Q.No. Question

1(a) Write short notes on (a) isolating devices (b) Storey Drift

1(b) Plan of a five storey building is shown in Fig.1. Dead load including self-weight of slab, finishes, partitions, etc. can be assumed as 5 KN/m² and live load as 4 KN/m² on each floor and as 1.5 KN/m² on the roof. Determine the lateral forces and shear at different storey levels. Storey height is 3.5 m and the building is located in seismic zone IV. The type of soil encountered is medium stiff and it is proposed to design the building with a special moment resisting frame.

OR

1' Design a continuous beam of two spans each of 6 m supported on stone masonry walls using limit state method and allowing 25% redistribution of moments. The following data may be used:

- Width of masonry supports = 230mm,
- Thickness of reinforced concrete slab = 150mm,
- Spacing of continuous beams = 3 m c/c,
- Self-weight of floor finishes = 0.4 KN/m²,
- Live load on office floor = 4 KN/m².

Adopt M-20 grade concrete and Fe-415 HYSD bars

2 Design top dome and top ring beam of an Intz tank for the following data:

- Capacity of tank = 1000 m³
- Central rise of top dome = 2 m
- Height of cylindrical wall = 8 m

[Contd. . . . .]
Rise of bottom dome = 1.6 m
Diameter of supporting tower = 8 m
Assuming the average depth of water = 0.75 D, where D is the diameter of the tank.
Use M 25 grade of concrete and FE 415 grade steel. The design should conform to the
stresses specified in IS: 3370 and IS: 456.

OR

2' Design an open square RC water tank to hold 60000 litres of water. The depth of
water in the tank is to be restricted to 3.5 m. The tank is resting on firm ground. Adopt
M 25 and Fe 415. Design should be limited to top 2.5 m of wall height only.

3 Calculate the bending moment for dead and live load only for a reinforced concrete
slab culvert for a state highway to suit the following data. Carriage way: 2 lane 7.5 m
wide, Kerbs: 600 mm wide, Clear span= 6 m, wearing coat=80 mm, width of bearing
=400 mm, Loading: IRC Class AA. Materials: M-25 grade concrete and Fe-415
HYSD bars.

4 In a pre-stressed concrete beam of cross section 200 mm x 300 mm and span of 6 m,
an initial pre-stressing force of 400 KN is applied at an eccentricity of 70 mm by
tendons of area 400 mm². Assuming E_s = 2 x 10^5 MPa and E_c = 0.333 x 10^5 MPa,
Anchor slip = 1.5 mm, creep coefficient in concrete Φ = 1, shrinkage of concrete =
0.0002 and loss due to relaxation = 3 % of steel stress. Find the total percentage loss
of stress in the tendons.

5 (a) Explain the basic difference in structural behaviour between ‘Stair slabs spanning
transversely’ and ‘stair slabs spanning longitudinally’.

5 (b) Calculate the bending moment and shear forces for a ‘waist slab’ type dog-legged
staircase for an office building, given the following data:

Height between floors= 3.2 m;
Riser =160 mm, tread=270 mm;
Width of flight =landing width=1.25 m
Live load =5.0 KN/m² and finishes load=0.6 KN/m²

Contd... 3.
Assume the stairs to be supported on 230 mm thick masonry walls at the outer edges of the landing, parallel to the risers. Use M 20 concrete and Fe 415 steel. Assume mild exposure conditions.

OR

5'(a) With the help of sketches, differentiate between counter-fort and buttress retaining wall.

5'(b) Determine the approximate proportions of a cantilever retaining wall for a height of 4m above the ground level. The top of earth retained is surcharged at 20° with the horizontal. The angle of repose of the earth is 35° and its density is 19 KN/m³. The safe bearing capacity of the soil is 80 KN/m³ and the coefficient of friction between concrete and soil is 0.55.

Fig. 1
B.E (EVENING) VII SEMESTER EXAMINATION
DESIGN OF CONCRETE STRUCTURE-II
(ECE-411)

Maximum Marks: 60
Duration: Two Hours

Note: Answer all the questions.
Assume suitable data, if required.
Notations used have their usual meaning.
Use of relevant IS codes and IRC loading charts are allowed.

Q.No. | Question | M.M.
--- | --- | ---
1(a) | Write short notes on (a) Energy dissipation devices (b) Properties of construction materials for earthquake resistance | [04]
1(b) | A five storey OMRF building has plan dimensions as shown in Fig1. The storey height is 3.0 m. The dead load per unit area of the floor, consisting of the floor slab, finishes, etc., is 4 kN/m². Weight of the partitions on the floor can be assumed to be 2 kN/m². The intensity of live load on each floor is 3 kN/m² and on the roof is 1.5 kN/m². The soil below the foundation is hard and the building is located in Delhi. Determine the seismic forces and shears at different floor levels. | [08]

Fig. 1

contd... 2.
1' A continuous beam of a multi-storey frame has three spans each of 6 m. The characteristic dead load is 10 kN/m and the characteristic live load is 15 kN/m. Design the critical sections of the beam and sketch the details of reinforcements using the limit state method. Adopt M-20 grade concrete and Fe-415 HYSDB bars.

2' Design the long wall of a RC tank 4.0 x 8.5 x 4.0 m deep resting on ground. 150 mm x 150 mm splays are provided at the junction of walls and the base slab. Adopt M 25 and FE 415

OR

2' Design top dome and top ring beam of an intz tank for the following data:
   Central rise of top dome = 1.5 m
   Diameter of cylindrical vessel = 12.0 m
   Height of cylindrical vessel = 4.5 m
   Rise of bottom dome = 1.5 m
   Mean diameter of supporting tower = 9.0 m
   Adopt M 25 and FE 415

3 Design a reinforced concrete slab culvert for a state highway to suit the following data. Carriage way: 2 lane 7.5 m wide, Kerbs:600 mm wide, Clear span= 5 m, wearing coat=80 mm, width of bearing =400 mm, Loading: IRC Class AA. Materials: M-20 grade concrete and Fe-415 HYSDB bars. Design the reinforced concrete deck slab. The design should conform to the specifications of the bridge code IRC: 21-1987.

4 Discuss the following:
   (a) Pre-tensioning and post-tensioning system of prestressing
   (b) Need for high strength steel and concrete in prestressed systems

5 Design a 'waist slab' type staircase comprising a straight flight of steps, supported between two stringer beams along two sides. Assume an effective span of 1.5 m, a riser of 150 mm and a tread of 270 mm. Assume a live load of 3.0 kN/m². Use M20 concrete and Fe 250 steel. Assume mild exposure conditions.

OR

5'(a) With the help of sketch, explain cantilever retaining wall.

5'(b) Determine the approximate dimensions of a cantilever retaining wall to retain an earth embankment 4m high above the ground level. The angle of repose of the earth is 30° and its density is 18 KN/m³. The embankment is horizontal at top. The safe bearing capacity of the soil is 200 KN/m³ and the coefficient of friction between concrete and soil is 0.5. use M 20 and FE 415.
Maximum Marks: 60

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q. No. | Questions | M.M.
--- | --- | ---
1a | What are the assumptions of Rankine’s theory of earth pressure? Define active, passive and pressure at rest. | (04)
1b | A RCC retaining wall with vertical back has a backfill 6.5 m deep behind it. The ground level is horizontal and has a surcharge intensity of 10 kN/m². Draw the pressure distribution diagram and determine the magnitude and line of action of resultant active pressure for the following data:
Unit weight of soil, \( \gamma = 19 \text{ kN/m}^3 \), \( \phi = 20^\circ \) and \( c = 0 \).
(OR)

1'a | Differentiate between cantilever and anchored sheet pile walls. Determine the depth of tensile crack for cohesive soil having unit cohesion, \( c = 60 \text{ kPa} \), \( \phi = 15^\circ \) and unit weight, \( \gamma = 20 \text{ kN/m}^3 \). | (04)
1'b | A cantilever sheet pile wall supports a cohesionless soil up to a height of 8 m above the ground level. The back fill surface is horizontal and has unit weight, \( \gamma = 20 \text{ kN/m}^3 \) and angle of internal friction, \( \phi = 30^\circ \). Draw pressure distribution diagram of lateral earth pressures and determine the critical and safe depth of embedment of sheet pile wall. | (08)
2a | Briefly discuss the different types of slope failures with the help of neat sketch. | (04)
2b | An infinite slope has to be made of granular soil having \( \gamma_{sat} = 19 \text{ kN/m}^3 \) and \( \phi' = 35^\circ \).
If a factor of safety of 1.3 is needed against slope failure, determine the safe angle of slope, when (i) the slope is dry without seepage (ii) the seepage occurs parallel to the slope. | (08)
3a | Explain briefly any two of the following:
(i) Limitations of plate load test (ii) SPT N-Value (iii) Angular distortion (iv) Differential settlement (v) Allowable bearing capacity | (06)

contd...
3b  A strip footing is needed to carry a load of 1000 kN at a depth of 1.5 m below the ground level. The shear strength parameters for the foundation soil are $c = 0$ and $\phi = 36^\circ$. Determine the minimum width of the footing when the water table rises up to the base of the footing. The values of bearing capacity factors for $\phi = 36^\circ$ are as, $N_c = 56$, $N_q = 40$ and $N_\gamma = 43$. Take $G = 2.65$, $e = 0.6$ and $\gamma = 16$ kN/m$^3$.

4a  What is negative skin friction? Explain its effect on load carrying capacity of pile.

4b  A drop hammer weighing 65 kN and having an effective fall of 0.9 m drives a RCC pile weighing 50 kN. The average settlement per blow is 1.5 cm. The total temporary elastic compression is 1.9 cm. Assuming the coefficient of restitution as 0.25 and a factor of safety of 2.5, determine the ultimate bearing capacity and the allowable load for the pile.

OR

4'a  Briefly discuss the conditions in which the pile foundation is more suitable than the shallow foundation.

4'b  A pile group consists of 16 piles of 300 mm diameter arranged in square pattern with centre to centre spacing as 0.75 m. Determine the safe load carrying capacity when the length of each pile is 10 m. Take $c_p = 100$ kN/m$^2$, $\gamma = 20$ kN/m$^3$ $\alpha = 0.6$ and F.O.S = 3.

5a  Write short notes on any two of the following:

(i) Natural frequency
(ii) Logarithmic decrement
(iii) Damping factor
(iv) Vibration isolation technique

5b  A vibrating system consisting of a mass of 5.0 kg and a spring of stiffness $3 \times 10^3$ N/m is viscously damped such that the ratio of any two consecutive amplitudes is 1.0 to 0.90. Determine:

(i) Natural frequency of the system ($\omega_n$)
(ii) Logarithmic decrement ($\delta$)
(iii) Damping factor (D) and damping coefficient (c)
(iv) Check whether, the vibrating system is over damped or under damped or critically damped.
2016-17
B.E. (WINTER SEMESTER) EXAMINATION
CIVIL ENGINEERING
CONCRETE TECHNOLOGY
CE 421

Maximum Marks: 60 Credits: 04 Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q. No. Question M.M.
1. With the help of neat sketch discuss the manufacturing process of Ordinary Portland Cement (OPC). [12]
   OR
   1' What do you understand by workability of cement concrete? Describe the various factors which affect it. [12]
2. What do you understand by shrinkage of concrete? Discuss various factors affecting the shrinkage. [12]
3. Discuss in details the role of permeability in durability of concrete. [12]
   OR
   3' What is the mechanism of sulphahe attack in concrete? How does it affects the durability of concrete? How would you control the sulphahe attack? [12]
4. List various tests conducted on hardened concrete and explain any one in detail. [12]
5. What are the advantages and disadvantages of fibre reinforced concrete? [12]
   OR
   5' Briefly discuss the role of different types of admixtures in concrete. [12]
Answer all the questions. Assume suitable data if missing. Notations used have their usual meaning.

1(a). The trip rate (y) and the corresponding household size (x) from a sample are shown in the table below. Compute the trip rate if the average household size is 3.25. Use regression method.

<table>
<thead>
<tr>
<th>House hold size (x)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trips per day (y)</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

1(b). What is trip distribution? Write the advantages of growth factor model?

OR

1'(b). Given that a zone has 345 household with car and 345 household without car and the average trip generation rate for each group is respectively 5.0 & 2.5 trips per day. Assuming that, in future all the household will have a car; find the growth factor and future trips from the zone. Assume that population and income remains constant.

2(a). Describe any method used for measuring the traffic volume on a busy highway.

2(b). A vehicle of 2500 kN skids a distance of 36 m before colliding with a stationary vehicle of 1600 kN weight. After collision both vehicles skid a distance of 14 m before stopping. Assuming coefficient of friction 0.5, determine the initial speed of the moving vehicle.

3(a). With the help of neat sketches, describe any two types of intersections.

3(b). Write down the advantages and limitations of rotary intersections.

OR

3'(a). Differentiate between intersections at grade and grade-separated intersections.

3'(b). Four legs in a rotary intersection are designated as 1, 2, 3 and 4. The traffic volume in terms of PCU/hour is given as follows:

<table>
<thead>
<tr>
<th>Leg</th>
<th>Left Turning</th>
<th>Straight Ahead</th>
<th>Right Turning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>260</td>
<td>820</td>
<td>* 450</td>
</tr>
<tr>
<td>2</td>
<td>200</td>
<td>650</td>
<td>670</td>
</tr>
<tr>
<td>3</td>
<td>150</td>
<td>560</td>
<td>720</td>
</tr>
<tr>
<td>4</td>
<td>130</td>
<td>740</td>
<td>500</td>
</tr>
</tbody>
</table>

Calculate practical capacity of rotary in PCU/hour. Take width of carriage way at entry and exit as 7 m and length of weaving section as 45 m.
4(a). An isolated traffic signal with pedestrian indication is to be installed on a right angled intersection with road A, 18 m wide and road B, 12 m wide. During the peak hour traffic volume per hour per lane of road A and B are 275 and 225 respectively. The approach speeds are 55 and 40 km/hr on roads A and B respectively. Assume pedestrian crossing speed as 1.2 m/s. Design the timings of two phase traffic and pedestrian signals by approximate method.

4(b). With the help of neat sketches, discuss the functions of any two types of regulatory signs. OR

4'(b). What are the various types of traffic markings commonly used? Also write their uses.
2016-17  
B.E (AUTUMN SEMESTER) EXAMINATION  
CIVIL ENGINEERING  
ECE429  
INDUSTRIAL POLLUTION CONTROL  

Maximum Marks: 60  
Credits: 04  
Duration: Two Hours

Answer all the questions.  
Assume suitable data if missing.  
Notations used have their usual meaning

<table>
<thead>
<tr>
<th>Q.No.</th>
<th>Question</th>
<th>M.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(a)</td>
<td>Discuss any two briefly</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>a) Ambient Lapse Rate (ALR) and Dry Adiabatic Lapse Rate (DALR).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Fanning and Trapping plume behaviour</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Investigation of health effects of air pollutants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>1'(a)</td>
<td>Explain the classification of air pollutants according to their origin, chemical composition and physical characteristics.</td>
<td>6</td>
</tr>
<tr>
<td>1(b)</td>
<td>Briefly discuss the neutrally stable and stable inversion atmosphere in accordance to Pasquill Stability classes.</td>
<td>6</td>
</tr>
<tr>
<td>2(a)</td>
<td>An air stream is flowing at the rate of 1000 m$^3$/h at a temperature of 50°C. It contains particle with a density of 1200 kg/m$^3$. Determine the diameter of the particle that will be removed with 50% efficiency if the inlet air velocity cannot exceed 10 m/s. At 50°C, density =1.25 kg/m$^3$, viscosity=1.8x10$^{-5}$ N-s/m$^2$. Numbers of effective turns are 12.</td>
<td>6</td>
</tr>
<tr>
<td>2(b)</td>
<td>Explain the working of bag house filters.</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>A quantity of 40 m$^3$/s of air flows from a pulp and paper industry. It contains husk particles whose settling velocity is 0.12m/s. If 90 % removal efficiency is required. Calculate the surface area of electrostatic precipitators</td>
<td></td>
</tr>
</tbody>
</table>

...
3(a) Write a short note on Water Reclamation & Reuse. Explain the impact if Industrial wastewater is sent for Secondary treatment without Equalization & Neutralization? Also write the tolerance limits for discharge of any 2 of the following environmental pollutants for Inland surface water & Marine/Coastal areas:

a) COD
b) Arsenic
c) Cadmium
d) Lead

OR

3'(a) The data of wastewater generated by a community on an hourly basis is recorded as shown in table 1. Determine the capacity require for designing a Circular Equalization Tank.

<table>
<thead>
<tr>
<th>Time (hr)</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
<th>22</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative Flow (m³/hr)</td>
<td>500</td>
<td>1000</td>
<td>2400</td>
<td>5100</td>
<td>8400</td>
<td>11200</td>
<td>14000</td>
<td>15500</td>
<td>16400</td>
<td>17200</td>
<td>17700</td>
<td>18100</td>
</tr>
</tbody>
</table>

4(a) Explain the importance & functioning of Trickling filter & Rotating Biological Contactor in Industrial waste water treatment along with proper diagram.

4(b) Write a note on Management of Industrial wastewater. Also explain the important disposal methods of Industrial waste.

5 Explain the manufacturing process in detail along with various wastewater streams generated its characteristic and discuss the proposed treatment scheme for tannery or sugar industry.
Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No.  
1. Analyze the frame shown in Fig. 1 using Kani's method. $EI$ is same for all the members.  

1' Compute the shear in columns, moments in columns, moment in beams, shear in beams and vertical reaction in columns for the frame shown in Fig. 2 by Portal method. The cross-sectional area and $EI$ is same for all the members.

Fig. 1  
Fig. 2  

Contd... 2
2. Use stiffness method to analyse the beam shown in Fig. 3. Flexural rigidity, EI, of the members is constant throughout.

![Beam Diagram](image)

Fig. 3

3. (a) Differentiate between Static and kinematic indeterminacy of the structure with the help of examples. 
(b) Develop flexibility matrix corresponding to the Coordinates defined as 1, 2 and 3, in Fig. 4.

![Coordinate Axes](image)

Fig. 4

4 (a) Determine the maximum +ve and –ve shear force at a section 12 m from the left end support in a simply supported beam of span 28 m when a load system as shown in Fig. 5 crosses the beam from left to right with 10 kN load leading.

![Load System](image)

Fig. 5

4 (b) Draw IL - diagram for shear force and bending moment for a section at 6m from the left support of the simply supported beam of 20m span and calculate maximum shearing force and bending moment at this section due to a uniformly distributed load of 1kN/m intensity and 8m long crossing the girder from one end to another.

OR

Contd...
4'. For the continuous beam shown in Fig. 6, draw I.L. Diagram for (i) vertical reaction at A, (ii) vertical reaction at B, (iii) bending moment at B, and (iv) shear force at G.

![Diagram of continuous beam](image)

Fig. 6

5. A Pratt truss with parallel top and bottom chords, having a hinge supported at left end and roller support at right end has 6 panels of 5m length each and is of 5m height. Draw IL diagrams for the forces in the members connected at the second joint of the top chord from the extreme left joint. OR

5'. Draw IL diagram for the bending moment at any section 40m from the left hand support and find its maximum values when a single point load of 200kN rolling over a three hinged stiffening girder of a suspension bridge of 200m span with supports at the same level and 20m central dip.
2016-17
B.E. (AUTUMN SEMESTER) EXAMINATION
CIVIL ENGINEERING
DISASTER MANAGEMENT
ECE-444N

Maximum Marks: 60 Credits: 04 Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

1a. What is strong ground motion? State and discuss their characteristics. How is the epicentre of an earthquake located?

1b. How is the local magnitude of an earthquake related to the intensity of earthquake? What is the basic design philosophy of seismic design of structures? Discuss briefly the need of seismic zoning.

1c. A damped single degree of freedom system has the following properties:

Mass \( m = 2\text{kg}; \) Stiffness \( K = 15,000\text{N/m} \) and coefficient of damping \( C = 45\text{N/m/s}. \)

Determine the natural circular frequency, damping factor, and damped frequency of the system.

Write the equation of free response for determine the time history response of the system.

OR

1a'. What is Torsional Seismograph? Explain the construction and principle of this seismograph.

1b'. In an experiment on a certain structure modelled as a single degree freedom system, the amplitude of free vibration decreased from 10mm to 4mm. If the logarithmic decrement was 0.1018 and undamped natural frequency is 40rad/sec, determine the damping ratio, damped period and number of cycles completed.

1c'. Find the natural period for the system shown below assume that the beam and spring are massless. Take \( L=1\text{m}, \) EI= unity and \( K=3\text{units}. \)
2. Answer any three of the followings: (5x3)

(i) In what way is the earthquake resistance of a structure affected by non-symmetry and elongated shape of building?

(ii) A building should exhibit ductile behaviour in earthquake prone regions. Give the measures and provisions as per IS1893:2002 to make a building resistant in earthquake prone regions.

(iii) If a building is to be constructed on the slope of a hilly area, what precautions will have to be exercised during planning of the building to avoid twisting?

(iv) Discuss inexpensive strengthening measures of partially or non-engineered low-cost housing.

(v) Discuss engineering aspects of cyclone disaster mitigation in terms of works need to be carried out on a continuous basis.

3a. Give a detailed classification of natural and anthropogenic disasters. (08)

3b. Give a short account of floods with special reference to India. (07)

OR

3b’. What do you understand by ‘cloud burst and its after effects with special reference to India. (07)

4a. What are the methods of landslide hazard zonation and mitigation. (07)

4b. Give a short account of disaster management policy and disaster management setup of India. (08)
2016-2017
B.E (CIVIL ENGINEERING) VII SEMESTER EXAMINATION
ELEMENTS OF EARTHQUAKE AND WIND ENGINEERING
(ECE-445N)

Maximum Marks: 60 Credits: 04 Duration: Two Hours

Note: (i) Answer all the questions.
(ii) Assume suitable data, if not given.
(iii) IS 875(Part-III) and IS 1893 are allowed.

Q1(a) During an earthquake the maximum amplitude recorded at a site by Wood-Anderson seismograph is 30cm. The maximum ground velocity recorded was 20 cm/s. The site was found to be 70 kM away from the epicenter. Determine the magnitude and intensity of occurred earthquake.

Q1(b) What is Theory of Plate Tectonics? Describe in detail different types of plate boundaries.

Q1(c) Discuss different types of seismic waves.

OR

Q1'(a) What is seismic hazard analysis? Describe deterministic approach of seismic hazard analysis.

Q1'(b) The epicentral intensity of an earthquake that occurred in 1915 is estimated to be IX in MMI scale. Estimate approximate value of magnitude of earthquake.

Q1'(c) Define Peak Ground Acceleration (PGA). A site is surrounded by a point source of at 19.2 kM (M = 6.5) and an area source at a distance of 12.36 kM (M = 7.5) from site. Determine the anticipated mean value of the PGA.

Q2. Find the natural frequency and mode shapes of a two storey building modeled as a two degree of freedom system as shown in figure. Take inter-storey stiffness (k) as 197392 N/m and floor mass (m) as 2500 kg and damping ratio as 2%.

\[ m \quad k \quad 2m \]

Q3(a) Define bands with neat sketches. At what levels in a masonry building would you provide them? Give justifications for each of them.

(05) (06) (04) (06) (03) (06) (15)
Q3(b) Discuss the major causes of failure of the RC and masonry structures under past Earthquakes.

Q4(a) Sketch the ductile detailing of reinforcement in Beam-column Joint and Footing as per IS 13920.

Q4(b) The plan and elevation of a three storey RCC hospital building is shown in figure below. The building is located in seismic zone V. The type of soil encountered is medium stiff and it is proposed to design the building with a special moment resisting frame. The intensity of dead load is 15.0 kN/m² and floors are to cater to an imposed load 4.0 kN/m². Determine the seismic forces at different floor levels.

---

Plan  
Elevation

OR

Q4′(a) Describe the various Earthquake resistant features that can be introduced in a masonry building to make it Earthquake resistant.

Q4′(b) A multi-storeyed building shown in figure below having 20m x 30m plan dimensions and an overall height of 30m is to be designed at Vadodara in developed out-skirt area with scattered buildings of its height. Determine the design wind pressures acting on the building and draw the pressure diagram.

---

Plan  
Section X-X