28/1/9

Ex/BESUS/CE-703/09

B.E. (CE) Part-IV 7th Semester Examination, 2009

Disaster Mitigation

(CE-703)

Time : 3 hours **Full Marks : 70**

Use separate answerscript for each half.
Two marks are reserved for neatness in each half.
Assume any data suitably, if required.

FIRST HALF

(*Answer any THREE questions.*)

1. What do you understand by the terms 'hazards' and 'disasters'. Explain in details duely describing the terminology called as 'vulnerability'.
   Explaining what 'risk' is, discuss two broad ways of risk reduction. Discuss Disaster Management cycle in details. **[2+2+2+3+2]**

2. Explain the cause and effect of Tsunami. How Tsunami warning is issued? What can be the preparedness measure and mitigation strategies for the same? **[4+2+5]**

3. How wind flow is generated? Why and how such flow exerts the wind load? What are the factors which decide intensity of wind pressure? Discuss various types of wind storms and cyclones hazard generated in India. What is eye of a cyclone? **[2+2+3+3+1]**

4. Discuss in details with adequate diagrams, the guidelines which are needed to be followed for improving cyclone resistance of low rise houses, specially highlighting the issues of planning and siting, opening in the walls and bracing in steel frames. **[11]**

5. Explain how earthquake occurs. What do you understand by the terms 'focus and epicentric'? What are meant by isoseismal lines? Discuss the meaning of magnitude and intensity with adequate conceptual explanation. **[3+2+2+4]**

6. **A semi-engineered building with pitched roof is having following details :**

Roof type	–	Mangalore pattern tiles on wooden battens
Walls	–	Break masonry in weak cement mortar (1:5) or cement:lime:scan (1:1:6) mortar.
Battens	–	25 mm x 10 mm (Jaman/Eucalyptus @100 c/c)
Rafters	–	70 mm x 70 mm Acacia (Khair) @ 800 c/c
Ridge beam	–	100 mm x 150 mm Acacia (Khair)

Consider the design wind pressure, $p_d = 1.5\ kN/m^2$. For a roof angle of 30°, the external pressure coefficients are given for the two primary wind directions.

Wind Direction	C_{pe}
$\theta = 0°$	$-0.2/-0.50$
$\theta = 90°$	-0.8

Consider for small permeability, $C_{pi} = \pm 0.2$.

Assume any other data and values suitably in accordance with IS 875 - Part 3.

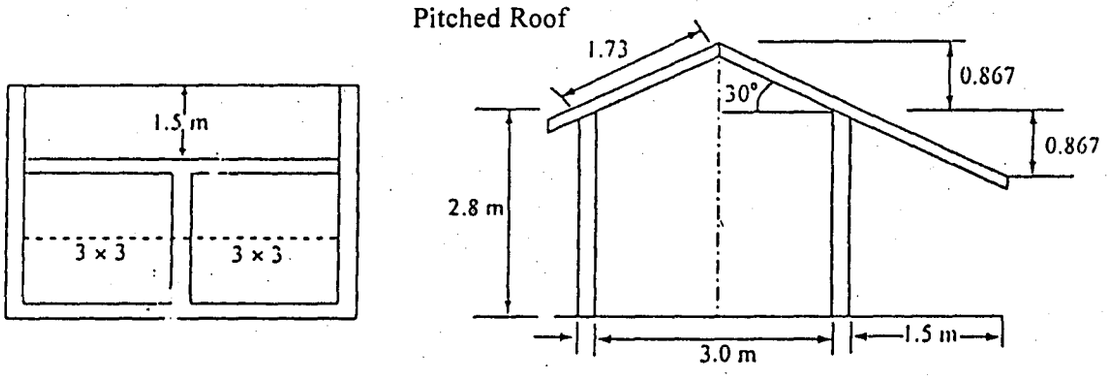
Consider the bending stress in timber as given below (NBC Pt VI).

Jaman/Eucalyptus = $10.2\ N/mm^2$

Khair = $15\ N/mm^2$

Typical self weight of Mangalore pattern tiles = $0.7\ kN/m^2$

Check the safety of roof cladding, battens and ridge beam. The geometric details of the building is provided in Figure Q.6 below. [11]



(a) Plan (b) Sectional Elevation

Figure Q.6

SECOND HALF

(Answer any THREE questions, taking at least ONE from each group.)

Group-A

7. a) Explain liquefaction of soil caused by earthquake.

   b) Enumerate the factors affecting liquefaction of soil.

   c) To evaluate the cyclic stress ratio for the soil profile in a proposed construction site, soil exploration was carried out and the following observations had been noted :

   Depth of bed rock = 20^m below existing ground level (G.L.)

   Position of water table = 5^m below G.L.

   First layer : Thickness = 8^m and $\gamma_{bulk} = 18.5\ kN/m^3$

   Second layer : Thickness = 12^m and $\gamma_{bulk} = 19.0\ kN/m^3$

Plot the variation of $\tau_{maxm.}$ and CSR with depth (5^m interval) for the given soil profile assuming the site will be subjected to an earthquake with peak ground acceleration of 0.2 g. [3+2+6]

8. a) Explain the following two methods to evaluate the liquefaction resistance of soil. (i) SPT-based Method and (ii) CPT based Method.

   b) The following SPT values are obtained from the soil exploration report for the site in Q.6(c). SPT procedure used in India, deliver about 65% of the theoretical free fall energy to the sampler. The soil profile is described in Q.6(c). Plot the values of $(N_1)_{60}$ assuming the corrections for borehole diameter, rod length, and sampler as 1.05, 0.8 and 1.0 respectively.

Depth (m)	5.0	10.0	15.0	18.0
Measured SPT, Nm	5	17	34	42

[(3+3)+5]

9. a) Enumerate the factors to be considered white selecting any ground improvement method for liquefaction hazard mitigation.

   b) Explain the following ground improvement methods
   (i) Stone Column and (ii) Vibro-compaction. [3+(4+4)]

Group-B

10. a) Discuss the various measures of flood control in brief.

    b) What are meant by flood forecasting and warning? Explain briefly. [5+6]

11. The storage, outflow data corresponding to different elevations of a reservoir, whose spill way crest is at 300.2 m are given in the table below :

Elevation (m)	299.5	300.2	300.7	301.2	301.7	302.5	302.7
Outflow (m^3/s)		0.0	15	40	75	115	160
Storage (Mm^3)	4.8	5.5	6.0	6.6	7.2	8.1	9.3

When reservoir elevation was at 300.2m the following flood is expected to enter into the reservoir :

Time (hr)	0	3	6	9	12	15	18	21	24	27
Inflow (m^3/s)	0	10	42	50	43	33	22	12	6	0

Route the flood to obtain outflow hydrograph. Also determine the variation of river water stage vs time upto 36 hours. [11]

12. a) K and x of a river reach may be taken as 22 hrs and 0.25 respectively. Route the following inflow hydrograph entering the river reach to obtain the outflow hydrograph, assuming outflow = 40 m^3/s at the beginning.

Time (hr)	0	12	24	36	48	60	72	84	96	108	120	132	144
Inflow (m^3/s)	40	65	165	250	240	205	170	130	115	85	70	60	54

b) Derive the routing equation in the form $D_2 = C_0I_2 + C_1I_1 + C_2I_0$ where symbols have their usual significance. [11]

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