Bibhas Paul

Roll No _____

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION - 2018

B.Tech VIII / M.Tech II Semester

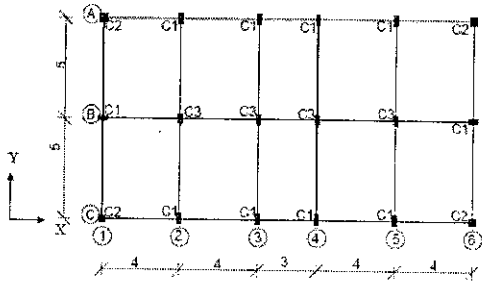
COURSE CODE: 12M1WCE213 MAX. MARKS: 35

COURSE NAME: Earthquake Resistant Design of Structures

COURSE CREDITS: 3 MAX. TIME: 2 HRS.

***Notes:*** *All questions are compulsory. Carrying mobile phone during examinations will be treated as case of unfair means. For any missing data or information, you are free to make whatever simplifying assumptions that you wish,* ***provided you supply a credible justification.IS:456-2000, IS1893 (I)-2016*** *and* ***IS:13920-1993*** *are allowed in examination hall.*

Q1 Consider a four-storey reinforced concrete office building shown in ***Fig # 1***. The building is to be constructed at Chandigarh. The soil conditions are medium stiff and the entire building is to be supported on a raft foundation. The RC frames are infilled with brick masonry. The lumped weight due to dead loads is 15 kN/m$^2$ on floors and 12 kN/m$^2$ on the roof. The floors are to cater for a live load of 4 kN/m$^2$ on floors and 2 kN/m$^2$ on the roof. ***CO 1*** ***CO 2*** ***CO 3*** ***CO4*** ***10 M***



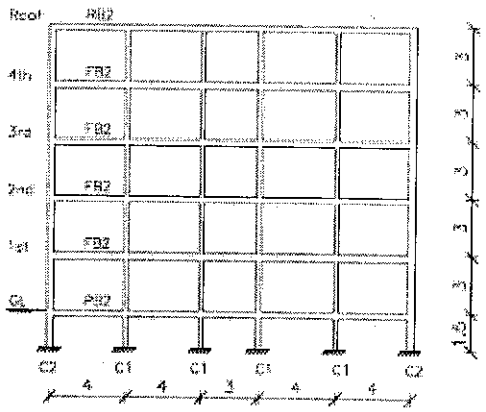
**PLAN**

**Schedule of Beams & Columns**

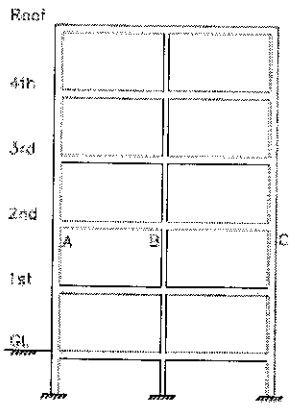
| Column | | Beam | |
|---|---|---|---|
| C1 | 300 x 500 | RB1, FB1 | 300 x 600 |
| C2 | 400 x 400 | RB2, FB2 | 300 x 500 |
| C3 | 400 x 500 | PB1 | 300 x 400 |
| | | PB2 | 300 x 350 |

Slab thickness: 125

Note: All dimensions in mm



**ELEVATION**



**ELEVATION**

***Fig # 1***

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**Member forces in beam AB for various primary load cases**

| Load Case | Left end | | Centre | | Right end | |
|---|---|---|---|---|---|---|
| | Shear (kN) | Moment (kN-m) | Shear (kN) | Moment (kN-m) | Shear (kN) | Moment (kN-m) |
| DL | -51 | -37 | 4 | 32 | 59 | -56 |
| LL | -14 | -12 | 1 | 11 | 16 | -16 |
| EQY | 79 | 209 | 79 | 11 | 79 | -191 |

Design the given beam AB according to IS: 456-200. Also Provide ductile detailing of the beam conforming to IS: 13920-1993. Show all required calculations and diagrams.

Q2 Briefly discuss the ***Response Spectrum Method*** for seismic analysis of a structure. Explain the difference between ***weak storey*** and ***soft storey***? ***CO 3 CO 4 CO5 8M***

Q3 Briefly discuss the ***Time History Analysis*** related to Earthquake engineering. Discuss the effect of damping in seismic responses of a structure. ***CO 3 CO 4 CO5 7M***

Q3 Explain the following terms related to Earthquake Resistant Design ***CO 1 CO 2 CO 4***

a) Response Reduction Factor
b) Ductility factor
c) Overstrength Factor
d) Capacity Design

***10 M***