R09

Code No: C2004

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I - SEMESTER EXAMINATIONS, APRIL/MAY-2012
ADVANCED REINFORCED CONCRETE DESIGN
(STRUCTURAL ENGINEERING)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1.a) State assumptions involved in the theory of 'Yield Line Analysis of Slabs'.
b) Obtain the collapse load for an Orthotropically reinforced rectangular slab continuous over all four sides and subjected to u.d.l, by assuming standard yield line pattern.

2. Using yield line theory, design the floor slab of a class room of a multi-storeyed structure for the following data. Dimensions of the class room are 4 m × 4 m. The panel is continuous on all edges. Assume M25 concrete and Fe415 grade steel. Derive the formulae involved. Sketch the reinforcement details. Assume moderate exposure condition.

3. Design an interior panel of 8 m × 8 m wide flat slab, simply supported at the periphery, by a masonry wall of 230 mm thick. Assume a live load of 4.4 kN/m^2 and finish load of 1.5 kN/m^2. Use direct design method. Use M35 concrete and Fe 500 grade steel. Sketch the reinforcement details. Assume mild exposure condition.

4. A single span deep beam has an overall depth of 4.6 m and an effective span 7 m. The width of the beam is 400 mm. The supports an udl of 305 kN/m over the entire span. Use M30 grade concrete and Fe415 grade steel. Sketch the reinforcement details.

5. Design a corbel to support a reaction due to a characteristic dead load of 105 kN and live load of 165 kN. This reaction acts at 250 mm from the face of the column which is 360 mm square in section. There is a horizontal reaction of 45 kN due to shrinkage restraint of beams. Design the corbel and sketch the reinforcement details. Use M25 concrete and Fe 500 steel.

6. A continuous concrete nib is to be provided to a reinforced concrete beam, cast in-situ. The nib is to support a series of pre-cast floor units 400 mm wide and 150 mm deep. The floor units have a clear span of 4 m and exert an ultimate total reaction of 35 kN per metre length on the rib. The dry bearing of the floor units on the beam can exert a pressure of 0.45f_{ck}. Assuming that an allowance of 20 mm has to be provided for spalling and an allowance of 25 mm has to be made for the face of the columns for inaccurate dimensions. Design a suitable nib and sketch the reinforcement details. Use M30 concrete and Fe 500 steel.

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7. Design a shear wall of length 6.5m and thickness 270 mm subjected to the following forces (Fig.1). Assume moderate exposure condition. Assume f_{ck} = 35 MPa and f_y = 415 N/mm^2 and the wall is a high wall with the following loadings: Sketch the reinforcement details.

Loading	Axial Force (kN)	Moment (kNm)	Shear (kN)
Dead Load + Live Load	2800	850	60
Seismic Load	370	5800	750

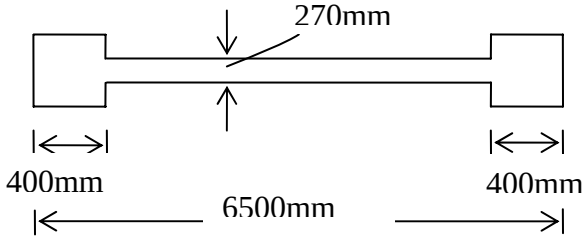


Fig.1 Shear wall

8.a) What are the various remedial measures for control of cracking ?

b) A simply supported doubly reinforced beam of rectangular section 300mm wide × 550mm overall depth is reinforced with 4 bars of 25 mm diameter on the tension face and 2 bars of 16 mm diameter on the compression face. Assume mild exposure condition. The beam spans over 8 m. Estimate only the long-term deflection. Use M25 concrete and Fe 415 grade steel.

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