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C14–C–607

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BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2018

DCE—SIXTH SEMESTER EXAMINATION

STRUCTURAL ENGINEERING DRAWING

Time : 3 hours] [*Total Marks* : 60

PART—A 4×5=20

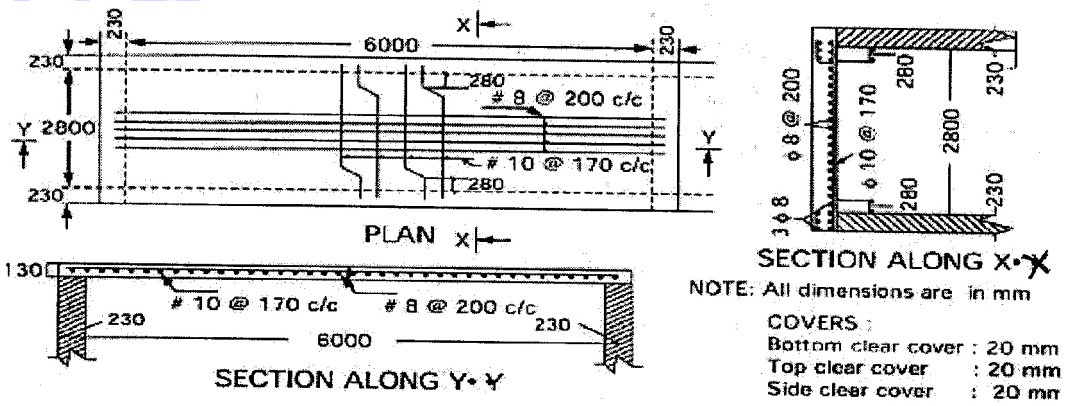
Instructions : (1) Answer **all** questions.

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

(3) Any missing data may be assumed suitably.

1. State any four guiding principles for positioning of columns in a structural planning of a building.

2. Prepare bar bending schedule and find the total quantity of steel required for one-way slab shown in the figure below :



3. Draw the longitudinal cross-section of an isolated square footing for a column with the following specifications :

Size of the column	= 400 mm × 400 mm
Size of the footing	= 2200 mm × 2200 mm
Thickness of the footing	= 450 mm
Base coarse thickness	= 150 mm with PCC 1 : 2 : 4
Reinforcement for footing	= 12 mm dia, at 150 mm c/c both directions. The horizontal lap length of the column reinforcing bar is 500 mm each

Reinforcement for the column :

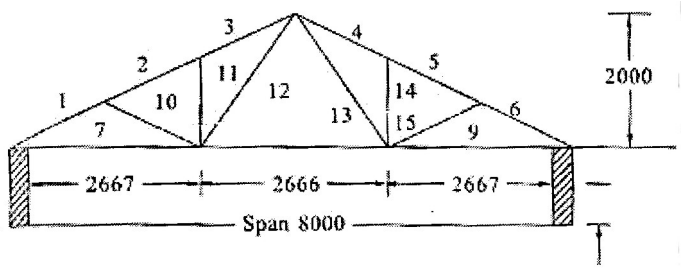
Main bars	= 16 mm dia, 4 Nos.
Lateral ties	= 8 mm dia, ties at 200 mm c/c
All covers	= 50 mm

4. From the following specifications draw cross-section of the lintel with sunshade. A lintel with sunshade arrangement was provided over an opening of 1200 mm. Bearing on either side of the walls is 230 mm. Width of the wall and lintel is 230 mm. Overall depth of the lintel is 200 mm. Lintel is provided with 3 bars of 12 mm dia as main reinforcement (middle bar is cranked at a distance of 150 mm from either side of support) and 2 bars of 10 mm dia as anchor bars at tap. To resist shear, two-legged vertical stirrups of 6 mm dia are provided at 150 mm c/c.

Projection of sunshade is 550 mm with thickness of 100 mm at the fixed end and 60 mm at the free end. Main bars of 10 mm dia at 140 mm c/c and distribution bars of 6 mm dia at 120 mm c/c.

Bottom clear cover in lintel is 30 mm and top clear cover in sunshade is 20 mm and all the remaining covers are 25 mm.

5. From the line diagram given below, draw the design details of a roof truss at the joint of bottom chord members :



Tie beam : 2 nos. back to back ISA 50 mm × 50 mm × 6 mm @ 4–5 kg/m

Other members at joint 1 no. ISA 50 mm × 50 mm × 6 mm @ 4–5 kg/m

Fig. 2

PART—B

20×2=40

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

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

(3) The drawing must be to the scale.

(4) Any missing data may be assumed suitably.

6. The reinforcement details of a simply supported singly reinforced rectangular beam are given below :

Specifications :

Clear span of the beam	= 3500 mm
Bearings on either side	= 200 mm
Width of the beam	= 300 mm
Overall depth of the beam	= 450 mm
Materials	= M20 grade concrete, Fe–415 steel
Bars in tension	= 5 # 20, out of which 2 bars are cranked at 45° at a distance of 400 mm from each face of the support
Hangers bars	= 2#12 mm dia at top
Stirrups	= #8, two-legged stirrups at 250 mm c/c

Top, bottom and side clear covers are 40 mm

Draw the following views to a suitable scale :

(a) Longitudinal section 10

(b) Cross-section at the middle 5

(c) Cross-section at the end 5

7. Draw the following views of a built-up column with batten system from the given specifications :

(a) Cross-sectional plan of the column 10

(b) Side elevation of column showing bottom tie plate and batten up to a minimum of two nos. 10

Specifications :

Overall height of the column is 6000 mm consists of 2 nos. ISMC 250 @ 30, 4 kg/m placed back to back keeping a clear distance of 150 mm between the webs. The column is provided with batten system. The sizes of end battens are 250 mm deep × 10 mm thick and intermediate battens are 200 mm deep × 10 mm thick. Spacing between the consecutive battens is 800 mm, 6 mm fillet weld of 60 mm lap length and over the entire depth of batten on end face is provided as batten connection with the main component.

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