

Total No. of Questions : 4]

SEAT No. :

P3329

[Total No. of Pages : 2

[5257]-1001

F.Y. B.Arch. (Semester - I)

**BUILDING TECHNOLOGY AND MATERIALS - I**  
**(Revised 2015 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Answer all questions from Section-I on Drawing Sheets, and from Section-II in Answer Book only.*

**SECTION - I**

**Q1)** Draw any one of the following : **[20]**

Draw T-junction for 1½ (one and half) brick thick English bond to a scale of 1:10.

- a) plans of alternate courses
- b) elevation of six courses
- c) isometric view of four courses

Label bats and closures used in both courses.

OR

Draw L-junction for one brick thick Double Flemish bond to a scale of 1:10.

- a) plans of alternate courses
- b) elevation of six courses
- c) isometric view of four courses

Label bats and closures used in both courses

**P.T.O.**

**Q2)** Write short note with sketch (any three) : **[15]**

- a) Explain random rubble masonry with sketches.
- b) Draw sketch of any 5 masonry tools and explain their uses.
- c) Draw any 03 types of coping in stone for parapet wall.
- d) Sketch and Explain any 05 types of special bricks.
- e) Draw a sketch of 450mm thick UCR wall in black cotton soil.
- f) Draw cross section of steps formation for plinth height 600.

### **SECTION - II**

**Q3)** Explain with sketch (any two) : **[20]**

- a) What is natural bed of stone? Write a note on geological classification of rocks.
- b) What is bulb of pressure? Explain its significance in building construction/ site investigation.
- c) Draw a neat sketch of segmental arch showing its components.
- d) Explain with sketches Load Transfer in a Load Bearing structure.

**Q4)** Explain any three : **[15]**

- a) What are causes of failure of foundation?
- b) What are advantages and limitations of Compressed Stabilized Earth Block.
- c) What is pointing? Write short note on any two types of pointing?
- d) Advantages and disadvantages of cement mortar.
- e) What is mortar? Explain function and qualities of good mortar.



Total No. of Questions : 4]

SEAT No. :

P3329

[Total No. of Pages : 2

[5257]-1001

F.Y. B.Arch. (Semester - I)

**BUILDING TECHNOLOGY AND MATERIALS - I**

**(Revised 2015 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 70*

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- 3) Figures to the right indicate full marks.*
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- 5) Answer all questions from Section-I on Drawing Sheets, and from Section-II in Answer Book only.*

**SECTION - I**

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- a) plans of alternate courses
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Label bats and closures used in both courses.

OR

Draw L-junction for one brick thick Double Flemish bond to a scale of 1:10.

- a) plans of alternate courses
- b) elevation of six courses
- c) isometric view of four courses

Label bats and closures used in both courses

**P.T.O.**

**Q2)** Write short note with sketch (any three) : **[15]**

- a) Explain random rubble masonry with sketches.
- b) Draw sketch of any 5 masonry tools and explain their uses.
- c) Draw any 03 types of coping in stone for parapet wall.
- d) Sketch and Explain any 05 types of special bricks.
- e) Draw a sketch of 450mm thick UCR wall in black cotton soil.
- f) Draw cross section of steps formation for plinth height 600.

### **SECTION - II**

**Q3)** Explain with sketch (any two) : **[20]**

- a) What is natural bed of stone? Write a note on geological classification of rocks.
- b) What is bulb of pressure? Explain its significance in building construction/ site investigation.
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- d) Explain with sketches Load Transfer in a Load Bearing structure.

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- c) What is pointing? Write short note on any two types of pointing?
- d) Advantages and disadvantages of cement mortar.
- e) What is mortar? Explain function and qualities of good mortar.



[5257]-1002

F.Y. B.Arch.

**THEORY OF STRUCTURE - I**  
**(2015 Pattern)**

Time : 3 Hours]

[Max. Marks : 70

*Instructions to the candidates:*

- 1) Q.1 from section I and Q.5. from section 2 has to be compulsory.
- 2) Any two question out of Q. 2/3/4 to be attempted from section I.
- 3) Any two question out of Q. 6/7/8 to be attempted from section II
- 4) Use of scientific calculator is allowed.

**SECTION - I**

- Q1)** A beam as shown in fig.1. Calculate a) support reaction b) shear force dia. With position of zero shear c) bending moment dia. With point of contraflexure. [15]

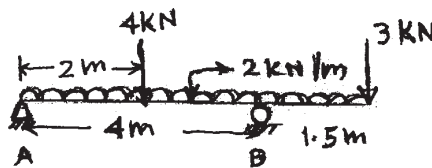


Fig.1.

- Q2)** a) An electric light fixture weighing 15 N hangs from point C, by two strings AC & BC. AC is inclined at  $60^\circ$  to the Horizontal & BC at  $45^\circ$  to the vertical as shown in Fig.2. Using Lami's theorem determine the forces in the strings AC & BC. [7]

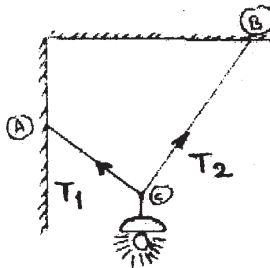


Fig.2.

- b) Define support. Explain hinged & roller support with respect to reaction they offer. [3]

P.T.O.

- Q3) a) Find the centroid of the 'T' section as shown in fig 3. [6]

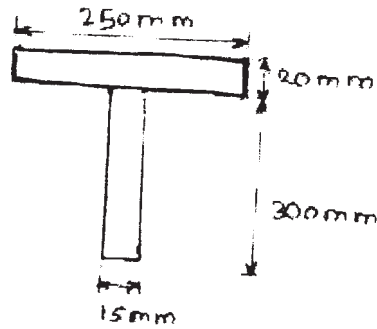


Fig.3.

- b) Draw a right angled triangle & semi-circle and show their center of gravity about X-X, Y-Y axis. [4]

Q4) Solve any two :

- a) State and explain Law of parallelogram theorem. [5]
- b) i) Draw and explain concurrent & non-current force system. [3]
- ii) Explain resolution of force. [2]
- c) State & explain the principle of superposition of force & principle of transmissibility of force. [5]

### SECTION - II

- Q5) Find centroide. And Calculate moment of inertia for a given section Fig.4 about its cenetroidal X-X & Y-Y axis. [15]

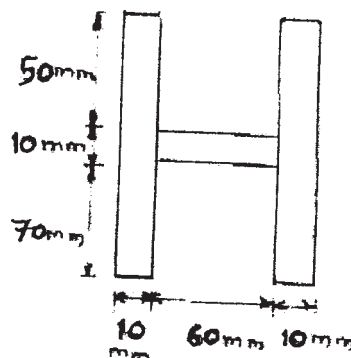


Fig.4.

Q6) a) Find support reaction for beam given in fig. 5. [7]

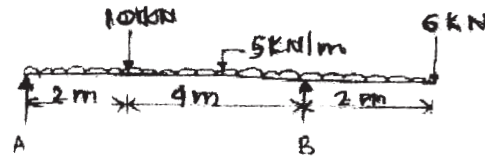


Fig.5

b) Explain point load, UDL & uniformly varying load. [3]

Q7) a) Find the resultant of the following system of forces as shown in fig.6. [6]

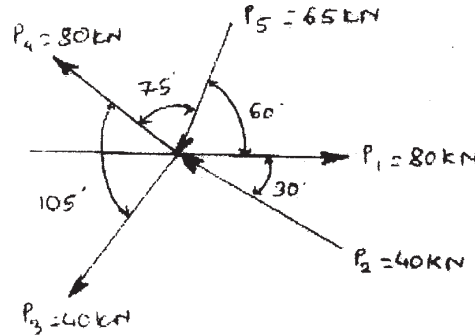
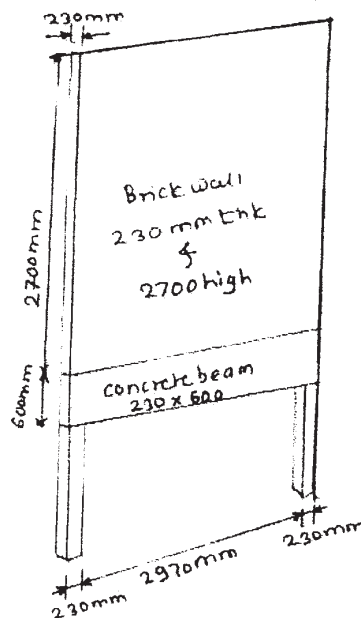


Fig.6

b) What is statically determinate and indeterminate structure. Explain the term degree of indeterminacy giving example of a fixed beam. [4]

Q8) a) Find the Support Reactions for the beam given Below. [6]



b) Explain a Simple, Fixed, Hinged and Roller Support with the help of reactions they offer. [4]



Total No. of Questions : 4]

SEAT No. :

P3331

[Total No. of Pages : 2

[5257]-2001

F.Y. B.Arch. (Semester - II)

**BUILDING TECHNOLOGY AND MATERIALS - II (Revised)  
(2015 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Answer all questions from Section-I on Drawing Sheets, and from Section-II in Answer Book only.*

**SECTION - I**

**Q1)** Draw any one of the following : **[20]**

Provide a single timber floor for first floor a room of size 2750mm × 3500mm built in 1½ (one and half) brick wall. Draw Plan and Section to the Scale 1:20  
Draw the following to a scale 1:5

- a) Joint between Joist and wall plate.
- b) Fixing of wall plate to wall.

OR

Provide a timber water proof flush door for a bath room with walls of 230 thick brick masonry surrounding it. Consider lintel level at 2100mm.

- a) Draw plan, elevation and section to a scale of 1:10.
- b) Sketch joinery detail between head and post

**P.T.O.**



**Q2)** Explain with neat sketches: **[15]**

Explain with neat sketches:

- a) Any 5 types of joints in bamboo.
- b) Any 2 types of joints in floor boards.

OR

Draw proportionate sketches:

- a) Draw a neat sketch of queen post and name its various parts and members.
- b) Draw and explain any three members used in timber staircases.

### **SECTION - II**

**Q3)** Attempt any two : **[20]**

- a) Draw neat, proportionate sketches, notes on uses of five different tools & equipment used for carpentry works.
- b) Draw neat & proportionate sketches
  - i) Barrel Vaults and cross vault
  - ii) Any two types of domes
- c) Explain different types of clay roofing with short note and sketch.

**Q4)** Write short notes with relevant sketches (any three) : **[15]**

- a) Explain terms Single, double and Triple floors in timber.
- b) Market forms of timber and it's any five uses.
- c) Explain Reinforced brick masonry with short note and sketch.
- d) Write down qualities of good timber.
- e) Explain different timber preservation methods.



Total No. of Questions : 8]

SEAT No. :

P3332

[Total No. of Pages : 3

[5257]-2002

First Year B.Arch. (Semester - II)

THEORY OF STRUCTURES - II

(2015 Pattern)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Q.1 in section I and Q.5 in section II are compulsory questions.
- 2) Answer any Two Questions out of remaining Three in each section.
- 3) Use of Scientific Calculator is allowed.
- 4) Marks to the right indicate Full Marks.

**SECTION - I**

Q1) For the given truss, find forces and mention their nature. (figure 1).

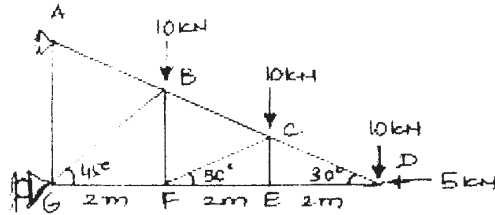


figure 1

Finding reactions [3]

Finding member forces [12]

Q2) a) Explain following terms : [2]

- i) Axial stress
- ii) Bending stress

b) Draw shear stress distribution diagram and find maximum shear stress for a simply supported beam having length 6 m, with uniformly distributed load 8 kN/m. Cross section of beam is a symmetrical I section, having moment of inertia  $22926667 \text{ mm}^4$ , top and bottom flanges 100mm wide, total depth including flanges is 200 mm and thickness of flange and web for I section is 10 mm. [8]

P.T.O.

- Q3)** a) Explain stress strain curve for mild steel with following terms : [6]
- Limit of elasticity
  - Yield stress
  - Ultimate stress
- b) Draw shear stress distribution diagrams for rectangular section and T section indicating maximum value of shear stress. [4]
- Q4)** a) For a cantilever beam having span 3m, if the permissible bending stress is  $5 \text{ N/mm}^2$ , what will be the maximum udl it can carry? Cross section is a rectangular section having 500 mm depth, 250 mm width. [8]
- b) What is lateral strain? What is poisson's ratio? [2]

### SECTION - II

- Q5)** a) For a masonry column cross section  $400 \text{ mm} \times 600 \text{ mm}$  carrying compressive load of 800 kN with eccentricities from xx and yy axis as shown. Find the resultant stresses at four corners A,B, C and D. Sketch the tensile zone for the column section. [12]

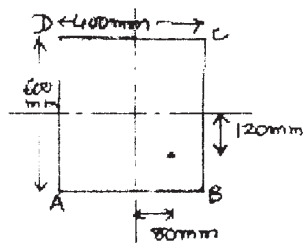


figure 2

- b) For a rectangular cross section having width 300 mm and depth 600 mm, sketch the kernel of the section. [3]
- Q6)** a) For a cantilever RCC beam having  $230 \text{ mm} \times 460 \text{ mm}$  section, and length 3 m, has modulus of elasticity  $E = 0.15 \times 10^5 \text{ N/mm}^2$ . The beam carries udl of 5 kN/m including self weight. Find maximum deflection for the same. [6]
- b) What is condition of perfect truss? Explain. [4]

**Q7)** a) For a circular RCC column having 400 mm diameter, compressive axial load is 900 kN. If the column is reinforced with 12 bars of 20 mm diameter, find the load carried by steel and concrete. Modulus of elasticity for steel is  $2 \times 10^5$  N/mm<sup>2</sup> and modulus of elasticity for concrete is  $0.15 \times 10^5$  N/mm<sup>2</sup>. [8]

b) Explain : section modulus. [2]

**Q8)** a) Explain bending stress equation and terms involved in it. [6]

b) Explain : [4]

Modulus of rigidity

Modular ratio



Total No. of Questions : 4]

SEAT No. :

P264

[Total No. of Pages : 2

[5257]-3001

S.Y. B.Arch. (Semester - III)

**BUILDING TECHNOLOGY AND MATERIALS - III**  
**(2015 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Answer to Section -I to be drawn on drawing Sheet only.*
- 3) *Answer to Section -II to be written on answer sheet only.*
- 4) *Draw neat labelled sketches wherever necessary.*
- 5) *Assume suitable data wherever necessary.*
- 6) *Figures on right of each question indicate full marks.*

**SECTION - I**

**Q1)** A shop of size 3m × 3m × 4.5m height needs to be constructed in RCC frame structure. It has flat roof and plinth level of 600mm from the ground level. Draw following details to the scale of 1:10.

- a) Draw sectional elevation and sectional plan showing all necessary RCC elements. [10]
- b) Draw detailed section through plinth showing RCC footing and plinth beam. [10]

OR

A balcony door opening of size 2.6 × 2.4m needs to be provided with a partly-glazed sliding & folding door. Draw the following to the scale of 1:10 showing all the required details.

- a) Draw elevation, section & plan through the glazed panel, showing all necessary fittings and hardware used. Show door in open and closed state in elevation and plan. [15]
- b) Draw fixing detail of the hardware used for sliding and folding. [5]

**P.T.O.**

**Q2)** Draw neat labelled sketches on sheet for the following (Any three) : [15]

- a) What tools are used for slump test of concrete.
- b) Explain the pressure bulb in soil investigation.
- c) Draw the details of a collapsible door.
- d) While casting RCC structural elements what precautions need to be taken?
- e) Draw the longitudinal section of a typical simply supported beam showing reinforcement details.
- f) What are the methods of damp proofing. Explain any two.

### SECTION - II

**Q3)** Answer any two with the help of sketches. [20]

- a) Explain the procedure of waterproofing a RCC chajja.
- b) Explain in detail the Shahabad tile water proofing method used for underground water tank.
- c) Explain the operation and working of MS Rolling shutter.
- d) What is a two-way slab? Explain the reinforcement details for same.
- e) How is raft foundation done? Where is it applicable?

**Q4)** Write short notes on any three of the following : [15]

- a) Draw the formwork for casting the RCC footing indicating different check points.
- b) Explain the cube test for testing of concrete.
- c) What is strip foundation? Explain the conditions when strip foundation is used.
- d) Why is soil investigation undertaken?
- e) Draw detail section of a bored cast in situ pile.
- f) How is the fixing of barbed wire fencing to the end angle post for compound wall done?



[5257]-3002

S.Y. B.Arch. (Semester - III)

**THEORY OF STRUCTURES - III (Backlog)**  
**(2015 Pattern)**

Time : 3 Hours]

[Max. Marks : 70

*Instructions to the candidates:*

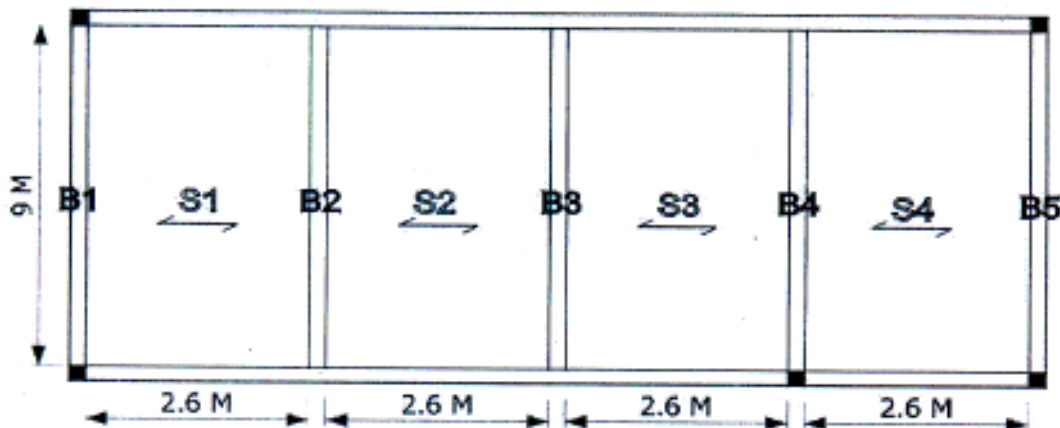
- 1) Q. nos. 1 & 5 are compulsory. Solve any two questions from 2,3 & 4 and two from 6,7 & 8.
- 2) Assume Steel of grade Fe410 / E250. Yield stress = 250 N/mm<sup>2</sup>.
- 3) Take permissible bending stress in steel as 165 N/mm<sup>2</sup> and permissible shear stress as 100 N/mm<sup>2</sup>.
- 4) Take permissible tensile stress in steel as 150 N/mm<sup>2</sup>.
- 5) Take permissible bearing stress for bolt = 300 N/mm<sup>2</sup> and permissible shear stress for bolt as 100 N/mm<sup>2</sup>.
- 6) Take permissible Stress in weld = 108 N/mm<sup>2</sup>.
- 7) Use of Non-Programmable Scientific calculator & steel tables is allowed.

**SECTION - I****Q1)** As per the sketch below,

Given, RCC Slabs S1, S2, S3 & S4 - 140 mm. thk., Floor finish load = 1.25 kN/m<sup>2</sup>, Live load = 3 kN/m<sup>2</sup>. Wall thickness - 230 mm

- a) Calculate load on girder B2. [5]
- b) Design girder B2. [10]

Assume permissible bending stress as 165 N/mm<sup>2</sup> and permissible shear stress as 100 N/mm<sup>2</sup>. Check for shear and deflection. Take allowable deflection as Span/300.



P.T.O.

- Q2)** a) What is Slenderness ratio ? Explain shortly with a sketch. [2]  
b) Design a Stanchion for an effective height ( $L_e$ ) 4.2 m to take a load of 700 kN. [8]
- Q3)** Write Short notes on any 3 of the following : [10]  
a) Criteria for 1. Length of wall & 2. Openings in a load bearing structure.  
b) Dead loads.  
c) Live loads.  
d) State the advantages & disadvantages of a continuous beam.  
e) Wind loads.
- Q4)** a) A fixed beam of span 8 m. carries an UDL of 15 kN/m and a central point load of 20 kN. Solve the fixed beam. [7]  
b) What are the advantages of a fixed beam? [3]

### SECTION - II

- Q5)** a) Design a steel tension member 1.5 m. long to take a force of 90 kN in a truss. [9]  
b) Also design the bolted connection. [6]  
Assume permissible tensile stress in steel as 150 N/mm<sup>2</sup>  
Take permissible bearing stress in bolt = 300 N/mm<sup>2</sup> and permissible shear stress in bolt as 100 N/mm<sup>2</sup>.
- Q6)** a) An ISA 75 × 75 × 8 is used as compression strut 2.1 m long to carry a load of 120 kN. It is to be welded to a gusset plate. Design the welded connection. [6]  
Take permissible stress in weld as 108 N/mm<sup>2</sup>.



- b) Explain any 2 of the following : [4]
- i) Advantages of bolted connections.
  - ii) Disadvantages of riveted connections.
  - iii) Advantages of welded connections.

**Q7)** Write Short notes on any 3 of the following : [10]

- a) Basic principles of load transfer in arches.
- b) What steel sections are recommended for 1. Stanchion, 2. Girder & 3. Strut?
- c) Common steel structures.
- d) Advantages of steel structures.
- e) Disadvantages of steel structures.

**Q8)** a) ISHB 350 @ 67.4 kg/m is used as a stanchion, 3.8 m. high, with both ends fixed. [6]

Determine its Crippling load using Euler's equation.

Given,  $E = 2 \times 10^5 \text{ N/mm}^2$ .

- b) Explain shortly any 2 of the following : [4]
- i) Why are connections required in a steel structure?
  - ii) Seismic load.
  - iii) State any 3 cases of load transfer across lintels.



Total No. of Questions : 4]

SEAT No. :

**P266**

[Total No. of Pages : 2

**[5257]-3003**

**S.Y. B.Arch. (Semester - III)  
BUILDING SERVICES - I  
(2015 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *All questions are compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data wherever necessary.*
- 5) *Draw neat sketches if necessary.*

**SECTION - I**

**Q1)** Design an overhead water tank for an apartment building with 16 flats. Calculate water capacity and draw section of the same. **[15]**

OR

Explain with neat sketches 'Bib tap' stopcock with reference to their parts, location in water supply system.

**Q2)** Write short notes on (Any 4) : **[20]**

- a) Ferrule connection.
- b) Float valve.
- c) Two types of pumps used in water supply.
- d) Calori fier.
- e) Solar Water heater.
- f) G.I. pipe - Advantages & Disadvantages.

**P.T.O.**

## SECTION - II

**Q3)** Draw and label all the parts of a septic tank and explain its working : [15]

OR

Explain with neat sketches Gully trap, disconnecting trap with reference to their use, location in drainage system.

**Q4)** Write short notes on (Any 4) : [20]

- a) Wash hand basin.
- b) Inspection chamber.
- c) Joining in stoneware pipe.
- d) Storm water drainage.
- e) Self cleansing velocity.
- f) Single stack system.



Total No. of Questions : 4]

SEAT No. :

P267

[Total No. of Pages : 2

[5257]-4001

S.Y. B.Arch. (Semester - IV)

**BUILDING TECHNOLOGY AND MATERIALS - IV**  
**(2015 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Answer to Section - I to be drawn on drawing Sheet only.*
- 3) *Answer to Section - II to be written on answer sheet only*
- 4) *Draw neat labelled sketches wherever necessary.*
- 5) *Assume suitable data wherever necessary.*
- 6) *Figures on right of each question indicate full marks.*

**SECTION - I**

**Q1)** The R.C.C. slab is to be constructed for the clear span of  $3 \times 4$  m, supported on the RCC beams of size  $230 \times 450$  on all four sides . Draw following details to the scale of 1:20

- a) Draw sectional elevation and sectional plan showing all necessary RCC elements. **[10]**
- b) Show the details of reinforcement. **[10]**

OR

An simple, doglegged RCC stair to be constructed for the clear height of 3.00m in a residential building. Draw the following details to the scale of 1:20.(Assume the necessary data)

- a) Draw plan & sectional elevation & through the stair case, showing section through mid landing along with the supporting beams detail. **[10]**
- b) Label all the elements in section ,along with the reinforcement details.[10]

**P.T.O.**

**Q2)** Answer the following with neat sketches (Any three) : **[15]**

- a) Draw the RCC beams and column junction, for continuous beams along both sides of column.
- b) What are Elevators & Escalators? Draw & label the important parts of it.
- c) What is a Bay window? Discuss it with the sketch.
- d) What is tanking to the basement? Discuss with the sketch.

### **SECTION - II**

**Q3)** Answer any two with the help of sketches. **[20]**

- a) What is Light weight concrete? Explain its applications.
- b) What is precast construction? How are the different elements are connected?
- c) What is ferrocement and its applications in building industry?
- d) How is basement water proofing done? Discuss any two methods with sketches.

**Q4)** Write short notes on any three of the following : **[15]**

- a) What are the different materials used for construction of metal windows? Discuss its advantages & disadvantages.
- b) What is a balcony? Discuss a bracket beam.
- c) What is Light weight concrete? Explain its applications.
- d) What are admixtures? Name those used in R M C.
- e) Explain the Battery of lifts & planning norms governing it.



Total No. of Questions : 8]

SEAT No. :

P268

[Total No. of Pages : 4

[5257]-4002

S.Y. B.Arch. (End Semester)

**THEORY OF STRUCTURES - IV**

**(2015 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 70*

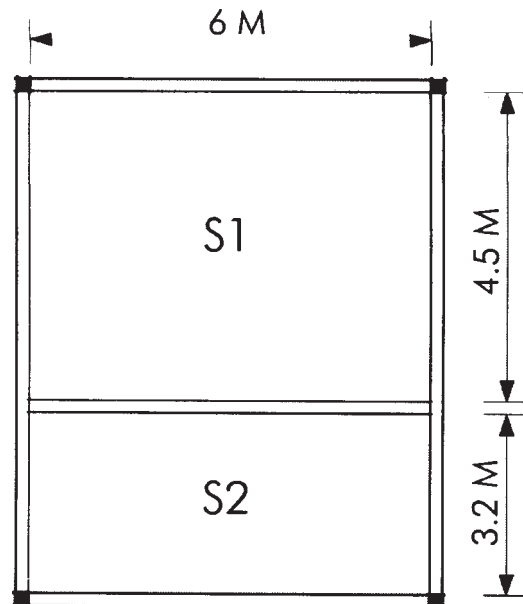
*Instructions to the candidates:*

- 1) *Q.nos. 1 & 5 are compulsory. Solve any two questions from 2, 3, & 4 and two questions from 6, 7, & 8.*
- 2) *Take M20 grade concrete & Fe500 grade steel.*
- 3) *Assume suitable data, if required. Mention the assumption.*
- 4) *Use of Non-Programmable Scientific calculator is allowed.*

**SECTION - I**

- Q1)** W.r.t. the framing plan in the figure below, design the slab S1. **[15]**  
Assume all beams as 230 mm thk. Take floor finish load =  $1.25 \text{ kN/m}^2$  & live load =  $4 \text{ kN/m}^2$ .

Summarize the design by Schedule & Sketch.



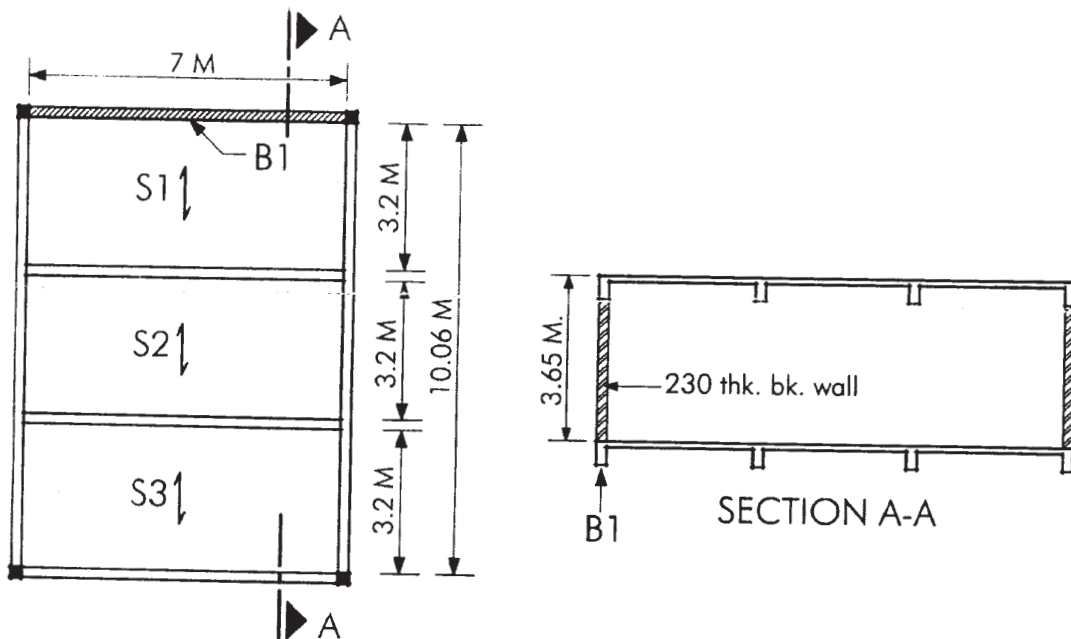
**P.T.O.**

- Q2)** A simply supported RCC beam of size  $230 \times 450$ , M20 grade concrete, is reinforced with 2 nos.  $20 \text{ } \Phi \text{ Fe500}$  bars in the tensile zone. Determine, [10]
- Moment of resistance of the beam.
  - The safe UDL, the beam can carry for an effective simply supported span of 4.10 m.
- Q3)** Design a short RCC rectangular column 230 wide, to take a load of 650 kN. Take 1% steel. Make the Schedule & sketch. [10]
- Q4)** Answer the following : [10]
- IS 456 provisions of minimum reinforcement in slabs and beams.
  - Short note on bond stress & development length.
  - Explain with sketches the function of distribution steel in slabs.

### SECTION - II

- Q5)** W.r.t. the framing plan & section in the figure below, design the highlighted beam B1. Assume all slabs to be 130 mm thk. Take floor finish load & live load on slabs as  $1.25 \text{ kN/m}^2$  and  $4 \text{ kN/m}^2$ , respectively. Take the beam & columns as 230 mm thk. Take density of brick masonry as  $19 \text{ kN/m}^3$ .

Also design the shear stirrups. Refer the Table 19 below as per IS 456 for the same. Summarize the design by Schedule & Sketches. [15]



## FRAMING PLAN

Table 19: Design Shear strength of Concrete

| 100 As/bd (%) | $\tau_c$<br>(N/mm <sup>2</sup> ) |
|---------------|----------------------------------|
| 0.15          | 0.28                             |
| 0.25          | 0.36                             |
| 0.50          | 0.48                             |
| 0.75          | 0.56                             |
| 1.00          | 0.62                             |
| 1.25          | 0.67                             |
| 1.50          | 0.72                             |

**Q6)** Design a cantilever balcony slab 1.25 m. wide for a bungalow. Take the beam as 230 thk. **[10]**

Take live load for the balcony = 3 kN/m<sup>2</sup>. Conclude with Schedule & sketch.

OR

Draw proportionately, a plan & section as per the following schedule. Show all dimensions and nomenclature. Given - Slab dimensions - 7.5 m × 3.6 m, Beam widths - 230 mm

| Slab | Depth | Steel @ shorter span | Steel @ longer span | Remark     |
|------|-------|----------------------|---------------------|------------|
| S4   | 145   | 10 $\Phi$ @ 125 c/c  | 8 $\Phi$ @ 285 c/c  | 1 way slab |

**Q7)** Answer any 3 of the following : **[10]**

- a) Explain Under-reinforced & over-reinforced sections.
- b) Explain compressive strength & characteristic strength of concrete.
- c) Explain Limit state of cracking and how is it taken care of.
- d) Explain Limit state of deflection and how is it taken care of.



**Q8)** Design a timber beam in Indian Oak to take a load of 27 kN/m inclusive of its own weight for a simply supported clear span of 4.6 m. The beam is supported on 230 thk. bk. walls. **[10]**

Take  $d = 3b$ , Permissible bending stress -  $12.16 \text{ N/mm}^2$ , Permissible shear stress -  $1.67 \text{ N/mm}^2$ , Check for shear only. Check for deflection and form factor not required.



Total No. of Questions : 4]

SEAT No. :

**P269**

[Total No. of Pages : 2

**[5257]-4003**

**S.Y. B.Arch. (Semester - IV)**

**BUILDING SERVICE - II**

**(2015 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) Solve two sections in separate answer books.*
- 2) Figures to right indicate marks.*
- 3) Assume suitable data wherever necessary.*
- 4) All questions are compulsory.*

**SECTION - I**

**Q1)** Explain the flow of electricity from service station to particular tenement with involved elements with necessary sketches. **[15]**

OR

Explain 'Lumen method'; explain different factors considered in 'Lumen method' with help of its formula.

**Q2)** Write short notes with neat sketches wherever necessary (Any 4) : **[20]**

- a) Incandescent lamp.
- b) Accent lighting.
- c) Daylight factor.
- d) Vermi composting.
- e) 3R concept in solid waste disposal.
- f) Luminance & Illuminance.

**P.T.O.**

## SECTION - II

**Q3)** Explain the different types of wiring systems used in building electrification. **[15]**

OR

What is earthing? Explain types of earthing with neat sketches.

**Q4)** Write short notes with neat sketches wherever necessary (Any 4) : **[20]**

- a) Miniature Circuit Breaker (MCB).
- b) Distribution Board.
- c) Bus bar.
- d) Fuse.
- e) Rain water harvesting.
- f) Household Solar Lighting System.



Total No. of Questions : 3]

SEAT No. :

P914

[Total No. of Pages : 2

[5257] - 5001

T.Y. B.Arch.

BUILDING, TECHNOLOGY & MATERIALS - V

(2015 Pattern)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) Answers to Section - I & Section - II should be written in separate books.
- 2) Use drawing sheets for section - I and answer sheets for section - II.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Assume suitable data, if necessary.

**SECTION - I**

**Q1)** Paneling is to be provided for two adjacent wall of a board room of size 4 m × 4 m and height 3m. with window opening of size 1.8 M × 1.2 M (HT) and cill level of 0.9 M

Draw a plan of paneling to the scale of 1:10. [10]

Draw elevation and section through paneling to the scale of 1:10. [10]

Draw paneling details at window cill level & paneling meeting at the corner of room. [10]

OR

An office of size 6.0 m × 4.0 m is to be provided with a framed and paneled false ceiling system.

Draw a reflected ceiling plan at 1:20 scale showing framing system and light positions. [10]

Draw a section at 1:20 scale through false ceiling. [10]

Draw details of panel fixing and light fixing to suitable scale. [10]

**P.T.O.**

**Q2)** Draw sketches of **any 1** of the following : **[10]**

- a) Draw any two joinery details for show case constructed in plywood.
- b) Draw joinery details of
  - i) Frame and leg
  - ii) Fixing of top,  
For a dining table constructed in teakwood.
- c) Draw any two alternatives for shelf fixing in a shoe rack unit.

**SECTION - II**

**Q3)** Write short notes **Any 5** of the following with illustrative sketches wherever necessary : **[30]**

- a) Form active structures.
- b) Pre tensioning and post tensioning.
- c) Any two types of pneumatic structures.
- d) Process of application paint to new wood work
- e) MDF and plywood
- f) Any two types of portal frames.
- g) Paint and Polish
- h) Ribbed slab and waffle slab



Total No. of Questions : 9]

SEAT No. :

P2575

[Total No. of Pages : 5

[5257]-5002

T. Y. B. Arch.

**THEORY OF STRUCTURES - V**  
**(2015 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Solve Any Three Questions From Each Section*
- 2) *Figures to the right indicate full marks*
- 3) *Assume suitable data where necessary only*
- 4) *Use M 20 Grade concrete and Fe 500 grade steel*
- 5) *Every R. C. C. Design should be accompanied by relevant Schedule and Reinforcement Sketch.*
- 6) *Use of non-programmable Calculators Allowed.*

**SECTION - I (Solve any Three)**

**Q1)** Design the Staircase Slab of the Building Shown in the accompanying sketch. Tread = 290mm, Number of Treads in each Flight = 11, Floor to Floor Height = 3800, Mid Landing = Upper Landing = 1400mm. The Staircase Slab is Supported on 230mm wide Beams on the Inner Edges of the Landings. **[12]**

- Q2)** a) Design the Beam B2 as a L Beam across span 6.8m. Restrict the overall depth to 550mm. Assume Slab Depth = 120 of Slab S1 & S2 Take Live Load as 4kN/m<sup>2</sup>. Design for Flexure only **[8]**
- b) State the Advantages of a T Beam. Explain how to calculate the Flange Width of a L Beam. **[4]**

**P.T.O.**

**Q3)** Design Beam B4 as a Doubly Reinforced Beam of Clear Span 7.39m to carry an u.d.l of 24kN/m. Restrict the Overall depth to 550mm. Design for flexure and Shear. [12]

**Table 19 Design Shear Strength of Concrete,  $\tau_c$ , N/mm<sup>2</sup>**  
(Clauses 40.2.1, 40.2.2, 40.3, 40.4, 40.5.3, 41.3.2, 41.3.3 and 41.4.3)

| $100 \frac{A_s}{bd}$ | Concrete Grade |      |      |
|----------------------|----------------|------|------|
|                      | M 15           | M 20 | M 25 |
| (1)                  | (2)            | (3)  | (4)  |
| ≤ 0.15               | 0.28           | 0.28 | 0.29 |
| 0.25                 | 0.35           | 0.36 | 0.36 |
| 0.50                 | 0.46           | 0.48 | 0.49 |
| 0.75                 | 0.54           | 0.56 | 0.57 |
| 1.00                 | 0.60           | 0.62 | 0.64 |
| 1.25                 | 0.64           | 0.67 | 0.70 |
| 1.50                 | 0.68           | 0.72 | 0.74 |
| 1.75                 | 0.71           | 0.75 | 0.78 |
| 2.00                 | 0.71           | 0.79 | 0.82 |
| 2.25                 | 0.71           | 0.81 | 0.85 |
| 2.50                 | 0.71           | 0.82 | 0.88 |
| 2.75                 | 0.71           | 0.82 | 0.90 |
| 3.00                 | 0.71           | 0.82 | 0.92 |

| fy in N/mm <sup>2</sup>            | d'/de |     |      |     |
|------------------------------------|-------|-----|------|-----|
|                                    | 0.05  | 0.1 | 0.15 | 0.2 |
| fsc for fy = 415 N/mm <sup>2</sup> | 355   | 353 | 342  | 329 |
| fsc for fy = 500 N/mm <sup>2</sup> | 424   | 412 | 395  | 370 |

**Q4) a)** Write Short Notes on any two of the Following drawing sketches wherever necessary [6]

- i) Piles - Need, Explain any two Types of Piles briefly
- ii) Different Types of Deep Foundations.
- iii) Reinforcement Detailing in a Central Stringer Beam Staircase with Cantilever Treads.
- iv) Write down the assumptions in Rankine's theory of Earth Pressure

**b)** Draw the Reinforcement Detail of the Slabs S1. -S2-S1 from the Schedule given below [5]

**Slab Schedule**

| Slab | Depth | Steel along shorter span |                               | Steel Along Longer Span | Remark             |
|------|-------|--------------------------|-------------------------------|-------------------------|--------------------|
|      |       | Bottom Reinforcement     | Top Reinforcement at Supports |                         |                    |
| S1   | 120   | 10Φ @ 200c/c             | 10Φ@180c/c                    | 8Φ @ 325c/c             | One way Continuous |
| S2   | 120   | 10Φ @ 250c/c             | 10Φ@180c/c                    | 8Φ @ 325c/c             | One way Continuous |

**SECTION - II (SOLVE ANY THREE)**

**Q5)** An U.C.R Masonry wall is to be provided to retain Earth on its Vertical Face. Density of Retained Earth =  $16\text{kN/m}^3$ , Density of Masonry =  $25\text{kN/m}^3$  Top Width of Wall = 1.2m, Take Bottom Width of wall =  $0.6h$  Height of Wall =  $4.8\text{m} = h$ , Angle of Repose =  $30^\circ$ , Coefficient of Friction  $\mu = 0.6$ , S.B.C of Soil =  $225\text{kN/m}^2$ . Check the Stability of the wall with respect to Overturning and Sliding and Calculate Maximum and Minimum Pressure at Base [12]

**Q6) a)** Explain the Dis-Advantages of Pre- Stressed Constructions over conventional R.C.C Construction. [4]

b) A Pre- stressed beam of size  $300 \times 700$  is simple supported on a span of 11m. It carries an udl of  $35 \text{ kN/m}$  over its entire span inclusive of its self-weight. It is pre-stressed by tendons supplying  $2200 \text{ kN}$  force which are placed at  $125\text{mm}$  below the neutral axis. Calculate the extreme fiber stresses at end span (support) and at mid span. [8]

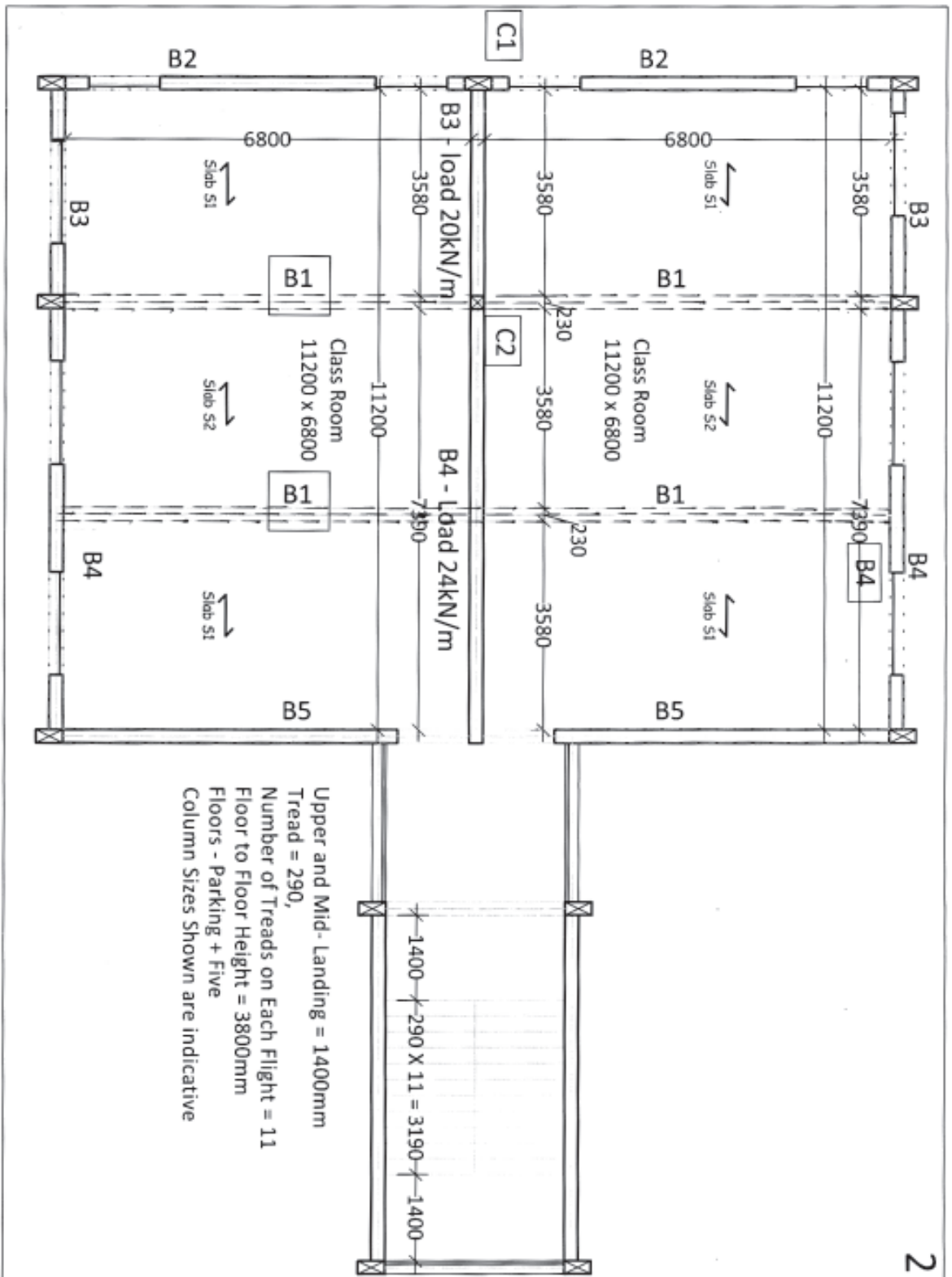
**Q7) a)** Two Columns of size  $300 \times 300$  and  $400 \times 400$  spaced  $2.0\text{m}$  apart rest in a Soil of S.B.C  $200\text{kN/m}^2$ . They carry loads of  $600\text{kN}$  and  $1100 \text{ kN}$  respectively. Design the combined footing in plan only. Take Length of the footing as 2.0 times the width. [8]

b) Write a Short Note on Raft Foundation - Need and Advantages [3]

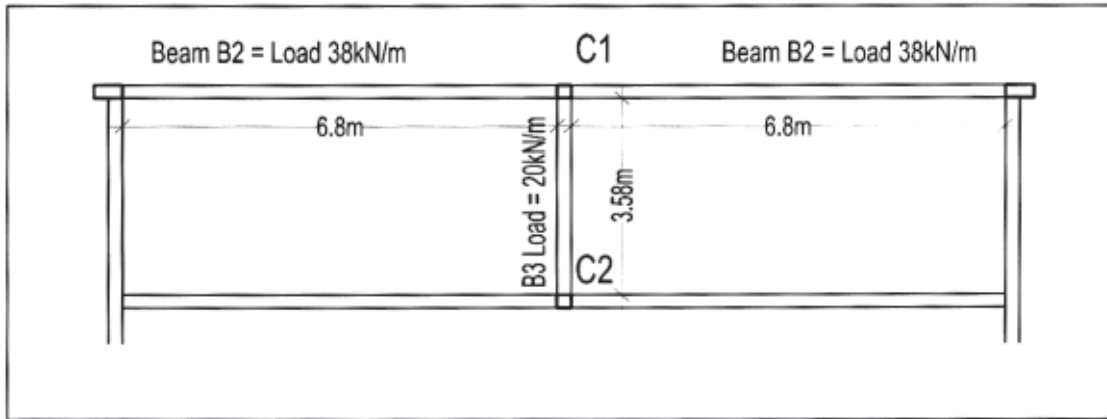
OR

**Q8)** Find the Load acting on column C1 per floor. Assume Load on B2 to be  $38\text{kN/m}$  and Load on B3 to be  $20\text{kN/m}$ . Calculate Load on every Floor considering Parking + 5 Floors. Design Column on First Floor using 3% steel and take one side as 230. Keep the length the same and change the width and design Column on Parking Floor. Draw Sketch of reinforcement of both the columns. [12]





**Q9)** Design the Isolated Pad Footing of a Column 250 x 650 to carry a load of 1600kN in a Soil of S.B.C 240kN/m<sup>2</sup>. Check for Single Shear. Draw Sketch of Reinforcement. **[11]**



❧❧❧

Total No. of Questions : 4]

SEAT No. :

**P915**

[Total No. of Pages : 2

**[5257] - 5003**  
**T.Y. B. Arch.**  
**BUILDING SERVICES - III**  
**(2015 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:-*

- 1) *ALL questions are COMPULSORY.*
- 2) *Answers to the Section - I and Section - II should be written in separate answer books.*
- 3) *Neat and labeled diagrams must be drawn wherever necessary.*
- 4) *Figures to the right [in brackets] indicate full marks.*
- 5) *Assume suitable data if necessary.*

**SECTION - I**

**Q1)** Explain in detail with sketches :

Explain different systems used in Mechanical Ventilation. **[15]**

OR

Explain working of an Evaporative Cooler stating advantages & disadvantages of Evaporative Cooling.

**Q2)** Write short notes (ANY FOUR)

**[4 × 5 = 20]**

- a) Stack effect
- b) Centrifugal fan
- c) Cross ventilation
- d) Indicators of human comfort conditions
- e) Psychometric Chart
- f) Axial flow fan

***P.T.O.***

## SECTION - II

**Q3)** Explain with sketches :

What is “Refrigeration cycle”? How it is used in Air-conditioning? Explain different components of RAC (refrigeration & Air-Conditioning) with appropriate sketches **[15]**

OR

What is the function of an Air Handling Unit (AHU) of central Air Conditioning system of a building? Explain location criteria of AHU in the building & network of distribution ducts.

**Q4)** Write short notes (ANY FOUR)

**[4 × 5 = 20]**

- a) Water-cooled condenser
- b) Reflected Ceiling Plan
- c) Types of Cooling Towers
- d) Split Type Air Conditioner
- e) Central DX Plant
- f) Natural Ventilation

