CV506

M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)
BANGALORE – 560 054

SEMESTER END EXAMINATIONS – DEC 2013 / JAN 2014

Course & Branch :	**B.E.- Civil Engineering**	Semester :	**V**
Subject :	**Design of RC Elements**	Max. Marks :	**100**
Subject Code :	**CV506**	Duration :	**3 Hrs**

Instructions to the Candidates:
- Answer one full question from each unit.
- Assume missing data suitably
- IS 456:2000 and SP 16 charts are allowed

UNIT – I

1. a) Explain clearly the difference between under reinforced, balanced and over reinforced sections with respect to limit state method. (12)

   b) Determine the moment of resistant of a singly reinforced beam. The cross section of the beam is 300mm×750mm overall. It is provided with 4#20 Ø as tension reinforcement. The effective span of the simply supported beam is 7.5m. Use M_{20} grade concrete and HYSD bars. Assume mild exposure condition. Assume #8mm Ø stirrups. (08)

2. a) Explain the necessity of minimum shear reinforcement in beams (05)

   b) An isolated T section has the following details (15)
   Width of Flange = 800mm, Thickness of Flange = 150mm
   Width of rib = 300mm, Overall depth = 750mm
   Reinforcement = 8 # 25 @ bottom, Grade of Concrete = M_{35} & Grade of steel = Fe 415.
   Assume severe exposure condition and stirrups dia. as 8 mm. Calculate the flexural strength of the T section and also determine the safe superimposed load the beam can take with an effective span of 7.5m.

UNIT-II

3. A Cantilever beam of 3.5m span is 300mm wide and 600mm deep. It is subjected to a maximum bending moment of 125kNm (service moment). Assume 60% of the moment is due to permanent. The beam is reinforced with 4 bars of 20mm diameter at an effective cover of 50mm, in the tension zone. Check the beam for short and long term deflection. The grade of concrete & steel are M_{20} and Fe 415 respectively. Take age of concrete as 28 days. (20)

4. A rectangular SS beam is of effective span 7.5m and of overall size 300mm×550mm. It is reinforced with 5#16Ø on the tension side. Superimposed load on the beam at service load is 20kN/m (Including Self (20)

Wt.). Determine the surface crack widths at the following points.
  i.   Bottom corner of the beam
  ii. Below the centre of corner reinforcement
  iii. Below the centre between two bars

Grade of concrete = M_{20}
Grade of steel = Fe 415 & Assume Effective cover = 50mm.

UNIT-III

5.   A rectangular beam 300mm × 600mm wide is subjected to the following at   (20)
     a given section
       i. M_u= 60kNm
       ii. V_u= 40kN
       iii. T_u=45kNm.

     Design the section. Assume the section is exposed to moderate
     environmental condition. Characteristic strength of concrete and steel are
     M_{30} and Fe415. Assume 10mm Ø stirrups. Sketch the details.

6.   A hall measures 9m×25m of clear dimensions. Spacing of beams is 5m c/c.   (20)
     Thickness of slab is 150mm and end bearing is 230mm.Take live load on
     the floor is 4kN/m^2. Account for floor finishes and partitions. Adopt M_{25}
     concrete and Fe500 steel and the exposure is moderate. Width of rib is
     restricted to 300mm. Design an intermediate T beam. Sketch the details.

UNIT-IV

7.   Design the slab for a hall 8m wide and 21m long. The slab is supported on   (20)
     RCC beams of 300mm wide and spaced at 3.5m c/c. The LL on the slab
     may be taken as 3.5kN/m^2. Account for floor finishes and light partitions.
     Use M_{20} concrete and Fe 500 steel. Assume mild condition and sketch the
     details.

8.   Design a doglegged staircase for a public building considering a service LL   (20)
     of 4kN/m^2. The size of the staircase room is 3.2m×6.3m. Vertical distance
     between floors is 3.6m. Assume the stairs to be supported on 300mm thick
     masonry walls at the outer edge of the landings parallel to risers. Use M_{25}
     concrete and Fe 415 steel. Take rise = 150mm and Tread = 300mm.
     Assume moderate condition and sketch the details.

UNIT-V

9.   a) Design a rectangular isolated footing of uniform thickness for RC column   (20)
         has to transfer an axial load of 2800kN at service from a rectangular
         column of 375mm×600mm. Assume M_{25} concrete and Fe 415 steel. SBC of
         soil is 220kN/m^2. Design the footing. Assume clear cover as 40mm and
         sketch the details. Assume the L to B ratio as 1.6

10. a) Explain the necessity of lateral ties in column   (05)
     b) Design the reinforcements for a circular column of diameter 350mm with   (15)
         circular ties to support a factored load of 1800kN. The column has an
         unsupported length of 4m and is Effectively held in position at both ends,
         but not restrained against rotation. Assume M_{35} concrete and Fe 500 steel.
         Assume severe condition and sketch the details.
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