquake? What are the different kinds of waves generated during an earthquake and what are their characteristics? **(05)**

b) Describe briefly the direct and indirect effects of an earthquake. **(05)**

Q. 2 **a)** What do you understand by SDOF and MDOF system? Differentiate between them. **(05)**

b) What are vibrations? How they are caused? **(05)**

OR

Q. 2 **a)** Name the different types of SDOF? Explain any one with the help of a figure. **(05)**

b) Define natural frequency, time period, damped frequency, damping ratio. **(05)**

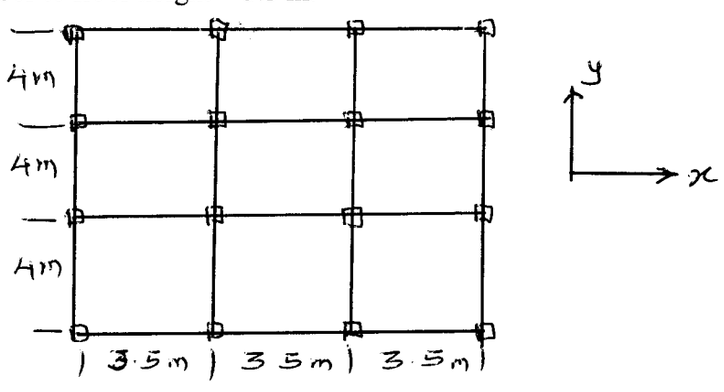
Q. 3 **a)** List the various coefficients used in determining the lateral force in static method? Why it is called static method? **(04)**

b) Write the steps in determining the lateral force and base shear using equivalent static method. **(06)**

OR

Q. 3 A four storied school building located at Chennai has a plan as shown in figure. Draw the lateral force and storey shear diagram along x-direction if the building is founded on a medium soil and is provided with a brick masonry. **(10)**

DL on floors = 4 KN/m^2
LL on floors = 3 KN/m^2
LL on floors = 1.5 KN/m^2
Size of beams and columns = 400 mm × 400 mm.
Floor to floor height = 3.3 m.



P. T. O.

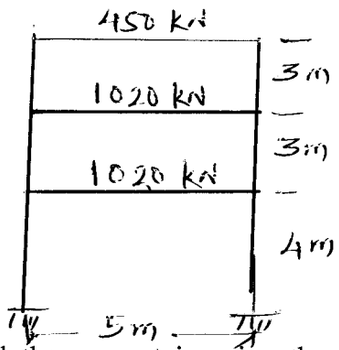
Q. 4 **a)** What do you understand by 'Dynamic Analysis of Earthquake Resistant Structures'? What are the methods of dynamic analysis? **(04)**

b) What is a seismograph? How it is used in determining 'PGA'? Elaborate with figures. **(06)**

OR

Q. 4 A building frame is as shown in figure. Determine the base shear using dynamic method of analysis. **(10)**
Take Z = 0.24, I = 1.5, R = 4. The building is founded on medium soil. The details of modal shapes are as below:

Floor	Mode1 T = 0.56 sec.	Mode 2 T = 0.49 sec.	Mode 3 T = 0.29 sec.
3	1.0	1.0	1.0
2	0.629	- 0.282	- 1.0
1	0.296	- 0.794	0.425



Q. 5 **a)** Define shear walls and the concept in using them for earthquake resistant design? What are their types? **(04)**

b) Write the steps in the design of a shear wall explaining the various types of reinforcements to be provided along with their functions. **(06)**

OR

Q. 5 Design a shear wall 10 m long each, provided on 2 parallel sides of a building on the entire periphery. Axial load on each shear wall is 5000 kN. **(10)**
Floor to floor height is 3.3 m. Size of the column is 300 mm × 800 mm.
The seismic lateral forces at different floors levels are as given below:

Floor level	5	4	3	2	1
Lateral force (kN)	600	200	130	60	14

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Q. 6 **a)** What is diaphragm in the framed building? What are the provisions to make the diaphragm more ductile? **(05)**

b) Write the longitudinal and transverse reinforcement requirements in columns for ductile detailing. **(05)**

OR

Q. 6 **a)** Define ductility and ductile failure in RC buildings. What are the measures to improve the ductility? Define SMRF and OMRF. **(05)**

b) "Irregularities of mass, stiffness and strength are not desirable in buildings situated in earthquake prone areas". Describe using diagrams, how these occur and affect the building. **(05)**

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