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C09-C-607

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BOARD DIPLOMA EXAMINATION, (C-09)  
SEPTEMBER/OCTOBER - 2020  
DCE—SIXTH SEMESTER EXAMINATION  
STRUCTURAL ENGINEERING DRAWING

Time : 3 hours ]

[ Total Marks : 60

PART—A

4×5=20

**Instructions :** (1) Answer **all** questions.

(2) Each question carries **four** marks.

(3) Part—A may be drawn not to scale.

(4) Assume suitable data, if necessary.

(5) For all main reinforcement, use HYSD bars.

1. State any four guiding principles for positioning of beams in the structural planning of a building. 1+1+1+1=4

2. Mark the position of columns in the given diagram and name them as per 'Grid Reference Scheme' : 2+2=4

ROOM 4000 × 3600	ROOM 2000 × 3600
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- \* 3. Prepare bar bending schedule and calculate quantity of steel for the lintel beam with the following specifications :

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Clear span = 2000 mm

Bearing on each side = 200 mm

Size of beam = 230 wide × 200 depth

All covers = 25 mm (clear)

Main bars in tension zone = 2-#12 mm

Hanger bars = 2-#8 mm

Stirrups = #8 mm two-legged

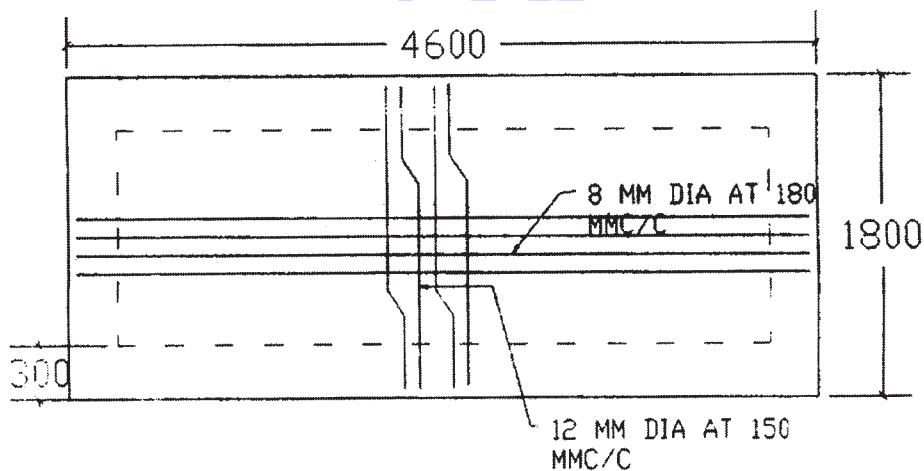
stirrups @ 200 mm c/c throughout

Weight of #12 mm = 0.89 kg/m

#8 mm = 0.39 kg/m

4. Prepare a bar bending schedule for the one-way slab shown below :

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Thickness of slab = 100 mm

All the covers = 20 mm (clear)

- \* 5. A singly reinforced rectangular beam of size 230 mm × 400 mm is provided with 3#16 mm at bottom and 2#12 mm at top with 25 mm clear covers. Shear stirrups of 2-legged #8 mm are provided @ 200 c/c. Out of 3 bars at bottom, one bar is cranked at the supports. Draw the section at end and mid-span of the beam.

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**PART—B**

20×2=40

**Instructions :** (1) Answer **all** questions.

(2) Each question carries **twenty** marks.

(3) Draw all questions to scale.

(4) Assume suitable missing data.

**6.** Draw the following views of a continuous one-way slab whose specifications are given below : 10+10=20

(a) Plan showing the reinforcement

(b) Longitudinal section of the T-beam

*Specifications :*

(i) Clear span (shorter) = 3 m

(ii) Clear span (longer) = 6.5 m

(iii) Overall depth of the slab = 110 mm

(iv) Depth of web of T-beam (from the bottom of the slab) = 340 mm, width of T-beam = 230 mm

(v) Slab reinforcement :

Main steel along the mid-span and continuous direction = #10 @ 130 mm c/c

Along longer span = #10 @ 180 c/c, as distributors

Distribution steel at the top to support bent up bars = #8 @ 200 mm c/c

(vi) Beam reinforcement :

Bars in tension = 3#16, out of which 1 bar is cranked at a distance of 930 mm from the face of the support

Hanger bars = 2#12

Stirrups = #8, two-legged stirrups at 200 mm c/c

Bed block size = 230 mm × 230 mm × 150 mm

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- (vii) All covers for slab reinforcement = 20 mm  
All covers for beam reinforcement = 40 mm
- (viii) Width of wall around = 230 mm
- (ix) Number of bays = three

**7.** Draw the longitudinal section of the staircase spanning longitudinally with the specifications given below :

*Specifications :*

- Size of the staircase room = 4000 mm × 2500 mm (inside)
- Level difference between the floors = 3600 mm
- Width of the stair = 1200 mm
- Landing width = 1000 mm
- Tread = 270 mm
- Rise = 150 mm
- Thickness of waist slab = 200 mm
- Bearing on wall = 230 mm
- Thickness of wall = 230 mm
- Projection into the basement = 300 mm × 300 mm

*Materials :*

Concrete = M 20 grade steel : Fe 415 grade

*Reinforcement :*

Along shorter span = #12 at 200 mm c/c (alternate bars are cranked at a distance of 400 mm from the face of the support)

Along longer span = #10 at 250 mm c/c (alternate bars are cranked at a distance of 500 mm from the face of the support)

Provide 3#8 hanger bars at each edge to keep top bars in position.

*Covers :*

Top and bottom clear cover = 20 mm

Side clear cover = 25 mm

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Draw the following views to a scale of 1 : 20 :  $10+5+5=20$

(a) Bottom plan of the reinforcement

(b) Top plan of the reinforcement

(c) Cross-section along the shorter span at mid-span

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