Total No. of Questions : 4]

SEAT No. :

P2520

[Total No. of Pages : 2

[5357] - 1001
First Year B. Arch. (Semester - I)
BUILDING TECHNOLOGY AND MATERIALS - I
(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 cross section from foundation to coping through a 1½ (one and half) brick thick compound wall of height 1500. Assume rubble masonry foundation of depth 1200mm. Scale 1:10

OR

Draw stop end details for 1½ bk. thick wall in English bond (Scale 1:10)

i) Plan of alternate courses

ii) Elevation of Six courses

iii) Isometric View

Q2) Draw neat sketches **[15]**

Draw a section through-

Internal one brick thick load bearing wall showing

i) Foundation (stone/brick)

ii) Plinth with DPC

P.T.O.

OR

Draw neat sketches

i) Semi-circular arch with all terminology.

ii) Lintel in stone and timber, for an opening of 750 mm with bearing in the wall.

SECTION - II

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

i) Explain load transfer system in load bearing structure.

ii) Explain different types of soils and bearing capacity of soil.

iii) Draw and explain the use of any 5 types of special brick.

Q4) Attempt any three **[15]**

i) Enumerate and write brief about structural and non structural elements in a building.

ii) Explain advantages of soild concrete blocks over conventional masonry units.

iii) Explain the following with their uses quick setting cement, rapid hardening cement and white cement.

iv) What is pointing? Explain various types of pointing.

v) What is mortar? Explain its uses in building construction.

Total No. of Questions : 8]

SEAT No. :

P2521

[Total No. of Pages : 3

[5357] - 1002
B. Arch.
THEORY OF STRUCTURE - I (Semester - I)
(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 rull marks.***

SECTION - I

Q1) Draw shear force and bending moment diagram for the given beam (figure 1). Showing points of zero shear and point of contraflecxure. **[15]**

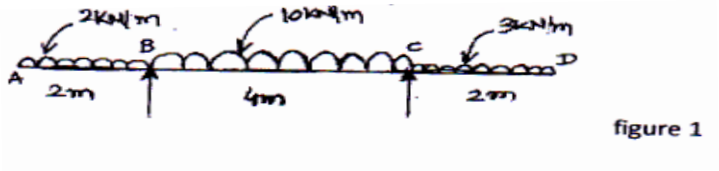


figure 1

Q2) a) Explain following terms with neat diagrams:
i) Cantilever beam
ii) Simply supported beam. **[4]**

b) Draw shear force and bending moment diagram for a simply supported beam having length L with central point load P Indicate maximum values of shear force and bending.Moment. **[4]**

c) State and explain Principle of transmissibility of forsces. **[2]**

Q3) a) Find centroidal co-ordinates of laming given in figures2, with respect to point O. **[10]**

[6]

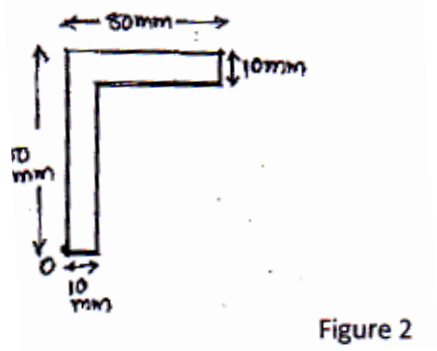


Figure 2

P.T.O.

b) Find resultant of two forces of 10 kN and 12 kN, emerging from a point. Angle between two forces is 50° . Also find the resultant angle with respect to force of 12kN using law of parallelogram of forces. **[4]**

Q4) a) Find resultant of given force system given in figure 3. **[8]**

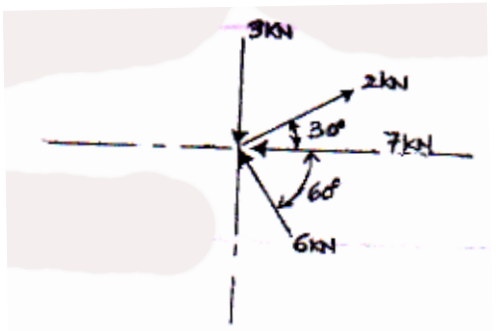


Figure 3

b) Explain the terms. Force polygon, like parallel forces. **[2]**

SECTION - II

Q5) Find centroidal x and y co-ordinate with respect to point A. Also find moment of inertia about centroidal xx and yy axis for the lamina shown in figure.4**[15]**

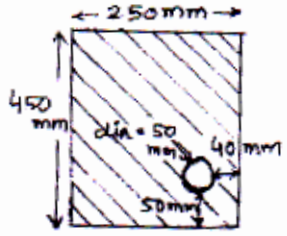


figure 4

Q6) a) Find support reactions for the cantileve RCC beam of 230 mm x 500 mm, subjected to load of brick wall of 230 mm thickness and 2m height. Length of beam is 2.3m. **[7]**

b) Write formula for moment of inertia of cirucular section of diameter d with respect to its centroidal xx,yy and zz axis. **[3]**

Q7) a) For a simply supported beam having udl of 5 kN/m over entire length of 6m and point load of 12 kN and 4 kN at 2m and 4m from left end. Find reactions at each end. **[7]**

b) What is moment of forces? **[3]**

Q8) a) Explain parallel axis theorem. **[4]**

b) Explain the difference between coplanar concurrent and coplanar non-concurrent force systems. **[2]**

c) What are bow's notations? What is space diagram? **[4]**

Total No. of Questions : 4]

SEAT No. :

P2522

[Total No. of Pages : 2

[5357] - 2001
F.Y. B. Arch.
BUILDING TECHNOLOGY AND MATERIALS - II
(2015 Pattern) (Semester - II) (Revised)

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]**

A store room of 3000 × 5000 mm in size has an opening of 900 × 2100, with wall thickness of 230mm.

Draw well labeled

i) Plan, Elevation and Section of a panelled Door at 1:10 Scale

ii) Draw isometric of any one joinery detail used in this door construction

OR

A timber straight flight stair of 1000mm clear width is to be provided to access a Mezzanine Floor of a shop measuring 4000 × 6000mm. The mezzanine floor height is 2 100mm and the shop height is 4200mm.

Draw well labeled

i) Key plan showing position of staircase in the shop (1:100)

ii) Plan of the Staircase at 1:10 Scale

iii) Longitudinal Section of the stair at 1:10 Scale

iv) Draw details of tread, riser and nosing

Q2) Write answers of any three out of five of the following **[15]**

a) Sketch any 5 types of wooden joints

b) Explain any 2 types of clay roofing tiles with sketches and dimensions

P.T.O.

c) Draw a well labeled section through a collar roof

d) Explain with sketches any 5 joints in Bamboo

e) Sketch and Explain any 5 carpentry tools

SECTION - II

Q3) Explain with sketch any two out of four of the following **[20]**

a) Explain with a neat labeled sketch a King Post Truss

b) Explain with sketches different types of reinforcements used in 350mm thick brick masonry wall

c) Explain with sketches a Single timber Floor

d) Fixing Details of ridge and eaves of a Mangalore Tile Roofing

Q4) Explain any three out of five of the following **[15]**

a) Sketch a typical elevation of a Timber Window and label its parts

b) Advantages and Disadvantages of Plywood

c) Explain Brick Vaults and domes with sketch and short note.

d) What is Seasoning of Timber? Mention various methods.

e) Different types of Hardware fittings used in Timber doors (Draw sketches)

Total No. of Questions : 8]

SEAT No. :

P2523

[Total No. of Pages : 3

[5357] - 2002
F.Y. B. Arch. (Semester - II)
THEORY OF STRUCTURES - II
(2015 Pattern)

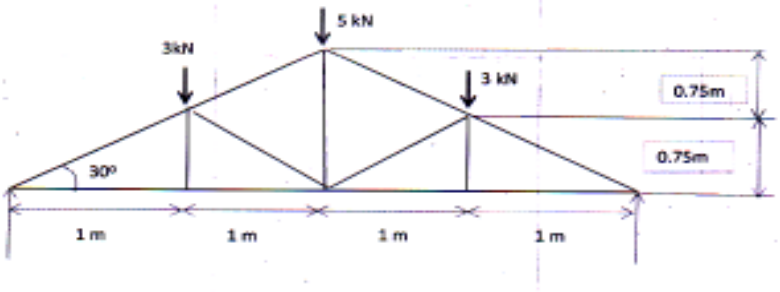
Time :3 hours] *[Max. Marks :70*

Instructions to the candidates:

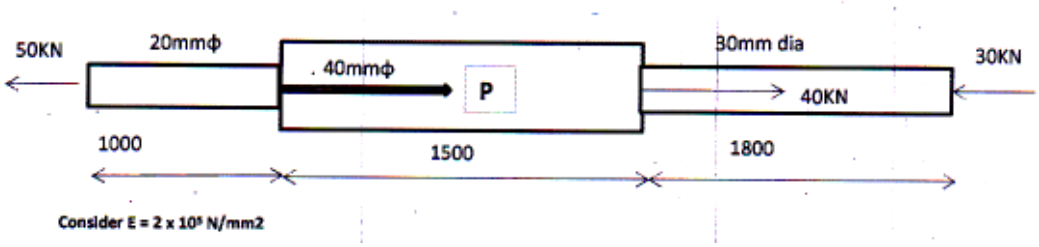
1) *The Q1. & Q5.are Compulsory*
2) *Answer any Two Questions out of remaining Three from each Section.*
3) *Use of Scientific Calculator Allowed*
4) *Marks to the right indicate Full Marks*
5) *Assume Suitable data if any.*
6) *Use separate answer booklet to write Section-1 & Section -2.*

SECTION - I

Q1) Analyse the given truss and tabulate forces with their nature in member. **[15]**
Use method of Joint/Section/Graphical/Analytically (Fig.1)



Q2) a) Find P for Eqilibrium.Also find stressesin each part of the long rod shown below. **[7]**



b) Explain Hooke's Law, Poisson's Ratio, Indeterminate Structure **[3]**

P.T.O.

Q3) a) A beam of cross section 300 × 600 mm simply supported at ends,has a udl load of 10 kN/m over the entire span of 6.0 m which is inclusive of self weight. Calculate

i) Calculate bending stresses at tension and compression extreme fibres. **[3]**

ii) Also find stresses at a distance of 100 mm from bottom and 150mm from top. **[2]**

iv) Draw bending stress distribution diagram **[2]**

b) Explain Middle Third Rule with sketch **[3]**

Q4) Define any Five **[10]**

a) Bulk Modulus

b) Volumetric Strain

c) Simple Strain

d) Modulus of Elasticity

e) Neutral Axis in bending

f) Flexural Formula

SECTION - II

Q5) a) Find out stresses at corners for rectangular column section 3M × 4M with eccentric load of 8 Ton The eccentric load is on X-axis and at 0.5 m from Y-axis. **[10]**

b) Write Assumptions made in theory of simple bending **[5]**

Q6) a) A cantilever beam of section 300×600 of span 4m is loaded with a udl of 2KN/m over its entire span and a point load of 5 KN at a distance of 2m from the support.Calculate Maximum slope and deflection. **[7]**

b) Draw Shear stress distribution diagram for I section, T section & L Section. **[3]**

Q7) a) A simply supported beam of cross-section 230 × 450 carries a UDL of 7KN/m over the entire span of 6 m.lt also a central point load of 10KN.Calculate the maximum shear stress and draw the shear stress diagram. **[7]**

b) Define Eccentricity and give an example in case of RCC column how eccentric load acts. **[3]**

Q8) Attempt any Five **[10]**

a) Yield Stress

b) What is Elastic material. Give an example.

c) Explain Perfect Frame

d) Draw Stress Strain diagrame for M.S. Steel and show important points on curve

e) Factor of Safety

f) Explain equivalent area.

Total No. of Questions : 4]

SEAT No. :

P2524

[Total No. of Pages : 2

[5357]-3001

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

BUILDING TECHNOLOGY AND MATERIALS - III

(2015 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

SECTION - I

Q1) An outhouse admeasuring 3 M × 3.5 M with an attached toilet of size 1.2 M × 2.1 M is to be constructed in RCC frame structure and 230 thick brick walls. Draw a framing plan at plinth level and a section upto plinth level through room and toilet, showing plinth formation, footings and other relevant RCC members of the structure; scale 1:20. **[20]**

OR

A glazed and panelled T. W. sliding door is to be provided between Living room and study room in a bungalow. The plastered opening size being 1.2 M × 2.1 M. Draw plan, section and elevation of the door showing all the members, fixtures and fastenings; to 1:10 scale. Draw enlarged details of any two parts of the door explaining the mechanism; to a suitable scale.

Q2) Draw neat labelled sketches for the following. (Any 3) **[15]**

a) Joinery details for a collapsible gate at any two joints of sections.
b) Damp proofing methods used at plinth level (any two).
c) Detail of water proofing treatment at Parapet level.
d) Fixing of chainlink fencing to M.S. post with post erection detail.
e) Gutter fixing detail for G.I. sheet roofing.
f) Fixing detail for G.I. sheets with M.S. angle purlin.

P.T.O.

SECTION - II

Q3) Answer with the help of neat, labelled sketches. (Any 2) **[20]**

a) Explain Pile foundation with end bearing pile.

b) Explain combined footing.

c) Explain fixing of Shahabad tiles for garden paving.

d) Explain IPS flooring.

Q4) Write short notes (Any 3) **[15]**

a) Water cement ratio

b) Types of reinforcement steel.

c) Necessity of soil investigation.

d) Causes of failure of foundations.

e) Types and market forms of tile flooring.

Total No. of Questions : 8]

SEAT No. :

P2525

[Total No. of Pages : 6

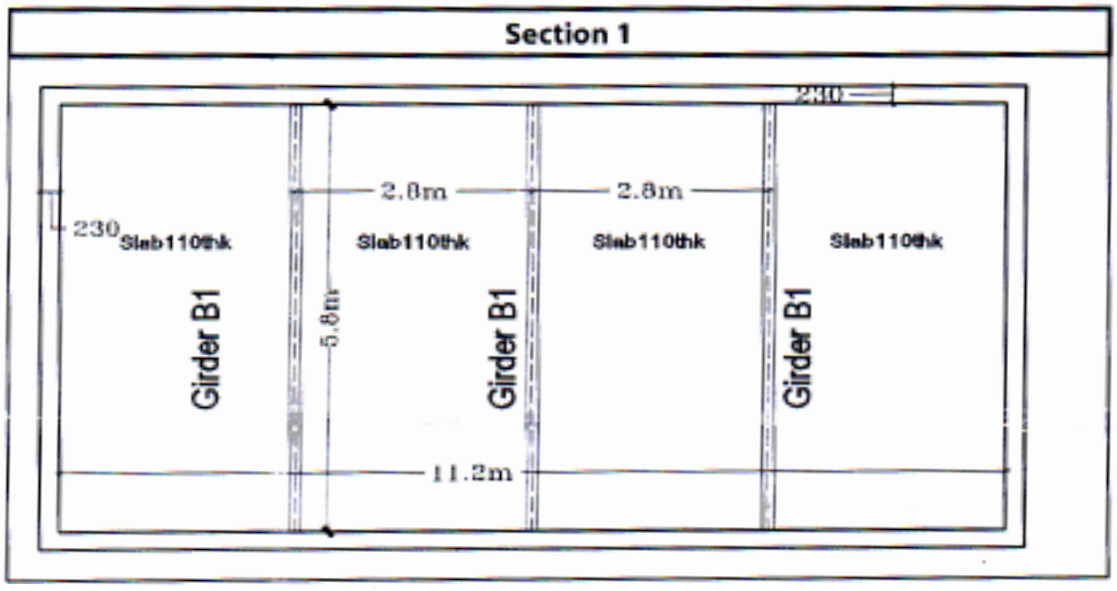
[5357] - 3002
S.Y. B.Arch. (Semester - III)
THEORY OF STRUCTURES - III

Time :3 hours] *[Max. Marks :70*

Instructions to candidates:

1. *Q. Nos. 1 & 5 are compulsory.*
2) *Solve any two questions from 2, 3 & 4 and any two questions from 6, 7 & 8.*
3) *Assume Steel of grade Fe410 / E250. Yield stress = 250 N/mm².*
4) *Use of Non-Programmable Scientific calculator & steel tables is allowed.*
5) *Take the Following Values*

1	*Permissible Bending Stress in Steel In Compression and Tension =165N/mm²*
2	*Permissible Shear Stress = 100N/mm²*
3	*Allowable Deflection for a Simple Supported Beam = Span/300*
4	*Allowable Deflection for a Cantilever Beam = Span/150*
5	*Permissible Weld Stress = 108N/mm²*
6	*Permissible Bearing Stress for Bolt = 300N/mm²*
7	*Permissible Shear Stress for Bolt = 100N/mm²*



P.T.O.

Q1) An office room of dimensions 5.8M x 11.2m (as shown in the sketch above) with 230mm thick walls on all four sides is to be provided with a slab 110mm thick supported on 3 intermediate steel girders and two endwalls. The girders are spanning across 5.8m span dividing the slab into 4 equal parts. Consider 1.2 kN/m^2 floor finish and a live load of $4kN/m^2$.

a) Calculate the Load on the Girder B1 **[4]**

b) Design Girder B1 and check for shear and deflection. **[11]**

Q2) a) What is Slenderness ratio? Explain its effect on the compressive load carrying capacity of columns. **[3]**

b) Design a steel column to carry compressive load of 725 kN. Steel column is having 4.5 m length with both ends hinged. **[7]**

Q3) a) Answer any two of the following the following. **[6]**

i) Write a short note on Working Stress Method. Define Permissible Stresses.

ii) Advantages and Disadvantages of fixed beams.

iii) List and Explain the factors affecting calculation of wind load.

b) Explain the Limitations of Load Bearing Structures w.r.t. any two of the following. **[4]**

i) Openings

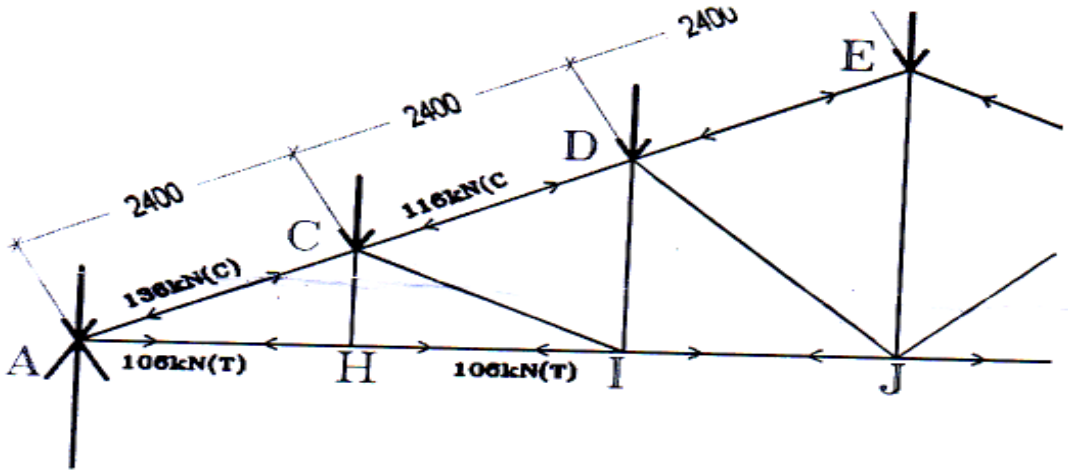
ii) Number of Floors

iii) Flexibility in Planning of Floors

Q4) a) A fixed beam of span 10m. is carrying an UDL of 18 kN/m and a central point load of 20 kN. Analyze the fixed beam and draw shear force and bending moment diagram for the same. **[7]**

b) Jot Down Various Categories of Buildings as Classified By I.S.875(2) for Live Loads **[3]**

Section II



Q5) a) Design Member AH of the Truss considering Welded Connection (For a Tensile Load of 106 kN) Use Unequal Angle Section. **[9]**

b) Design the Welded Connection **[4]**

Draw a neat sketch of the Connection showing Thickness of Gusset Plate. **[2]**

Q6) a) An Angle Section 125 × 65 × 8 taking a load of 148kN is to be connected to the Gusset Plate by 24mm Bolts. Design the Bolted Connection. Draw a Sketch of the same. **[6]**

b) Differentiate between Bolted and Welded connections. **[4]**

Q7) a) Draw the B.N. Diagram of a Three Span Continuous Beam of equal spans and same u.d.l. on all spans showing important Values as per I.S. Code. **[4]**

b) Answer any two of the following **[6]**

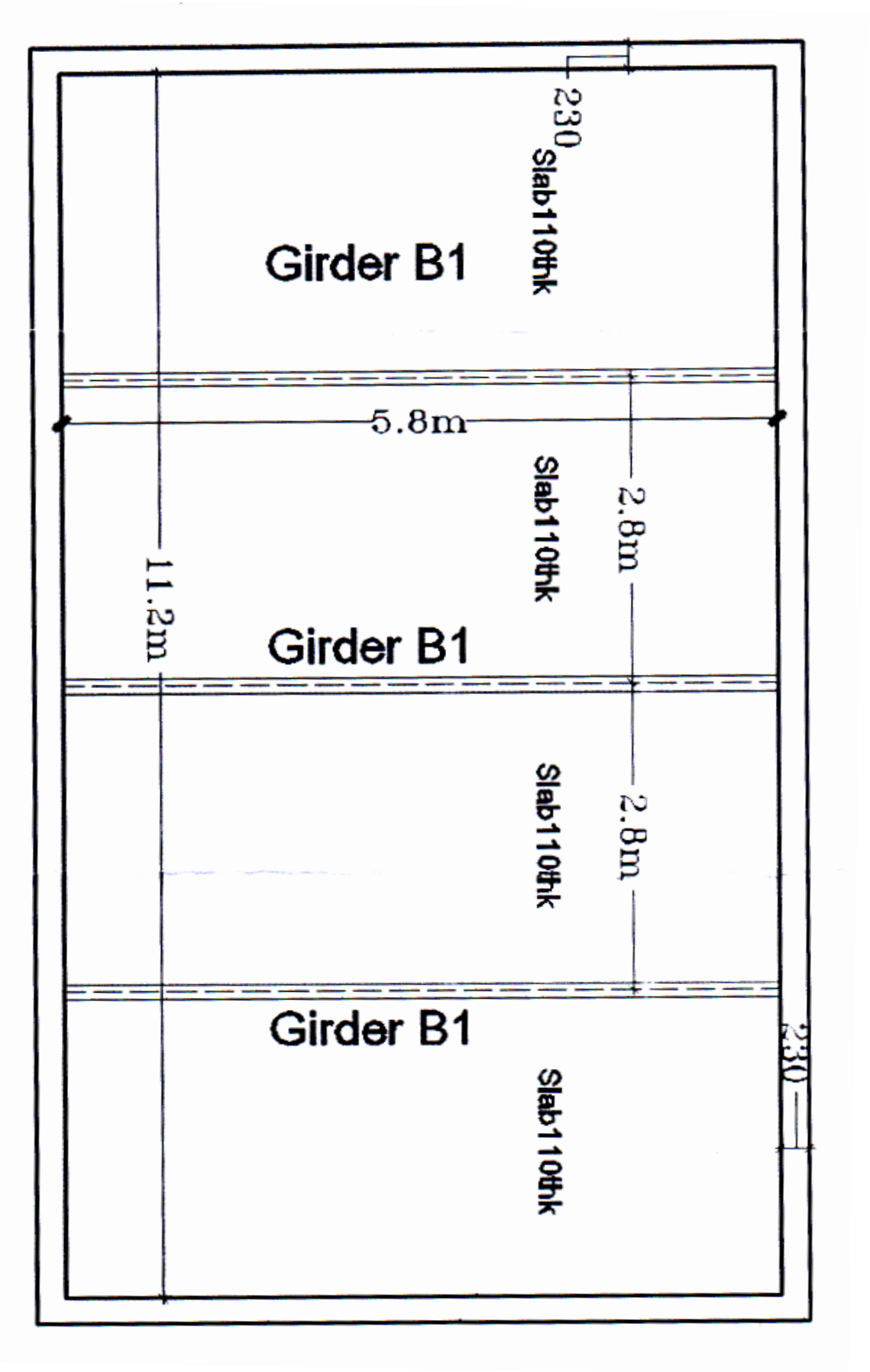
i) Write Down Rankine's Formula and Explain each term.

ii) Draw Diagrams of any two Cases of Load Transfer on to a Lintel

iii) Explain the basic principles of Load Transfer in an Arch

Q8) a) A hollow circular Steel column has an outer diameter 400 mm and thickness 10mm. Height of column is 5m and one of column is fixed and the other and hinged. Find Buckling Load of column by Euler's method. $E = 2 \times 10^5 N/mm^2$ **[7]**

b) Explain the failure of Short and Long Columns in one line each **[3]**


230
Slab110thk
Girder B1
5.8m
Slab110thk
2.8m
11.2m
Girder B1
Slab110thk
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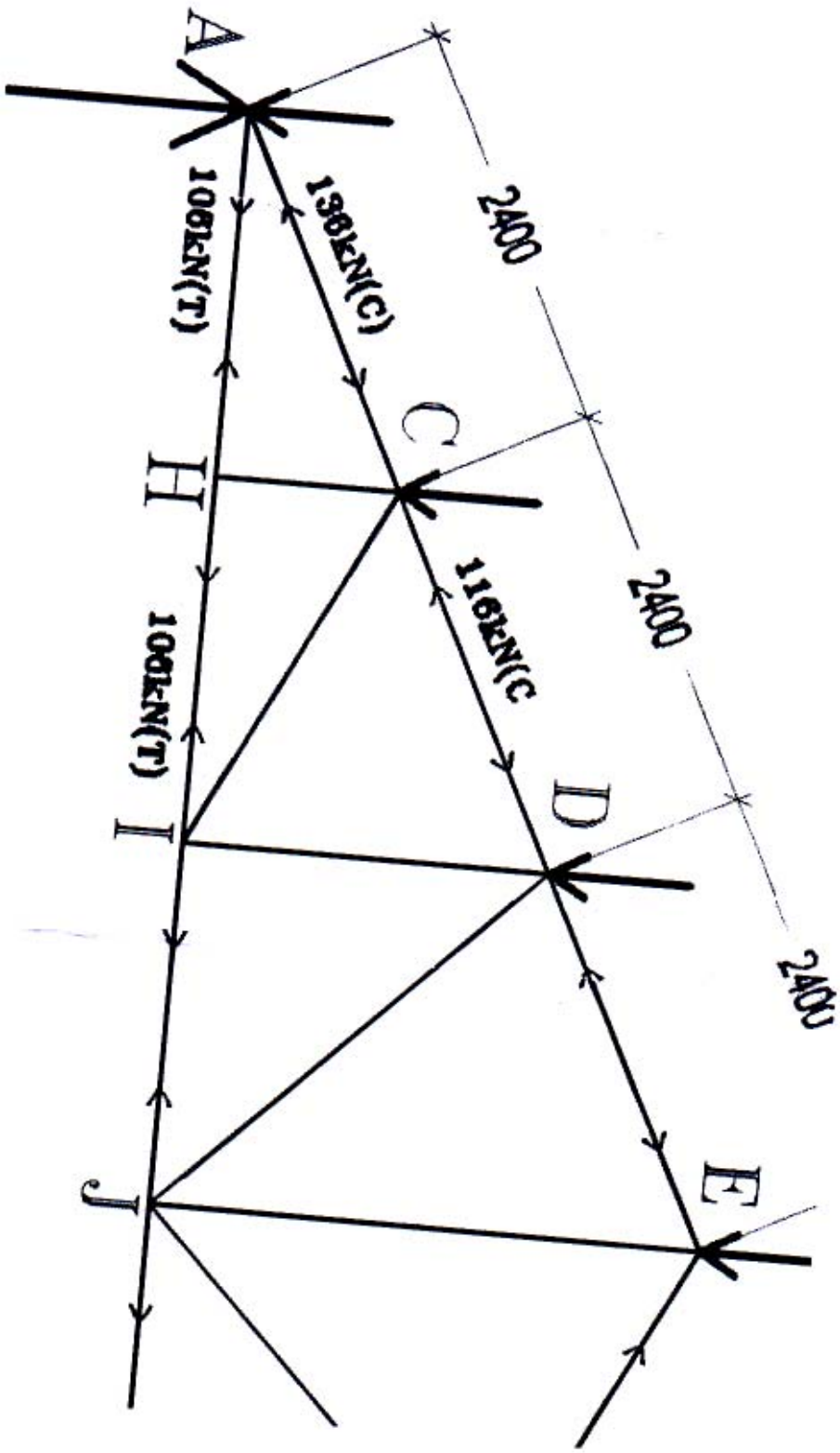
Girder B1
230
Slab110thk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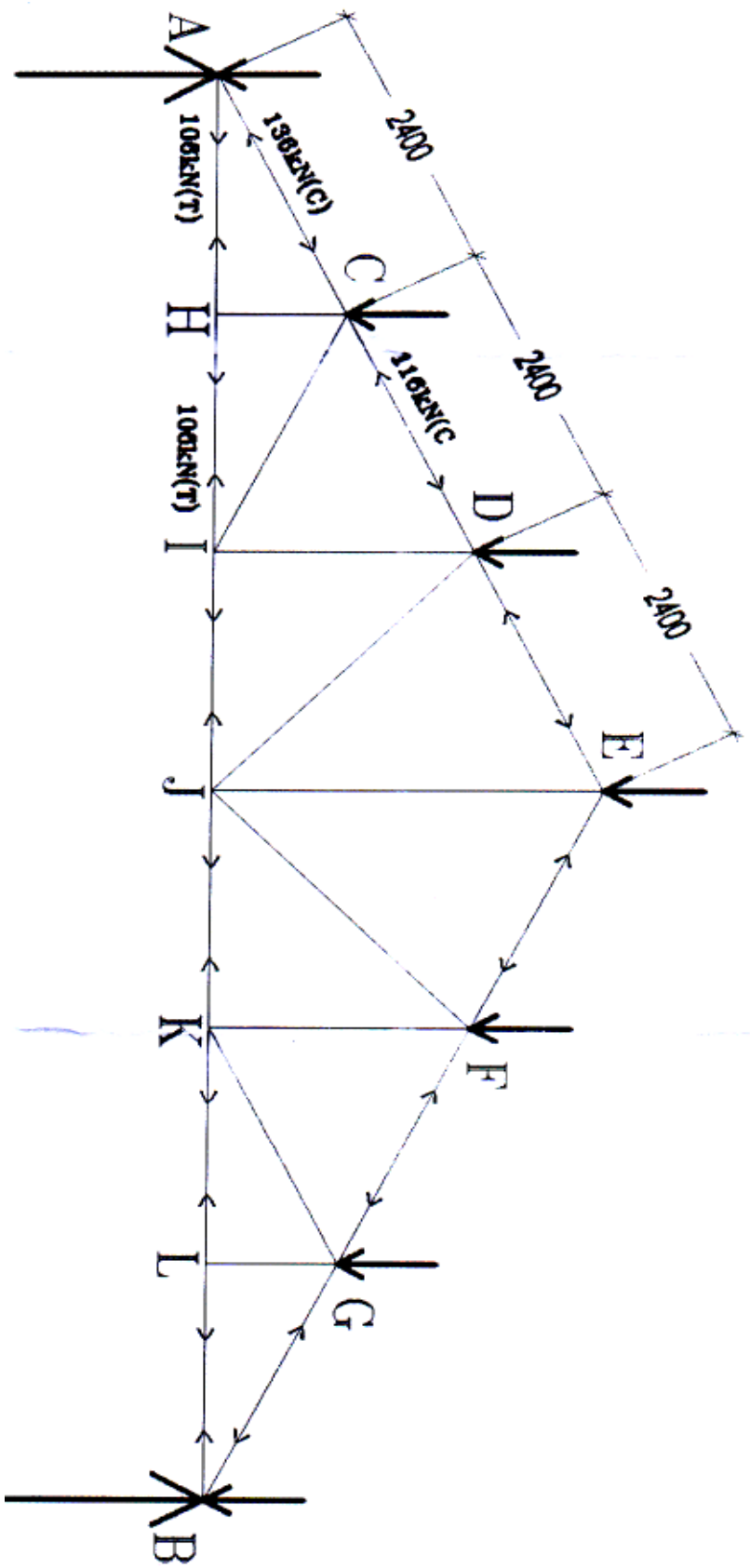
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Total No. of Questions : 4]

SEAT No. :

P2526

[Total No. of Pages : 2

[5357] - 3003
S. Y. B.Arch.
BUILDING SERVICES - I
(2015 Pattern) End Semester

Time :3 hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Figures to the right indicate max. Marks to respective questions.***
2) ***Answers to both units are compulsory.***
3) ***Support the answers with neat sketches wherever necessary***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) Explain with neat sketches methods of layout of distribution of water supply pipes. **[15]**

OR

How is water tapped from the road mains? Explain with suitable sketches?**[15]**

Q2) Write short notes any four with neat sketches wherever necessary. **[20]**

a) Calorifier

b) Submersible pump

c) Any two valves

d) Bib tap

e) Classification of water supply pipes.

f) Specials used in water supply

P.T.O.

SECTION - II

Q3) Explain with plan and section showing the working of a septic tank? **[15]**

OR

What are the different materials used for drainage pipes. Mention their Advantages and disadvantages? **[15]**

Q4) Write short notes any four with neat sketches wherever necessary. **[20]**

a) Indian WC pan

b) Flushing cistern

c) Floor trap

d) P & Q trap

e) Bio gas plant.

f) Inspection Chamber

Total No. of Questions : 4]

SEAT No. :

P2527

[Total No. of Pages : 2

[5357] - 4001
S. Y. B.Arch. (End Sem.)
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) ***Figures to the right indicate full marks.***
6) ***Assume suitable data wherever necessary.***

SECTION - I

Q1) A 1.2 M Wide, overhanging balcony is to be provided along 3 M side, for a hall measuring 3 M × 6.5 M Draw a framing plan for the hall and balcony. indicating slab reinforcement for both slabs. Assume 230 × 450 columns at four corners of the hall. propose suitable beam supports for the balcony Draw detailed section through hall and balcony slabs showing reinforcement. Scale.1:20. **[20]**

OR

A dog legged staircase in RCC is to be designed from ground floor to upper floors for an apartment building. The floor to floor height is 3M.The staircase is to be provided with suitable M.S. railing. Draw plan of the staircase from Ground to first floor showing both flights with all RCC elements. Draw detailed section through first flight showing all reinforcement details. Scale 1:20. **[20]**

Q2) Draw neat, labelled, proportionate sketches for the following. (Any3) **[15]**

a) Fixing details of 'Z' section M.S. Window.

b) Sectional detail showing construction of ferrocement wall.

P.T.O.

c) Spine beam staircase.

d) Part plan and section through first floor toilet slab showing external and internal floor beams.

e) Structural and mechanical components of a lift.

SECTION - II

Q3) Answer with the help of neat, labelled sketches. (Any 2) **[20]**

a) Draw a conceptual sketch section through an escalator explaining its working.

b) Explain the working of a three track. sliding aluminium window with suitable sections adapted for the same.

c) Name the materials used in basement waterproofing. Explain any 2 with their application.

Q4) Write short notes (any 3) **[15]**

a) Types of Light weight concrete.

b) Advantages and disadvantages of Ready mix concrete.

c) Differentiate between aluminium and UPVC windows.

d) Types of RCC slabs.

e) Water bars used in construction.

Total No. of Questions : 8]

SEAT No. :

P2528

[Total No. of Pages : 3

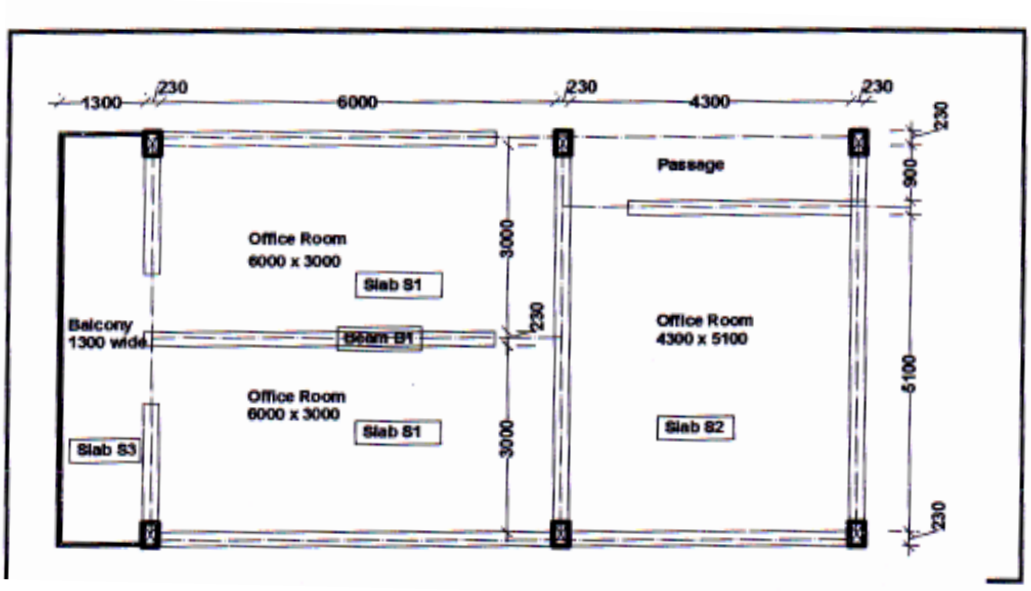
[5357] - 4002
S. Y. B.Arch. (Semester - IV)
THEORY OF STRUCTURES - IV
(2015 Pattern)

Time :3 hours] *[Max. Marks :70*

Instructions to candidates:

1) ***Questions No.1 and 5 are compulsory.***
2) ***Answer any two of the remaining three in each section.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data where necessary.***
5) ***Use M 20 Grade concrete and Fe 500 steel.***
6) ***Every R.C.C Design should be accompanied by relevant schedule and Reinforcement sketch.***

SECTION - I



Q1) Design slab S2 for Size 4.3 m × 5.1 m for given plan. Assume live load as 4 kN per square meter and floor finish as 1.2kN per square metre. **[15]**

P.T.O.

Q2) Design a square R.C.C. short column to take compressive working load of 600 kN. Use 1.2% Steel. **[10]**

Q3) Write short notes on any Three **[10]**

a) Compare Working Stress Method and Limit State Method.

b) Explain Over - Reinforced section with strain diagram.

c) Explain importance of curing and compaction with respect to concrete technology.

d) Limit state of deflection

e) Main steel and Distribution steel.

Q4) Design Cantilever balcony Slab S3 for an office building as shown in the figure 1.S3 is. **[10]**

Supported on 230mm wide beam. Draw R.C.C. details for the same. Assume standard floor finish.

SECTION - II

Q5) Design Beam B1 considering the following. **[15]**

Slab S1 thickness = 120mm, with standard live load for and office building ad standard floor finish floor To Floor Height is 3.1m beam is supporting Brick wall having 150mm thickness Design beam for Flexure and shear Reinforcement.

Design shear stress

For M20 in

100Ast/bd N/mm^2

0.15%	0.28
0.25%	0.36
0.50%	0.48
0.75%	0.56
1.00%	0.62

Q6) Design a Lintel beam for an opening of 2.3m × 2.1 m centrally placed in a load bearing wall having 6.3 m length and 4.8 m height. Lintel level 2.1m. **[10]**

Q7) Write short notes on any three **[10]**

a) Explain grades of steel used for RCC construction.

b) Defects in timber

c) Water Cement ratio and it's importance.

d) Explain removal of formwork for RCC columns and walls, slabs and beams.

e) Explain the importance of cover in RCC construction. Also mention minimum cover requirement for slab, beam, columns and footing.

Q8) Design a Timber Beam to take a load of 5kN/m over a simply supported effective span of 4.73m considering the following. **[10]**

Assume depth of timber beam = 3 × width of timber beam

Permissible bending stress for inside location - 12.16N/mm^2

Permissible shear stress - 1.37N/mm^2

Allowable deflection - Span / 240

E = 8.93 × 10^3N/mm^2

Total No. of Questions : 4]

SEAT No. :

P2529

[Total No. of Pages : 2

[5357] - 4003
S.Y.B. Arch.
BUILDING SERVICES - II
(2015 Pattern)

Time :3 Hours] ***[Max. Marks :70***

Instructions to the candidates:

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

SECTION - I

Q1) Explain any 3 methods of garbage disposal at Town level. **[15]**

OR

What are different types of wiring? Explain with merits & demerits of various types of wiring. **[15]**

Q2) Write short notes on (any four): **[20]**

a) 3 phase supply

b) Define luminance & Illuminance

c) Fluorescent lamp

d) Distribution Board

e) Types of switches.

SECTION - II

Q3) Write important criteria of locating electric substation. **[15]**

P.T.O.

OR

Draw an electrical Layout with a schedule of switch boards for a Study Room in a Residence of size 4M × 3M. Show following electrical points.

a) General and task lighting points.

b) Fan/s

c) Computer point

d) Telephone point

e) Plug points for equipment used for charging laptop & mobile phone

(Draw only proportionate sketch in the regular answer sheet.) **[15]**

Q4) Write short notes on (any four) **[20]**

a) Daylight factor

b) Define Efficacy & Efficiency

c) Lumen method for calculating number of fitting.

d) Explain the terms Current, Voltage and Watt

e) Garbage chute

f) Rain water harvesting.

Total No. of Questions : 3]

SEAT No. : ____

P2530

[Total No. of Pages : 2

[5357]-5001

T.Y. B.Arch.

BUILDING TECHNOLOGY & MATERIALS - V

(2015 Pattern)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Section I should be solved on drawing sheets only & Section II should be written in separate answer book.***
2) ***Neat diagram with dimension s must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

SECTION - I

Q1) Draw plan, elevation & section of sandwich partition proposed for a sound recording studio with detail of acoustic treatment. Size of partition of 3 M in length & 3 M in height with a glass window of size 1.2 M × 1.2 M located at center.

Draw A plan to scale of 1:10 **[10]**

Draw Elevation & Section to scale of 1:10 **[10]**

Draw any Two enlarged Details **[10]**

OR

Draw Reflected Plan & section of suspended ceiling for a living room of size 4.5 M × 3.5 M.

Draw Plan & section to 1:20 scale **[20]**

Draw enlarge light fixing detail & fan fixing detail to suitable scale **[10]**

Q2) Draw neat Sketches of Any one of following : **[10]**

a) Fixing of door shutter & shelf in wardrobe.

b) Joinery between top frame to leg of a table & fixing of Glass top to frame.

c) Detail of Drawer in Storage unit

P.T.O.

SECTION - II

Q3) Write short notes Any five of following with neat sketches wherever necessary. **[30]**

a) Form active systems

b) Block board & Plywood

c) Portal frames & types of portal frame.

d) Laminate & veneers

e) Process of painting to old wood work

f) Pre tensioning

g) Band beam & Ribbed slab

h) Open grid suspended ceiling

Total No. of Questions : 8]

SEAT No. : ____

P2531

[Total No. of Pages : 4

[5357] - 5002
T.Y. B. Arch.
THEORY OF STRUCTURES - V
(2015 Pattern) (End - Semester)

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) a) Design the staircase slab of the building shown in the accompanying sketch. **[12]**

Tread = 275mm, Number of Treads in each flight = 11, Floor to Floor Height = 3800,, Mid landing = Upper Landing = 1500mm.

The staircase slab is supported on 230mm wide Beams on the Outer Edges to the Landings.

Q2) a) Design the Beam B1 as a T beam across span 6.8m Restrict the overall depth to 500mm . Assume slab depth = 120 of slab S1 & S2 take live load as 4kN/m^2. Design for Flexure only **[8]**

b) State the conditions under which a Beam can be considered a T Beam as per. I.S. Code 456. **[2]**

c) State any two Advantages of a T Beam. **[2]**

P.T.O.

Q3) a) Design Beam B4 as a Doubly Reinforced Beam of Clear span 7. 39m to carry an u. d. I. of 24kN/m. Restrict the Overall depth to 500mm. Design for flexure only. **[7]**

Fy inN/mm^2	d'/de			
	0.05	0.1	0.15	0.2
fsc for fy = 415N/mm^2	355	353	342	329
fsc for fy = 500N/mm^2	424	412	395	370

b) Flat slab constructions - Applications and proportioning of various Elements **[5]**

Q4) a) Write short notes on any two of the following drawing sketches wherever necessary. **[6]**

i) Functions of foundations.
ii) Coffered slab construction - When used, salient features.
iii) Reinforcement Detailing in a folded plate staircase
iv) Raft Foundation - Need and Types.

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) a) An U.C.R Masonry wall is to be provided to retain Earth on its vertical Face Density of Retained Earth = 18kN/m^3, Density of Masonary = 24kN/m^3

Top width of wall = 1.3 m, take Bottom width of wall = 0.65h height of wall = 5.2m = h **[9]**

Angle of Repose = 30°, Coefficient of friction μ = 0.6, S.B.C of Soil = 225kN/m^2

Check the stability of the wall with respect to Overturning and sliding.

b) Write a short note on Active and passive earth pressure. **[3]**

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

b) A Pre - stressed beam of size 300 × 600 is simple supported on a span of 10m. It carries an udl of 30 kN/ m over its entire span inclusive of its self weight. It is pre - stressed by tendons supplying 1800 kN force which are placed at 100mm below the neutral axis. Calculate the extreme fiber stresses at end span (Support) and at mid span. **[8]**

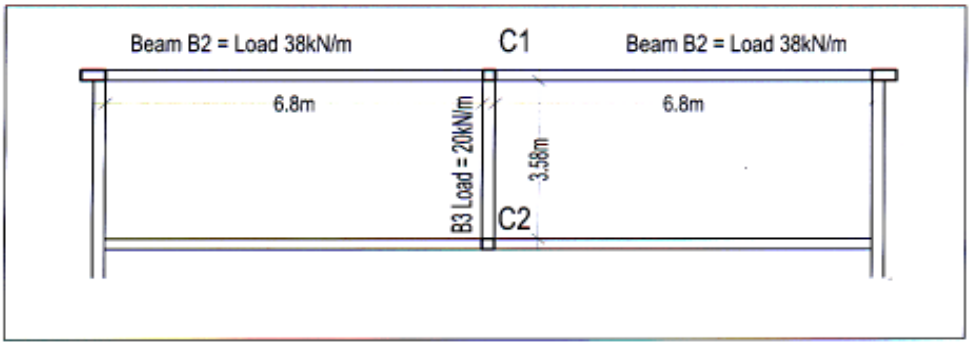
Q7) a) Two columns of size 350 × 350 and 450 × 450 spaced 2.1m apart rest in a soil of S.B.C. 200kN/m^2.

They carry loads of 700kN and 1200kN respectively. Design the combined footing in plan only. Take Length of the footing as 2.5 times the width.**[8]**

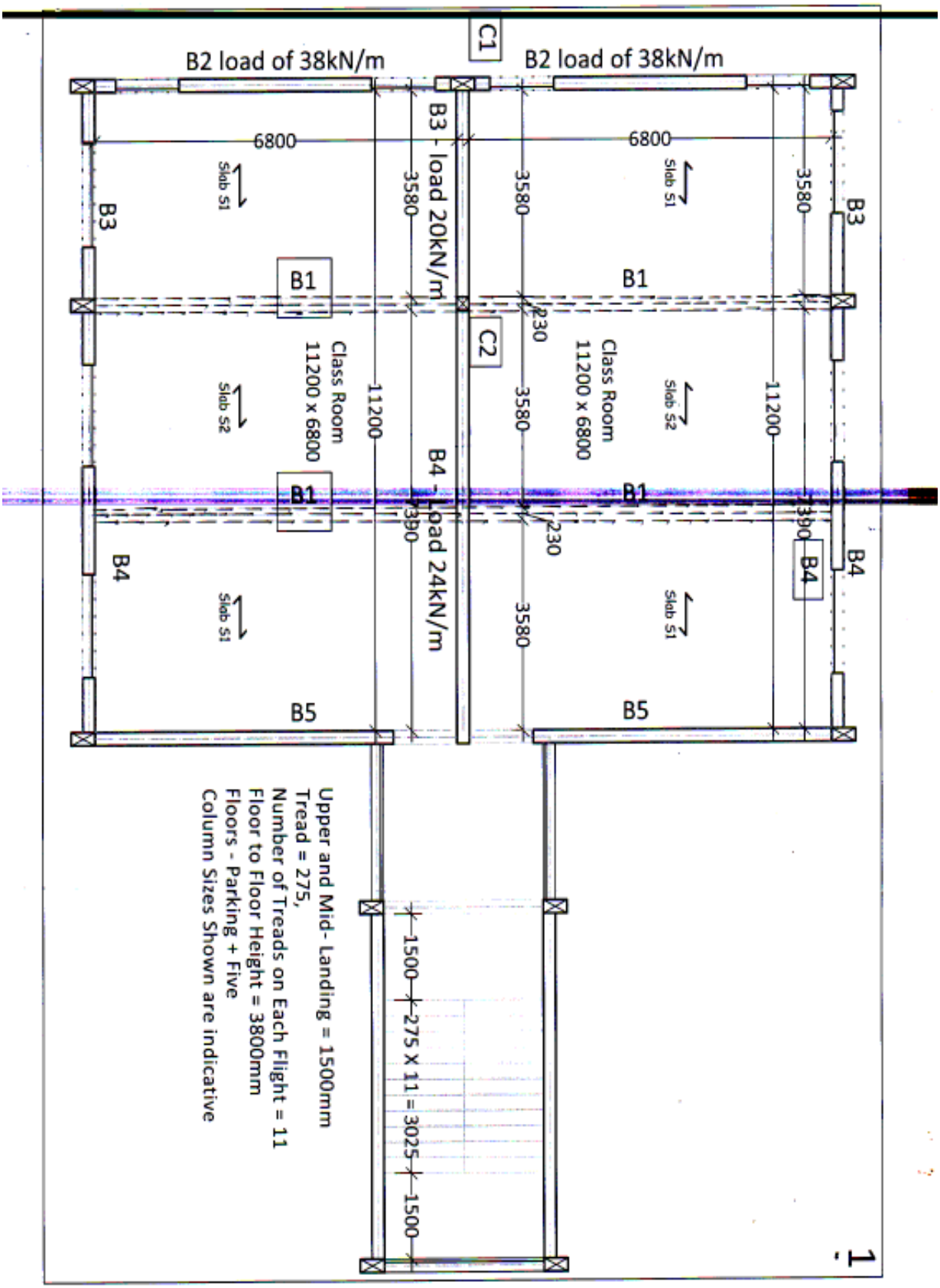
b) Explain under what circumstances does the need of a combined footing arise. Draw the B.M.D. of a combined footing and Reinforcement detailing of the same. **[3]**

OR

Design the Isolated pad footing of a column 275 × 675 to carry a load of 1800kN in a soil of S.B.C. 250kN/m^2. Check for Double shear . Draw sketch of Reinforcement. **[11]**



Q8) Find the load acting on column C1 per floor. Assume load on B2 to be 38kN/ m and load on B3 to be 20kN/ m. Calculate load on every floor considering Parking + 5 floors. Design Column on second floor using 2% steel. Keep the size same and design column on first floor. Draw sketch of reinforcement of both the columns. **[12]**


B2 load of 38kN/m
B2 load of 38kN/m
C1
B3 load 20kN/m
B4 load 24kN/m
6800
6800
3580
3580
3580
3580
3580
B3
B3
B1
B1
B1
B1
C2
230
230
390
390
11200
11200
Class Room
11200 x 6800
Class Room
11200 x 6800
Slab S1
Slab S1
Slab S1
Slab S2
Slab S2
B4
B4
B4
B5
B5
1500
275 x 11 = 3025
1500
Upper and Mid- Landing = 1500mm
Tread = 275,
Number of Treads on Each Flight = 11
Floor to Floor Height = 3800mm
Floors - Parking + Five
Column Sizes Shown are indicative

❀ ❀ ❀

Total No. of Questions : 4]

SEAT No. : ____

P2532

[Total No. of Pages : 2

[5357] - 5003
T.Y. B.Arch. (Semester - V)
BUILDING SERVICES - III
(2015 Pattern)

Time :3 hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answer to the section - I and section - II should be written in separtate answer books.***
3) ***Neat and labeled diagrams must be drawn wherever necessary.***
4) ***Figures to the right (inbrackets) indicate full marks.***
5) ***Assume suitable data if necessary.***

SECTION - I

Q1) Explain in detail with sketches: (Any one) **[15]**

Explain the procedure and data required for the no. of exhaust fans calculation for a kitchen.

OR

Explain Evaporative cooling and the various passive strategies for Evaporative cooling

Q2) Write short notes (Any Four) **[20]**

a) Stack effect

b) Centrifugal fan

c) Cross ventilation

d) Indicators of human comfort conditions.

e) Natural ventilation.

f) Roof Pond

P.T.O.

SECTION - II

Q3) Explain with sketches: (Any one) **[15]**

What is "Refrigeration cycle"? How it is used in Air-conditioning? Explain different components of RAC.

OR

Explain the central DX system with its various components.

Q4) Write short notes. (Any four) **[20]**

a) Compressor

b) Types of filters used in air conditioning.

c) Types of cooling towers.

d) Window type Air conditioner

e) Expansion valves.

f) Filters used in Air Conditioning.

Total No. of Questions : 3]

SEAT No. :

P2533

[Total No. of Pages : 2

[5357] - 6001
T.Y. B.Arch. (Semester - VI)
BUILDING TECHNOLOGY & MATERIAL - VI
(2015 Pattern)

Time :3 hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Answer Section - I should be solved on drawing sheets only & section - II should be written in separate answer book.***
2) ***Neat diagram with dimensions must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

SECTION - I

Q1) A workshop of size 12 M X 20 M X 4.5 M height at tie lvl is to be constructed using steel truss & stanchion column in an industrial area. **[10]**

Draw key plan & section of entire arrangement to 1:100 scale

Draw a part plan to scale 1:20 showing truss spacing along with purlins & stanchion column **[10]**

Draw part sectional elevation to scale 1:20 of the truss along with sheet roofing. **[10]**

OR

Draw plan & section of partially precast RC planks and joist roofing system for site office with Toilet.

Draw key plan & section to scale 1:100 **[10]**

Draw part detail plan & section to 1:10 scale **[10]**

Draw fan fixing detail to suitable scale **[10]**

P.T.O.

Q2) Draw neat sketches of any one of following. **[10]**

a) Column protection details in basement parking.

b) Castellated beam

c) Cantilever Retaining wall.

SECTION - II

Q3) Write short notes Any Five of following with neat sketches wherever necessary. **[30]**

a) Planning methods for modular co-ordination in buildings.

b) Types of Retaining wall

c) Precast Waffle unit

d) External & Internal tanking

e) Use of glass in building Industry.

f) Characteristics & properties of plastic,

g) Adhesives and sealants

h) Role of floor and Roof Diaphragm in earth quake resistance.

Total No. of Questions : 8]

SEAT No. :

P2534

[Total No. of Pages : 7

[5357] - 6002
T.Y.B. Arch.
THEORY OF STRUCTURES - VI
(2015 Pattern)

Time :3 hours] ***[Max. Marks :70***

Instructions to the candidates:

1) *Q.No. 1 and Q. No. 5 are compulsory. Out of the Remaining three Solve any two in each Section.*
2) *Figures to the right indicate full marks.*
3) *Assume suitable data where necessary only. Use of Standard Steel Tables allowed.*
4) *Use M20 Grade concrete and Fe*500 grade steel and L.S.M. of *Design in R.C.C. Problems.*
5) *For Structural Steel Use Steel Fe410 (E250)whose fy = 250N/mm^2. Use L.S.M. of Design.*
6) *Every R.C.C Design should be accompanied by relevant schedule and Reinforcement Sketch.*
7) *Use of non-programmable Calculators Allowed.*

SECTION - I

Q. No. 1 Compulsory. Answer any 2 From Q. No. 2,3 and 4.

Q1) Make the Framing Plan for the Given Ground Floor and First Floor.**Framing Plan to be shown on Ground Floor Plan Only** **[11]**

Show Columns only on Ground Floor, Size could be 230 x 350

Show all Beams. Restrict Depth of Beams to **550mm.** Indicate depth on plan and the Span to Depth Ratio considered for type of beam.

Show Spans of all Slabs(lncluding Staircase) and Indicate Depth considered, **Span to Depth Ratio**. Slab depths to be restriced to **140mm**.(Not for Staircase Slab)
No Columns to be provided within the Main Halls

Window Positions are indicative only and could be changed to adjust for Column Positions.

P.T.O.

Q2) A R.C.C Cantilever Retaining wall is detailed as below.

1. Top width of stem – 250 Width of base – 3100 S.B.C of soil – 250 kN/m^2.
2. Bottom width of stem – 520 thickness of base – 500 Density of soil – 17 kN/m^2
3. Height of stem – 5400 Toe projection –750 Coefficient of friction– 0.6
4. Density of Concrete – 25 kN/m^3 Angle of repose - 28°

A. **Check the stability of the retaining wall with respect to over turning and sliding.** **[8]**

B. **Find the max and Minimum Pressure at Base** **[4]**

Q3) Answer any 3 of the Following **[12]**

a) Explain the Structural Need, Placement and Reinforcement of Shear Key w.r.t Retaining Wall.

b) Explain the Structural Action on the walls of a Square Water Tank hence the Reinforcement Detailing.

c) Explain the Various Pressure Conditions for an Under-Ground Water Tank and how the combined earth and water pressure of the surrounding ground tackled.

d) Explain the Remedial measures to control crack width or to take care of the Limit State of Cracking in R.C.C of a Water Tank.

e) Explain the basic concept of a Portal Frame and Draw B.M.D of a Two Pin Frame. Draw the detail of a Hinged Joint between the R.C.C Column and Foundation.

Q4) a) Design the Stem Reinforcement of the Retaining Wall of Q2 . Answer with a proper Sketch **[4]**

b) For the Structural System Worked out for the Terrace Above Slab (Shown as Detail at A), for Q. No.1, draw plan and Sectional Details. **[4]**

c) Draw the Detailed Plan of Column (Mention Cover). Draw Plan and Section of the Footing(Mention Cover) given in the schedule below **[4]**

Col No	Footing				Col on Parking Floor		
	Size	Depth	Steel Along Shorter Span	Steel Along Longer Span	Size	Vertical Main Steel	Links
C1	2650 X 2400	600	16 Tor @ 165c/c	17 Tor @ 150c/c	300 x 600	8 No 25 Tor	8 Tor @ 300c/c

SECTION - II

Q.No.5 **Compulsory. Answer any 2 From Q. No. 6,7 and 8**

Q5) A Factory Building is to be Built over a Plinth Area of 15.5m x 33m. **[11]** Decide at what centre to centre distance you will place the stanchions to support roof trusses Draw a **Key Plan** Showing Stanchions, Bracing System Used and Position of Bracing System you may use a **Howe or Fink Truss.** Draw the **Single Line Elevation** of the Truss Showing important Dimensions. Show Purlin Spacing. Calculate the **Live Load** based on the angle of the Truss. Suggest an **Unequal Angle Purlin** (You may use Thumb Rules for the same) Explain the Importance and **Structural Need of a Bracing System**

Q6) a) Explain the development of Plastic Hinges in a Steel Girder **[3]**

b) **ISMB 550** is welded with **230mm x 20mm** plates on each side of the Flange. Determine the safe udl it can carry over a Effective Span of 10.23m. Classify the ISMB Section.Also Check for Actual Deflection against an Allowable Deflection of Span/240 **[9]**

Designation	Zp cm^3	Shape Factor
ISMB 250	465.71	1.1345
ISMB 300	651.74	1.1362
ISMB 350	889.57	1.1421
ISMB 400	1176.18	1.1498
ISMB 450	1533.36	1.1500
ISMB 500	2074.67	1.1471
ISMB 550	2711.98	1.1492
ISMB 600	3510.63	1.1471

OR

Design a **Cantilever Beam** of Overhang **2.2m** for a load of 36kN/m using ISMB. Check for Bending Strength, Shear and Deflection. **[12]**

Q7) a) Explain the principal Advantage in Compound Stanchions as Compression members. Also Explain the structural need of a Lateral System in Compound Stanchions. **[3]**

b) Design a Compound Stanchion consisting of 2 no ISMC placed front to front with a Battened Lateral system to take a load of l500kN. Length or Height of the Stanchion is 9.5m, with both ends fixed. Assuming a suitable Battening System draw a sketch of the same. (Hint: Assume Stress = 200N/mm^2 to start the design process) Effective Lengths against End Conditions is given in the attachments **[9]**

S.R	Buckling Class a	Buckling Class b	Buckling Class c	Buckling Class d
For Steel of fy=250N/mm²				
30	220	216	211	204
40	213	206	198	185
50	205	194	183	167
60	195	181	168	150

Q8) Answer any 3 of the Following **[12]**

1) Explain the I.S Provisions for a **Lacing System.** Draw neat Sketches of the same

2) Explain the need and Advantages of a **Castellated Girder**

3) Explain the Structural Action on a **Dome** and the R.C.C Detailing for the same

4) Explain the Structural Action on **Short and Long Barrel Vaults**. Explain the need for Edge Stiffeners for R.C.C Vaults

5) Explain **Shear Walls and Out Rigger Systems** as Interior Structural Systems in A High Rise Building

6) Explain the **Different Tube Systems** as Exterior Structural Systems in a High Rise Building

Classification of Sections into Plastic , Compact, Semi Compact Sections

Table 1. Limits on Width to Thickness Ratio of Plate Elements

Compression element			Ratio	Class of Section		
				Plastic (β_1)	Compact (β_2)	Semi-compact (β_3)
Outstanding element of compression flange	Rolled section		b/t_f	9.4ε	10.5ε	15.7ε
	Welded section		b/t_f	8.4ε	9.4ε	13.6ε
	Compression due to bending		b/t_f	29.3ε	33.5ε	42ε
Internal element of compression flange	Axial compression		b/t_f	Not applicable		
Web of an I-H-or box section [c]	Neutral axis at mid-depth		d/t_w	84ε	105ε	126ε
	Generally	If r_1 is negative:	d/t_w	$\frac{84\varepsilon}{1+r_1}$ but $\leq 42\varepsilon$	$\frac{105.0\varepsilon}{1+r_1}$	$\frac{126.0\varepsilon}{1+2r_2}$ but $\leq 42\varepsilon$
		If r_1 is positive :	d/t_w		$\frac{105.0\varepsilon}{1+1.5r_1}$ but $\leq 42\varepsilon$	
	Axial compression		d/t_w	Not applicable		

Note 1: Section having elements which exceeds semi-compact limits are to be taken as slender cross sections

Note 2: $\varepsilon = (250/f_y)^{1/2}$

Note 3: Check webs for shear buckling in accordance when $d/t > 67\varepsilon$. Where, b is the width of the element may be taken as clear distance between lateral supports or between lateral support and free edge, as appropriate, t is the thickness of element, d is the depth of the web, D mean diameter of the element.

Note 4: Different elements of a cross-section can be in different classes. In such cases the section is classified based on the least favorable classification.

Note 5: The stress ratio r_1 and r_2 *are defined as*

$r_1 =$ *actual average axial compressive stress / design compressive stress of web alone* , $r_2 =$ *actual average axial compressive stress / design compressive stress of overall section*

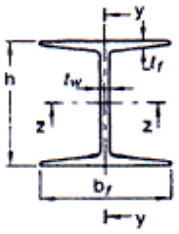
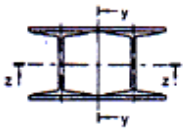
End conditions and effective lengths for stanchions

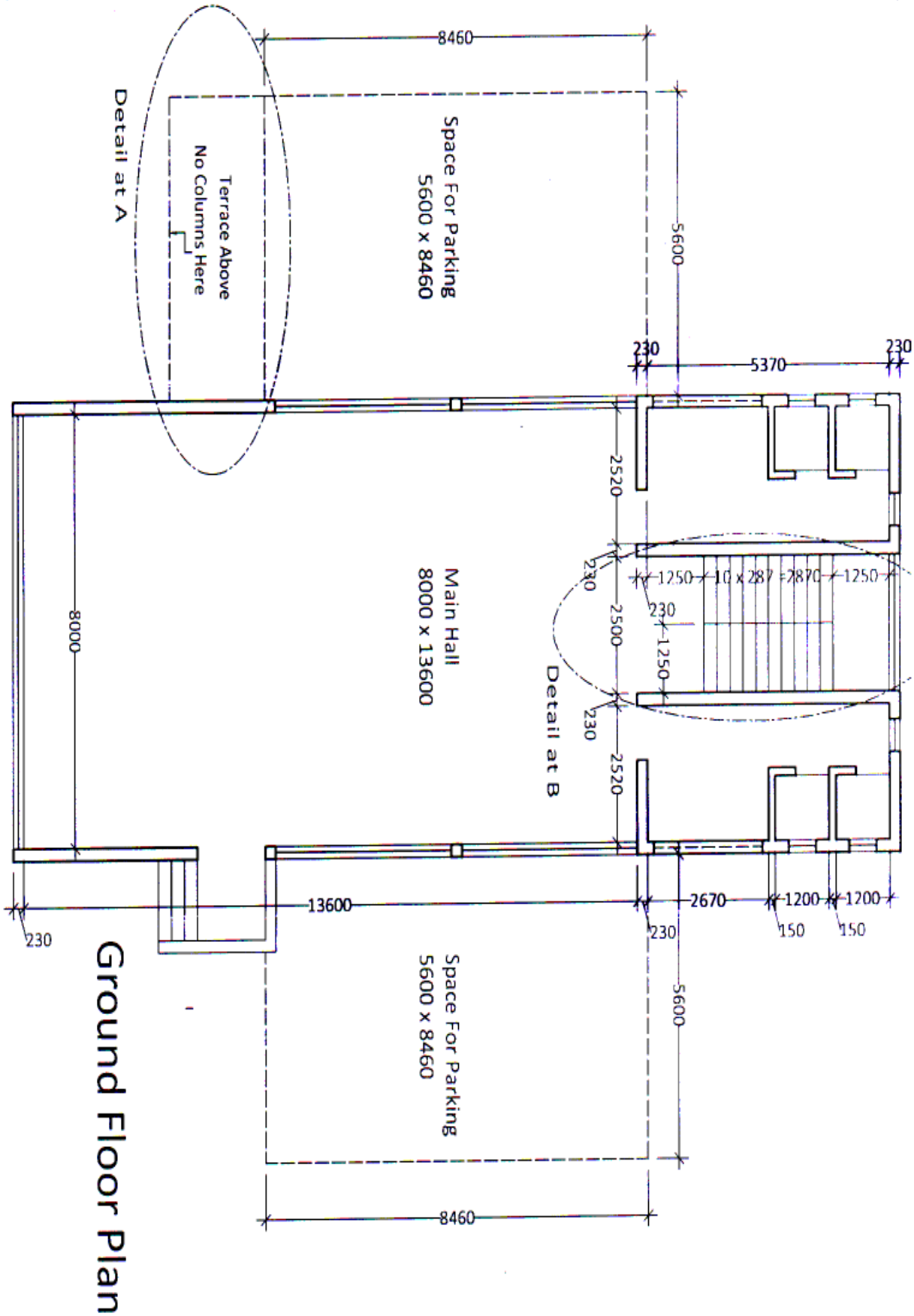
a. Both ends Fixed Le = 0.65L
b. One End Fixed other end Hinged Le = 0.8L
c. Both Ends Hinged = 1.0L
d. One End Fixed One End Free Le = 2L

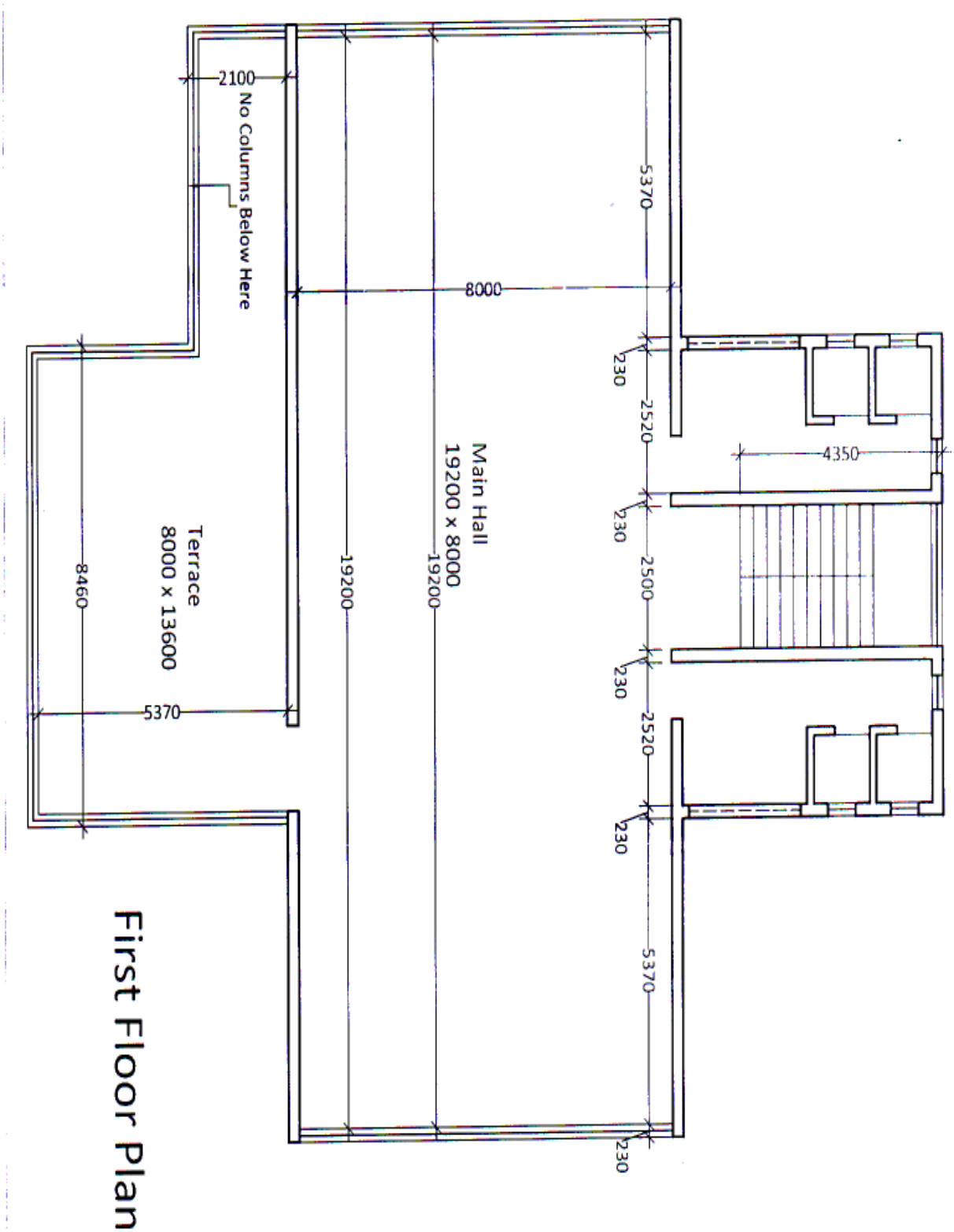
Table 10 Buckling Class of Cross-Sections

IS 800 : 2007

(Clause 7.1.2.2)

Cross-Section	Limits	Buckling About Axis	Buckling Class
(1)	(2)	(3)	(4)
Rolled I-Sections 	$h/b_f > 1.2$: $t_f \leq 40$ mm	z-z y-y	a b
	40 mm < $t_f \leq$ 100 mm	z-z y-y	b c
	$h/b_f \leq 1.2$: $t_f \leq 100$ mm	z-z y-y	b c
	$t_f >$ 100 mm	z-z y-y	d d
Built-up Member 		Any	c


8460
Detail at A
Terrace Above
No Columns Here
Space For Parking
5600 x 8460
5600
230
5370
230
2520
230
1250
10 x 287 =2870
1250
230
2500
1250
Main Hall
8000 x 13600
8000
Detail at B
230
2520
13600
2670
1200
1200
230
150
150
230
Space For Parking
5600 x 8460
5600
8460
Ground Floor Plan



First Floor Plan

❀ ❀ ❀

Total No. of Questions : 4]

SEAT No. : ____

P2535

[Total No. of Pages : 2

[5357] - 6003
T.Y.B. Arch. (Semester - VI)
BUILDING SERVICES - IV
(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 Labelled 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: **[15]**

Describe any 3 ways of passive fire control as per the rules and regulations of NBC.

OR

List the different types of fire extinguishers used in fire fighting systems with the help of neat sketches.

Q2) Write short notes (Any Four) **[20]**

a) Sprinklers

b) Refuge Area

c) Fire resistance of materials.

d) Fixed Apparatus for fire fighting

e) Wet Riser

f) Dry Riser

P.T.O.

SECTION - II

Q3) Explain with sketches: (Any One) **[15]**

Explain the properties of sound absorbing material and give its classification according to use with neat sketches.

OR

Explain with neat sketches the principles of auditorium acoustics.

Q4) Write short notes (Any Four) **[20]**

a) Methods of cutting off structure Borne Noise

b) Echo

c) Reverberation time

d) Effect of plan shapes on hearing conditions.

e) Acoustical defects

f) Masking effect of sound

SEAT No. :

P2536 **[Total No. of Pages : 3**

[5357] - 6004
T.Y. B.Arch.
DESIGN - VI
(2015 Pattern)

Time :12 Hours (Enlodge 6 Hours] ***[Max. Marks :100***

Instructions to the candidates:

1) ***The design will be assessed as a whole.***
2) ***Assume suitable data wherever necessary.***
3) ***Line drawings of plan and section at a scale of 1:100 must be submitted at the end of day one. These drawings will not be returned to the students on day two.***
4) ***All the drawings should be neat, clear & self explanatory.***

Primary School building at Pune

Design Brief :

A reputed educational institute is setting up a day school for pre-primary & primary stage (LKG, KG and to 4 standards). This school is going to be affiliated to the state board Maharashtra. The school is being set up in an upcoming suburb of Pune. The school intents to develop students skills such as creativity, social responsibility etc.

The plot area of the project is 4800 sqmt. with a 12 mt. wide road on the North side of the plot. Other details of the plot are as below.

1. Area of the plot - 80 mt. × 60 mt. = 4800 sqmt.
2. Maximum ground coverage - 1200 sqmt . (25% of plot area)
3. Set back from road - 6 mt.
4. Set back from all other sides – 4.5 mt.
5. Maximum height of building - 12.00 mt.

P.T.O.

Design Program:

SR No.	Description	Numbers	Carpet area per Numbers (sqmt.)	Total Carpet area (sqmt.)
A	Administration Area			
1.	Entrance lobby	1	30.00	30.00
2.	Administration Office with space for 2 Clerks,1 Accountant	1	30.00	30.00
3.	Head Masters cabin with attached toilet	1	30.00	30.00
B	Academic Area			
4.	Class rooms for 30 students	6	50.00	300.00
5.	Multipurpose hall	1	200.00	200.00
6.	Library	1	100.00	100.00
7.	Activity rooms	2	40.00	80.00
8.	Arts & crafts room	1	30.00	30.00
9.	Staff room (for 8 staff)	1	80.00	80.00
10.	Adequate toilets for Ladies & gents staff			
11.	Adequate toilets for boys & girls students			

Along with the above mentioned design requirements the following facilities should be provided.

1. Open amphi theater with a capacity of 200 seats
2. Open play ground area.
3. Semi open interactive spaces along with appropriate landscape elements.

Parking Requirements

1. School bus parking - 2 buses
2. Four wheelers - 5 cars
3. Two wheelers - 20 Numbers
4. Bicycles - 50 Nos.

Drawing Requirements.

SR No.	Description	Scale
1.	Site plan	1: 200
2.	Site section (1min.)	1: 200
3.	All floor plans	1:100
4.	Building sections minimum two	1:100
5.	Building elevation minimum two	1:100
6.	Perspective views As per requirements	

Site Plan