Department of Civil Engineering
Institute of Technical Education & Research, SOA University

Mid-Semester Examination, March-2017
Reinforced Concrete Design (CVL4121)

Semester: 6^{th} **Branch: Civil Engineering**
Full mark: 100 **Time: 2 Hours**

Subject Learning Outcome (Student will able to)	*Taxonomy Level	Question number	Marks
Classify and apply different methods of analysis of reinforced concrete structures like Working stress method (WSM) and Limit state method (LSM).	L4	2	40
Design tensile and compressive reinforcement in concrete members such as beams and slabs using LSM according to IS-456:2000.	L5	1	40
Design shear reinforcement in concrete members such as beams and slabs using LSM according to IS-456:2000.	L5	1	20

*Blooms taxonomy levels: Knowledge (L1), Comprehension (L2), Application (L3), Analysis (L4), Evaluation (L5), Creation (L6)

Answer both questions. Use data given in question paper and IS code only.

Question 1

A slab is simply supported on two beams and the beams simply supported on two walls as shown in Figure 1. The wall are 250mm thick have a clear distance of 7m between them. Beams have a center to center distance of 3m. The slab has to carry a dead load of $1.5\frac{kN}{m^2}$ and a live load of $4.5\frac{kN}{m^2}$. Design tensile and shear reinforcement for slab and beams each respectively according to IS456:2000. **20 + 10 + 20 + 10**

Question 2

The beam as shown in Figure 2 has an effective span of 8m. Find the strain in compression and tension steel. Determine the moment of resistance and maximum UDL that can be carried by the beam. Assume Fe415 steel, M20 concrete and 25mm clear cover. Refer to data given in Table 1 and 2. **25 + 15**

Grade of steel	d'/d			
	0.05	**0.10**	**0.15**	**0.20**
Fe 250	**217.5**	**217.5**	**217.5**	**217.5**
Fe 415	**355.1**	**351.9**	**342.4**	**329.2**
Fe 500	**423.9**	**411.3**	**395.1**	**370.3**

Table 1: f_{sc} **for Fe415 at** $x_u = x_{lim}$

Strain	**Stress(MPa)**
0	**0**
0.00144	**288.7**
0.00163	**306.7**
0.00192	**324.8**
0.00241	**342.8**
0.00276	**351.8**
$\geq$**0.00380**	**360.9**

Table 2: **Stress-Strain data Fe415**

$p_t = \frac{100A_{st}}{bd}$	$f_{st}(MPa)$		
	145	**190**	**245**
0.3	-	**1.89**	**1.47**
0.4	-	**1.68**	**1.34**
0.5	**1.95**	**1.53**	**1.23**
0.6	**1.79**	**1.43**	**1.17**
0.8	**1.57**	**1.29**	**1.06**
1.0	**1.42**	**1.20**	**0.99**
1.2	**1.33**	**1.12**	**0.95**
1.4	**1.26**	**1.08**	**0.92**
1.6	**1.21**	**1.03**	**0.88**
1.8	**1.17**	**0.99**	**0.85**
2.0	**1.12**	**0.97**	**0.83**

Table 3: **Data for** k_t **or** k_1

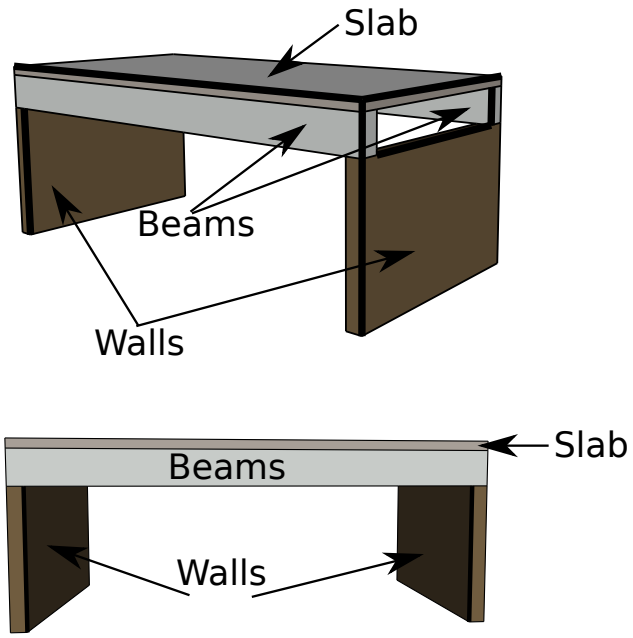

Figure 1:

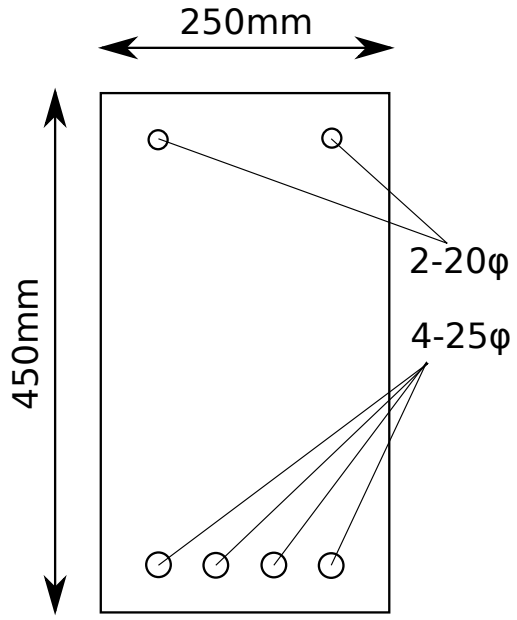

Figure 2: