III-SEM./CIVIL ENGINEERING/ 2021(W) OLD

CET 301 - Mechanics of Material

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. What do you mean by free body diagram?

b. What is the value of M.I for rectangular, square and circular sections respectively?

c. Define modulus of elasticity or young's modules (E).

d. What is the value of bending moment at the fixed end of a cantilever carrying uniformly distributed load over the whole span?

e. What do you mean by principal stress?

f. What do you mean shear force and bending moment?

g. What do you mean by point of contraflexure?

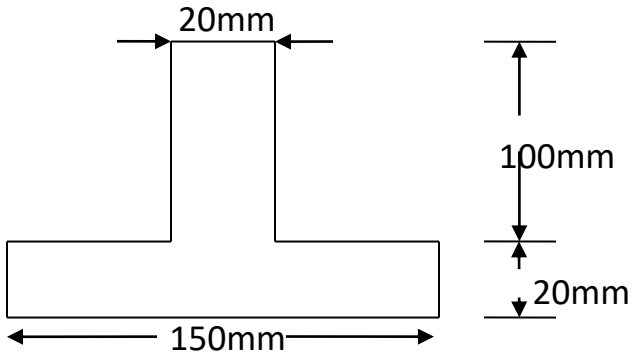
h. Define Poisson's ratio .

i. What is the maximum bending moment and shear force for a simply supported beam carrying point load at the centre and uniformly distributed load over the whole span respectively?

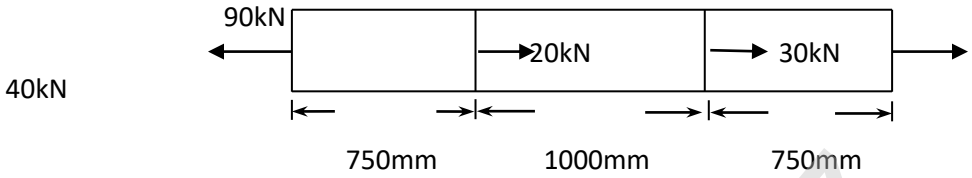
j. Write the relationship between three elastic constants.

2. Answer **Any Six** Questions 5X6

a. Find the centroid of lamina shown in fig .



b. Determine the elongation of the bar. Take E for the steel as 200 Gpa.



c. What are the assumptions in the theory of simple bending?

d. A wooden tie is 75 mm wide, 150 mm deep and 1.5 meter long. It is subjected to an axial pull of 45000N. The stretch of the member is found to be 0.6380 mm. find the Young's modulus for the material.

e. A wooden bar is subjected to a tensile stress of 5 MPa.What will be the values of normal and shear stress across a section which makes an angle of 25° with the direction of tensile stress.

f. A hollow steel column has an external diameter of 250 mm and an internal diameter of 200 mm. Find the safe axial compressive load for column if the safe compressive stress is 120N/ mm^2.

g A cantilever beam of 1.4m length carries a uniformly distributed load of 1.5KN/m over its entire length . Draw the shear force and bending moment diagram of the cantilever.

3 A cantilever beam 1.5 m long carries point loads of 1 KN, 2 KN and 3 KN at 0.5 m, 1 m and 1.5 m from the fixed end respectively. Draw the shear force and bending moment diagram for the beam. 10

4 Derive an expression for the relation between intensely of load. S.F and B.M. 10

5 A beam 3 m long has rectangular section of 80 mm width and 120 mm depth. If the beam is carrying a uniformly distributed load of 10 KN/m . Find the maximum bending stress developed in the beam? 10

6 A T- Section beam with 100 mm x 15 mm flange and 150m x 15 mm web is subjected to a shear force of 10 KN at a section. Draw the variation of shear stress across the depth of the beam and obtain the value of maximum shear stress at the section. 10

7 A simply supported beam of span 4.5 m carries a uniformly distributed load of 3.6 KN/m over a length of 2 m from the left end ' A' . Draw the S.F and B.M.D for the beam. 10

III-SEM./CIVIL/2021(W) OLD

CET 302 Fluid Mechanics and Hydraulic Machine

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2

Figures in the right hand margin indicates marks

1. **Answer All questions** **2 x 10**

- **a.** **Define viscosity and write down its unit in C.G.S system.**
- **b.** **Define density and its unit.**
- **c.** **Write down the relationship between atmospheric pressure, absolute pressure and gauge pressure.**
- **d.** **What is Archimedes principle?**
- **e.** **Define discharge and its unit.**
- **f.** **What is notch and write down its uses.**
- **g.** **Write down Darcy Weisbatch formula.**
- **h.** **What are the main parts of a centrifugal pump?**
- **i.** **What is mechanical efficiency of a centrifugal pump? Write down its mathematical formula.**
- **j.** **What is the difference between poise and stoke?**

2. **Answer Any Six Questions** **6 x 5**

- **a.** **Derive continuity equation.**
- **b.** **Derive expression for total pressure exerted on vertical surface.**
- **c.** **Find the volume of the water displaced and position of centre of buoyancy for a wooden block of width 2.5 m and of depth 1.5 m, when it floats horizontally in water. The density of wooden block is 650 kg/m^3 and its length is 6 m.**
- **d.** **Describe hydraulic gradient line and total energy line.**
- **e.** **Derive an expression for the meta centric height of a floating body.**
- **f.** **Write down the statement and mathematical formula for the loss of head due to sudden enlargement and sudden contraction of a pipe.**
- **g** **A pipe, through which water is flowing, is having diameters 20 cm and 10 cm at the cross section 1 and 2 respectively. The velocity of water at section 1 is given as 4.0 m/sec. Find the velocity head at sections 1 and 2 and also rate of discharge.**

3 **State and prove Bernoulli's equation.** **10**

4 **Briefly describe different parts of a centrifugal pump.** **10**

5 **A single acting reciprocating pump running at 50 rpm, delivers 0.01 m^3/sec of water. The diameter of the piston is 200 mm and stroke length is 400 mm. Determine** **10**

- **(i)** **The theoretical discharge of the pump.**
- **(ii)** **Coefficient of discharge**
- **(iii)** **Slip and percentage slip of the pump.**

6 **Derive the discharge formula for venturimeter.** **10**

7 **Describe different types of flow through pipe** **10**

- **(i)** **Steady and unsteady flow**
- **(ii)** **Uniform and non uniform flow**
- **(iii)** **Laminar and turbulent flow**
- **(iv)** **Compressible and incompressible flow**

III-SEM./CIVIL/2021(W) OLD

CET 303 Survey -1

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2

Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. State the basic principle of surveying.
b. Differentiate between open traverse & close traverse.
c. What is a contour line?
d. Draw the conventional symbols of metalled road and wire fencing.
e. Differentiate between plan and map.
f. What is reciprocal levelling?
g. Outline the uses of a cross staff.
h. Convert 270° into reduced bearing system.
i. Define a benchmark and write down different type of benchmark.
j. Explain the term contour line.

2. Answer **Any Six** Questions 5X6

a. In levelling between points A and B on opposite side of a bank of a river. The level was set up near A and the staff reading on A and B are 2.156 & 3.568 respectively. The level was then moved and set up near B and the respective staff readings on A and B were 1.968 and 3.262. Find true difference level of A and B & write which is at high level.
b. The length of a line measured with a 20 m chain was found to be 250m. Calculate the true length of the line if the chain was 10 cm too long.
c. Describe the method of testing chain.
d. The four bearings of the lines AB, BC, CD and DE are 45°20',120° 30', 200° 30' & 280°30' respectively. Find angles ∠B, ∠C & ∠D.
e. Draw a comparison between chain surveying and compass surveying.
f. Explain the method of continuing a chain line facing the following obstacles.
> A tall building
> A river
g What do you mean by contour interval .Write down the factors affecting choice of contour interval?

3 The following staff readings were observed successfully with the level, the instrument being changed after 3rd, 6th and 8th readings. 10
2.228, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684 meters.
Enter the above readings in a page and calculate the RL of points, if the first reading was taken with staff held on a benchmark of 432.384 m

4 Write down the various characteristics of contour with diagrams wherever necessary. 10

5 Find which station is free from local attraction & work out the correct bearings. 10

Line	F.B.	B.B.
AB	154°	334°40'
BC	205°40'	23°38'
CD	140°00'	321°22'
DE	69°38'	249°38'

Explain each reading underneath the tabular form.

6 Describe the field procedure of chain surveying. 10

7 What are the sources of error in chaining? What precautions would you take to guard against them? 10

III- SEM /CIVIL/2021(W) OLD

CET-304 CIVIL ENGINEERING MATERIAL

Full Marks: 80 Time : 3 Hours

Answer any Five Questions including Q No. 1& 2

Figures in the right hand margin indicates marks

1. Answer the following : 2×10
   (a) What do you mean by water cement ratio ?
   (b) What is annual rings in timber ?
   (c) What do you mean by dressing of stone ?
   (d) What is an enamel paint ?
   (e) What do you mean by curing ?
   (f) Differentiate between cast iron and wrought iron.
   (g) State the size of a modular brick.
   (h) Write down two uses of terracotta.
   (i) Name the different types of tests for testing quality of cement.
   (j) What is an Asphalt ?

2. Answer any six questions : 5×6
   (a) State briefly the methods of processing painting on new wood work.
   (b) Why curing is necessary in cement concrete work ?
   (c) Define plastic and its use as building materials.
   (d) Briefly explain the manufacturing process of plywood.
   (e) Describe the different salient points of good quality bricks.
   (f) Describe briefly the grading of aggregates.
   (g) Differentiate between tar and bitumen.

3. Explain the term " Bulking". How its presence affects the cement proportion ? 10

4. What are the ingredients present in a distemper ? Explain the process of distempering. 10

5. State the operations involved in the manufacturing of bricks. 10

6. Describe the different methods adopted for preservation of timber. 10

7. Describe briefly the methods of manufacture of cement. 10

3rd Sem./ Civil /2021(W)OLD
CET 305 Construction Technology

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions **2 x 10**

a. List out the different components of a building.

b State different methods of site exploration ?

c. Differentiate between shallow & deep foundation ?

d What is retaining wall?

e Define D.P.C.

f. Define purlin.

g Define Queen Closer & King Closer.

h State the relation between rise and tread in a staircase?

i. Identify the commonly used water repellent for exterior surfaces.

j. Define floor toping?

2 Answer **Any Six** Questions **5x6**

a. Sketch and Explain Flemish Bond for 1 and 1 ½ brick thick wall with figure.

b Explain different parts of Arch with figure.

c. Classify building depending on the occupants.

d Show the different parts of a Queen post truss with a neat sketch.

e. Describe the preparation and application of paints on newly plastered wall surfaces.

f. What is dampness ? Write about its ill effects ?

g Describe briefly various types of shallow foundation?

3 Define holdfast and Describe various types of Doors used in building with neat sketch. **2+8**

4 Define deep foundation. Classify Piles according to its function. **2+8**

5 What is stone masonary and describe any three types with neat sketches. **3+7**

6 What is Distempering & Mention the application procedure of distempering a new wall? **2+8**

7 Write short notes on the following **2+4+4**

i. Vibrator
ii. Hoisting Equipment
iii. Excavator

III-SEM./CIVIL ENGINEERING/2021(W)

TH-I Structural Mechanics

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. Define perpendicular axis theorem.

b. Define poisson's ratio.

c. State Hooke's law.

d. Write down the value of maximum B.M in case of a simple supported beam of length l carrying a point load of W at its center.

e. Draw the shear stress distribution diagram for a rectangular section and I section.

f. Define section modulus.

g. Define modulus of rigidity modulus.

h. What is point of contraflexure.

i. Write down the relation between elastic modulus and bulk modulus.

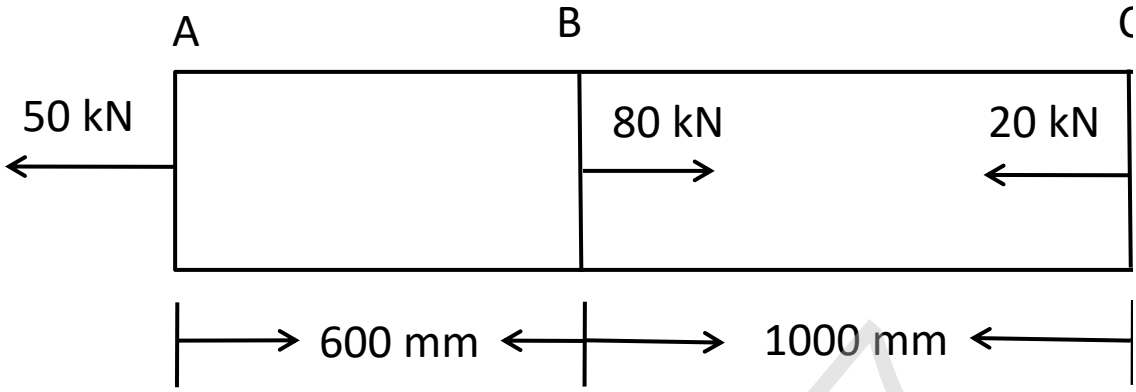
j. Differentiate between statically determinate and statically indeterminate structure.

2. Answer **Any Six** Questions 5X6

a. Draw the neat sketch of stress strain diagram for mild steel and explain the salient points.

b. The modulus of rigidity of a material is $0.8x10^5$ N/mm^2.When a 6mmx6mm rod of this material was subjected to an axial pull of 3600N it was found that the lateral dimension of the rod changed to 5.9991 x 5.9991mm. Find the Poisson's ratio and the modulus of elasticity.

c. A brass bar having cross-sectional area of 1000mm^2 is subjected to an axial force as shown in figure. Find the change in length of the bar. Take E= $1.05x10^5$ N/mm^2.



d. Draw the shear force and bending moment diagram of a cantilever beam of length 'l' carrying a concentrated load W at the free end.

e. Write down the assumptions in pure bending.

f. A timber beam 100mm wide 150mmdeep supports a uniformly distributed load over a span of 2meters.If the safe stresses are 28N/mm^2 in bending and 2N/mm^2 in shear, calculate the maximum load which can be supported by the beam.

g. A steel rod is 5m long & 50mm diameter is used as a column with one end fixed & other end free. Determine the crippling load by Euler's formula. Take E as 200Gpa.

3. A beam AB 10 meters long has supports at its ends A and B. It carries a point load of 5 KN at 3 meters from A and a point load of 5 KN at 7meters from A and a uniformly distributed load of 1KN per meter between the point loads. Draw SF and BM diagrams for the beam. 10

4. Find the moment of inertia of a T- section with flange as 150mm x150mm and web as 150mm x50mm about x-x and y-y axis through the centre of gravity of the section. 10

5. Derive the formula for slope and deflection for a simply supported beam AB of span l carrying a uniformly distributed load of w per unit run over the whole span. Also find the maximum deflection and slope at A. 10

6. a) Define principal stress and principal plane. 10
b) A beam of rectangular cross section is 300mm wide and 500mm deep. If the section is subjected to a maximum shear force of 50 KN, Find the maximum shear stress and draw the shear stress distribution along the depth of the beam.

7. a) Write down the assumptions in pure torsion. 10
b) A solid shaft of 200mm diameter has the same cross sectional area as that of a hollow shaft of the same material with the inside diameter 150mm. Find the ratio of power transmitted by the two shafts at the same speed.

III-SEM./CIVIL ENGG./ 2021(W)

TH-II Geo Tech. Engg

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
   a. What is block diagram? What is its use?
   b. What is Density Index?
   c. Define Uniformity Coefficient.
   d. State Darcy's Law.
   e. Differentiate between compaction and consolidation of soil.
   f. State Mohr- Coulomb's equation of shear failure.
   g. Differentiate between active and passive earth pressure.
   h. Define MDD and OMC.
   i. What is Zero air void line?
   j. What is bearing capacity of soil?

2. Answer **Any Six** Questions 6 x 5
   a. Explain the origin and formation of Soil.
   b. Derive the relation between Void ratio and porosity.
   c. What is Consistency of Soil? Explain different types of Atterberg indices.
   d. Discuss about Plasticity Chart.
   e. Write short note on Quick sand condition.
   f. Compute the active and passive earth pressure force at a depth of 8m in a dry cohesionless sand with angle of internal friction 30 degree and unit weight 18 KN/m^3.
   g How many cubic meter of earth fill can be constructed at a void ratio of 0.67 from 190000 m^3 of borrow material that has a void ratio of 1.1?

3 What do you mean by sedimentation analysis? Give a brief description about pipette method. 10

4 In a consolidation test void ratio decreased from 0.70 to 0.65 when the load was changed from 50 KN/m^2 to 100 KN/m^2. Compute compression index and coefficient of volume change. 10

5 The mass and volume of a saturated clay specimen were 29.8 gm and 17.7 cm^3 respectively. On oven drying the mass got reduced to 19 gm and volume to 8.9 cm^3. Calculate shrinkage limit, shrinkage ratio and volumetric shrinkage. Also compute G of soil. 10

6 A cylindrical mould of diameter 7.5 cm contains 15 cm long sample of sand. When water flows through the soil under constant head at a rate of 55 cc/minute, the loss of head between two point 8 cm apart is found to be 12.5 cm. Determine the coefficient of permeability of soil. 10

7 What are the types of shear failures? Describe with neat sketches. 10

3rd Sem./ Civil Engg./ 2021(W)

Th3 Building Material & Construction Technology

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2

Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. What is the function of alumina and silica in brick earth?
b. Define water cement ratio.
c. What is seasoning of timber?
d. What is the role of solvent in paint?
e. Differentiate between shallow foundation and deep foundation.
f. What do you mean by king closer in brick masonry?
g. What do you mean by throating in stone masonry.
h. Name different tests used to measure workability of concrete.
i. Differentiate landing from flight.
j. What is D.P.C and why it is provided.

2. Answer **Any Six** Questions 5X6

a. What do you mean by workability of concrete? Describe the importance of workability on the strength of concrete.
b. What are the characteristics of a good Timber?
c. Describe the purpose of use of Arch and lintel in a building.
d. Explain the characteristics of good building stone.
e. Classify pile foundation and write briefly.
f. State the functions of constituent parts of paints.
g Why curing is necessary in cement concrete work?

3 Classify stair depending on the method of construction. 10

4 Explain different operations involved in the brick manufacturing process. 10

5 Name various types of Doors. Described about any two types of doors with neat sketch. 10

6 Explain different methods of damp proofing treatment. 10

7 Classify building depending on the occupants. 10

3rd Sem./ Civil/ 2021(W)

TH 4 Estimation & Cost Evaluation-I

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. State the actual and nominal size of a standard modular bricks .

b Mention the multiplying factor for painting work in case of fully glazed window and flush door.

c. What do you mean by out turn?

d When centre line method of estimating is preferred?

e Calculate the amount of plastering required for a 5mX 4m room having 30 cm thickness and 3m height?

f. Define Lead and Lift.

g Calculate the additional length of bent up bar for 45* cranked bar?

h Write down the units of the following items
i. Honey comb brick work
ii. Collapsible gate
iii.Stone Masonary
iv.Flooring

i. Classify labourers according to OPWD.

j. What is the standard weight of 20mm dia. Bar of 1m length?

2 Answer A**ny Si**x Questions 5x6

a. Calculate the quantity of dry material for $10m^3$ of cement concrete with proportion 1:3:6 ?

b Draw the hierarchy of Engineering department in State Govt.

c. Calculate the quantities of dry material required for 100sqm ,12mm thick plastering with proportion 1:6 ?

d Mention the duties and responsibilities of Assistant Engineer.

e. Calculate Sal wood work in chowkhat for door and window size of 1.2mX2.1m and 1mX1.5 m? Size of chowkhat 10cmX 8cm .Assume any suitable data.

f. Estimate the following items from Fig No 1 by centre line Method. 2 ½ +
i.Earth work in Excavation
ii.Brick work in foundation and plinth 2½

g Calculate the dry materials required for $450m^2$ of 25mm thick DPC in cement concrete of Proportion (1:1.5:3)?

3 Calculate the following items of work from Fig No 2. 5+5
i.Earthwork in excavation in foundation.
ii. Earth work in filling in plinth..

4 Calculate the cost of 10cum of brickwork in foundation and plinth with 20×10×10cm brick with cement sand mortar 1:6 ?

5	Estimate the quantities of the following items of a residential building from fig-3 i. First class brick work in foundation and plinth. ii. 2.5 cm Damp proof course.		6+4
6	Estimate the quantities of the following items of a building from fig-4 iii. 12 mm thick inside plastering in walls (1:6) iv. Painting doors and windows		6+4
7	Write short notes on : (a) Plinth area Estimate (b) Contigency (c)Work charged establishment. (d) Scrap value and Salvage Value	[5X2]	2 ½ x 4

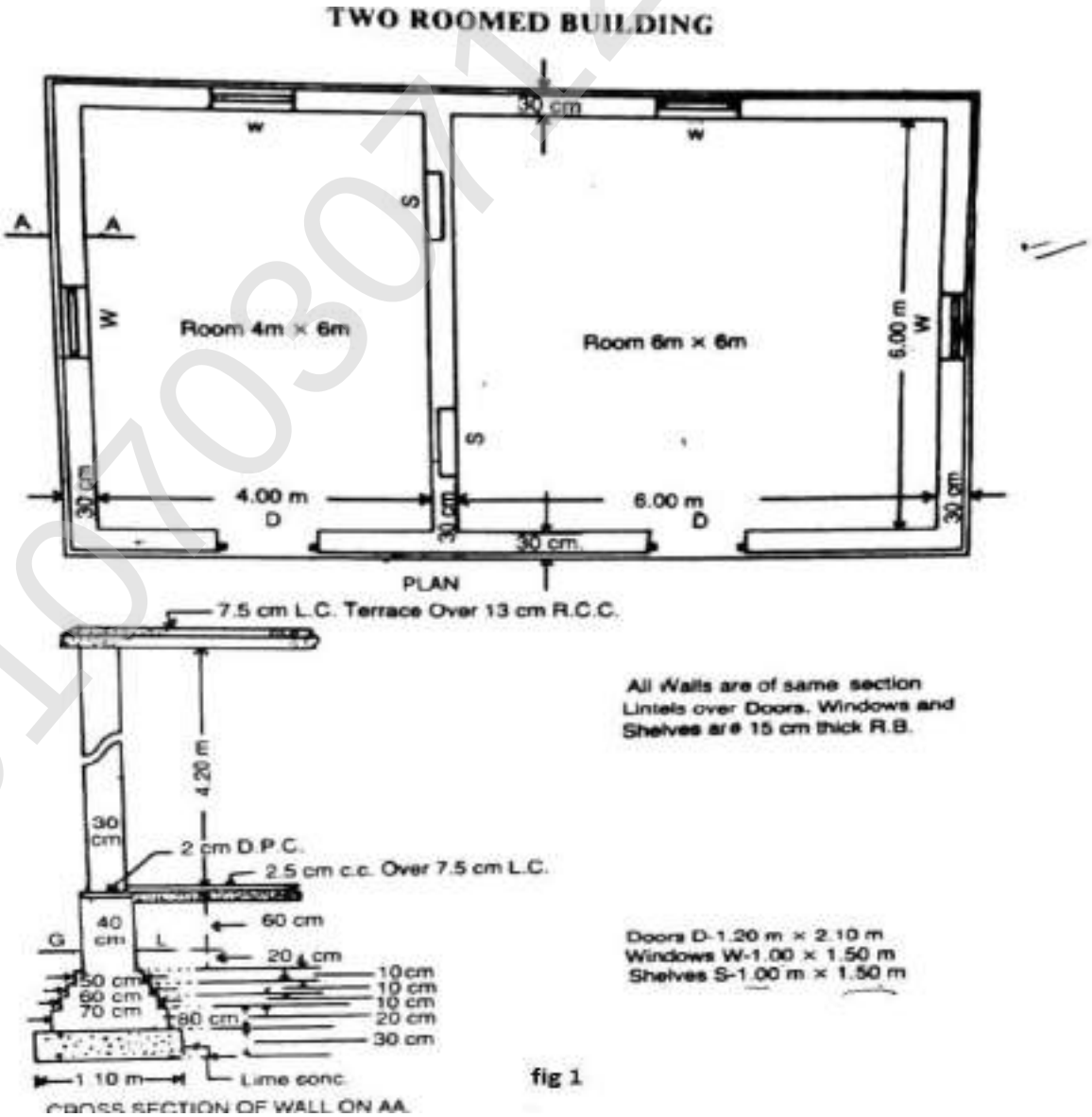


fig 1

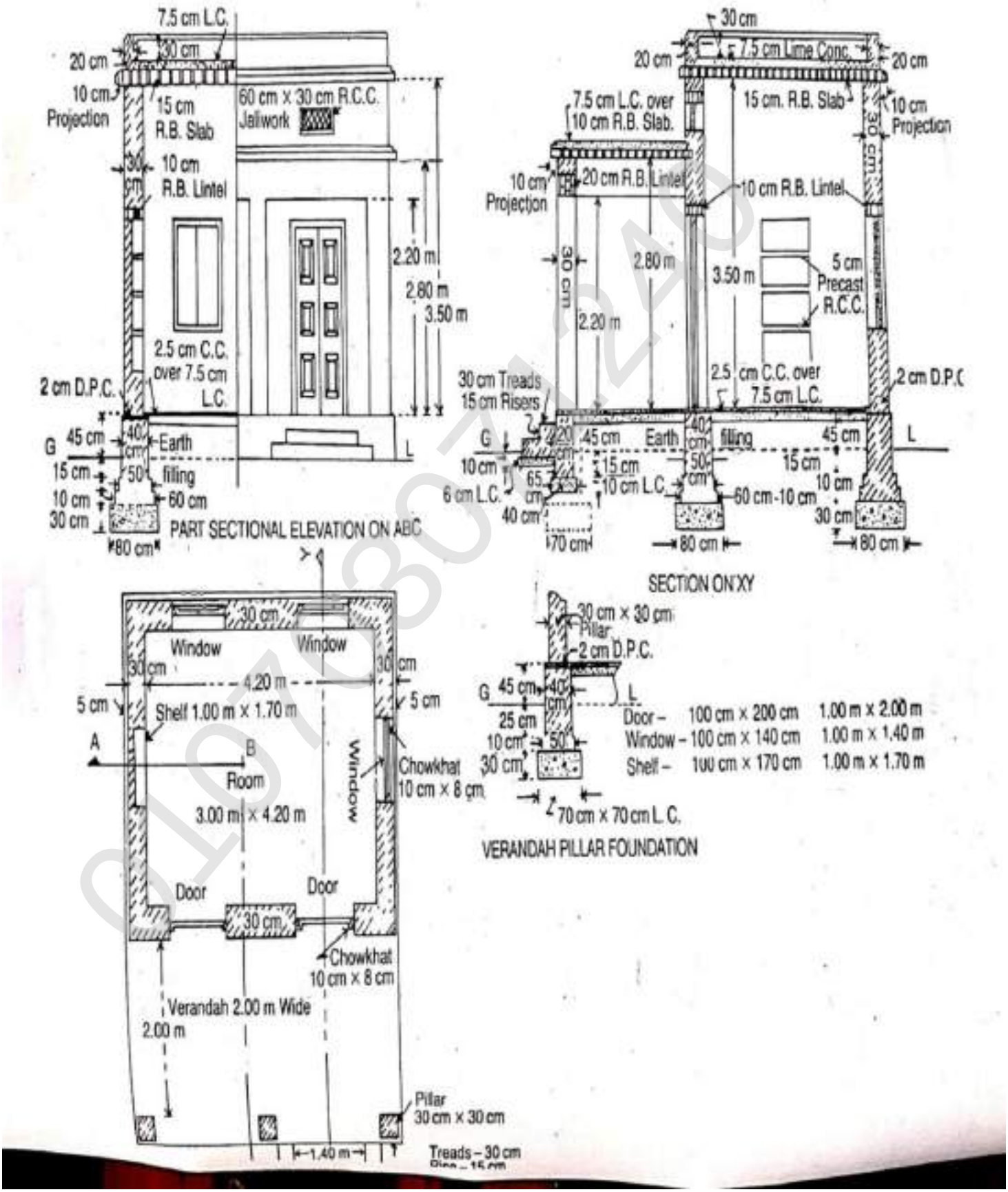
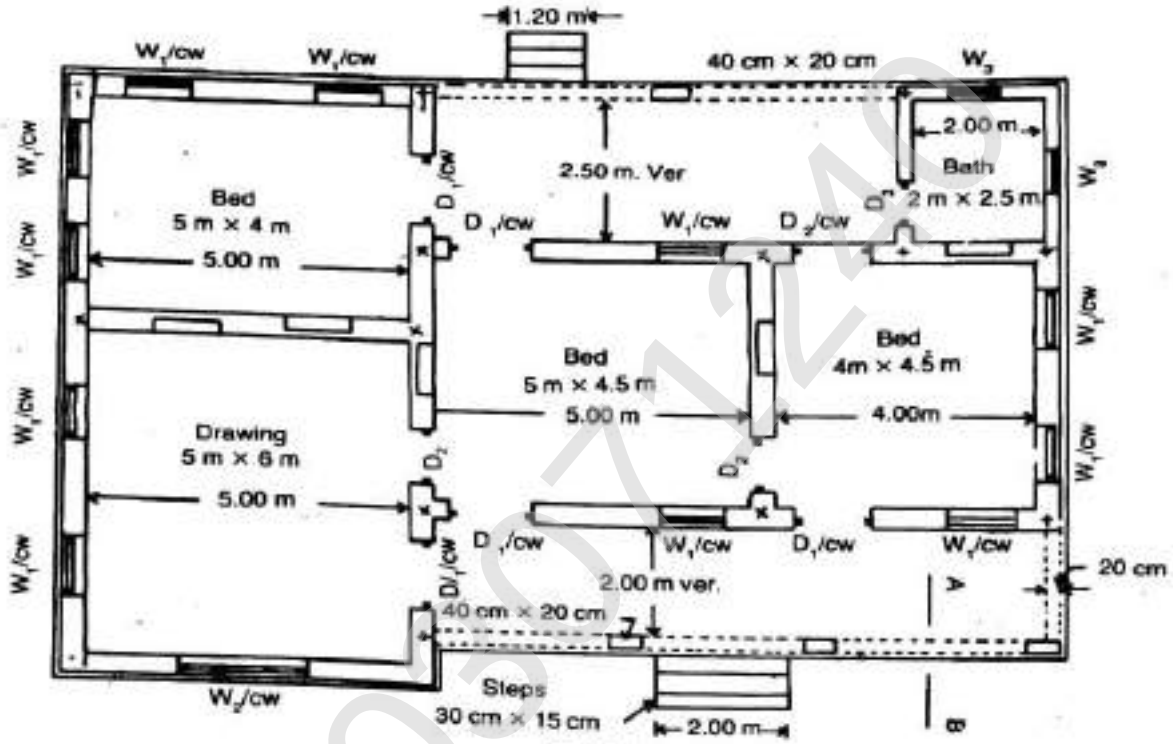
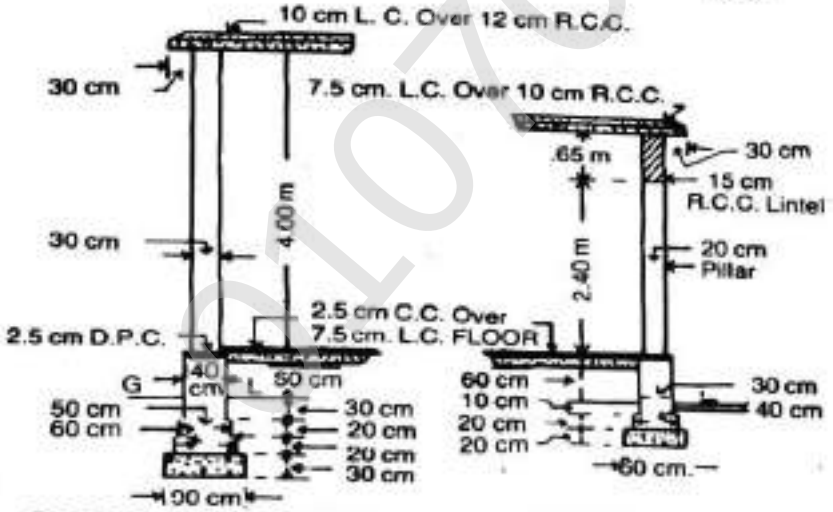

7.5 cm L.C.
30 cm
20 cm
10 cm Projection
15 cm R.B. Slab
60 cm x 30 cm R.C.C. Jaliwork
30 cm
10 cm R.B. Lintel
2.20 m
2.80 m
3.50 m
2.5 cm C.C. over 7.5 cm L.C.
2 cm D.P.C.
G
45 cm
40 cm
Earth
15 cm
50
filling
10 cm
60 cm
30 cm
80 cm
PART SECTIONAL ELEVATION ON ABC
30 cm
7.5 cm Lime Conc.
20 cm
7.5 cm L.C. over 10 cm R.B. Slab.
15 cm. R.B. Slab
10 cm Projection
10 cm Projection
20 cm R.B. Lintel
10 cm R.B. Lintel
30 cm
2.80 m
3.50 m
5 cm Precast R.C.C.
2.20 m
30 cm Treads
15 cm Risers
2.5 cm C.C. over 7.5 cm L.C.
2 cm D.P.C
G
20 cm
45 cm
Earth
40 cm
filling
45 cm
L
10 cm
15 cm
50 cm
15 cm
10 cm
6 cm L.C.
65 cm
10 cm L.C.
60 cm
10 cm
40 cm
30 cm
70 cm
80 cm
80 cm
SECTION ON XY
30 cm
Window
Window
30 cm
30 cm
4.20 m
5 cm
5 cm
Shelf 1.00 m x 1.70 m
A
B
Room
3.00 m x 4.20 m
Window
Chowkhat 10 cm x 8 cm
Door
Door
30 cm
Chowkhat 10 cm x 8 cm
Verandah 2.00 m Wide
2.00 m
Pillar 30 cm x 30 cm
1.40 m
Treads – 30 cm
30 cm x 30 cm Pillar
2 cm D.P.C.
G
45 cm
40 cm
L
25 cm
10 cm
50
30 cm
70 cm x 70 cm L.C.
VERANDAH PILLAR FOUNDATION
Door – 100 cm x 200 cm 1.00 m x 2.00 m
Window – 100 cm x 140 cm 1.00 m x 1.40 m
Shelf – 100 cm x 170 cm 1.00 m x 1.70 m

Fig 2

RESIDENTIAL BUILDING



PLAN



CROSS SECTION OF MAIN WALLS

CROSS SECTION AB OF VER.WALL

Doors:-
D_1 – 120 cm × 210 cm (1.20 m × 2.10 m)
D_2 – 100 cm × 200 cm (1.00 m × 2.00 m)
D_3 – 75 cm × 180 cm (.75 m × 1.80 m).

Windows:-
W_1 – 100 cm × 150 cm (1.00 m × 1.50 m)
W_2 – 200 cm × 150 cm (2.00 m × 1.50 m)
W_3 – 75 cm × 120 cm (.75 m × 1.20 m)
C.W. – 75 cm × 60 cm (.75 m × .60 m).

Shelves:-
S – 100 cm × 150 cm (1.00 m × 1.50 m)
Lintel Over Doors, Windows Etc.
15 cm R.B.

All walls of Drawing Rooms and Bed Rooms have same section

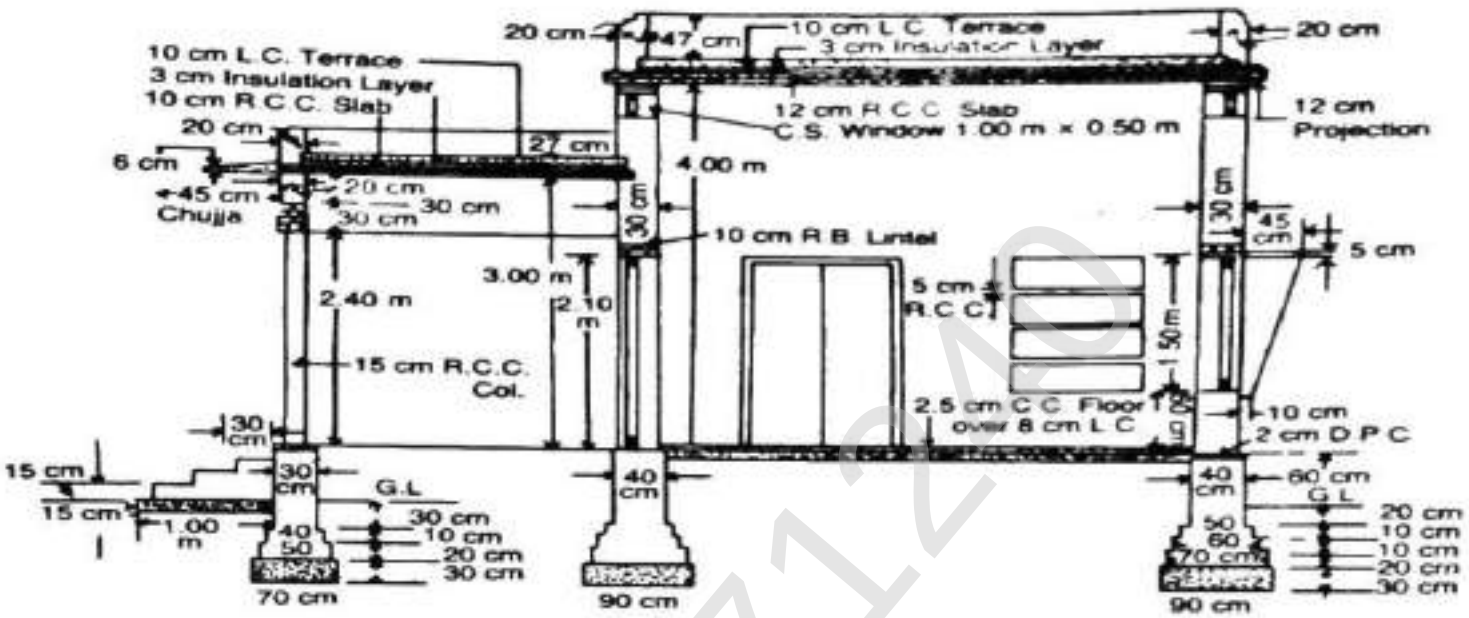
Bath Room Walls have similar section

Note— *No beam has been shown in the plan.*

fig 3

TWO-ROOM BUILDING WITH FRONT VERANDAH

CROSS-SECTION OF TWO-ROOMED BUILDING



SEC^NL ELEVATION ON CEFG

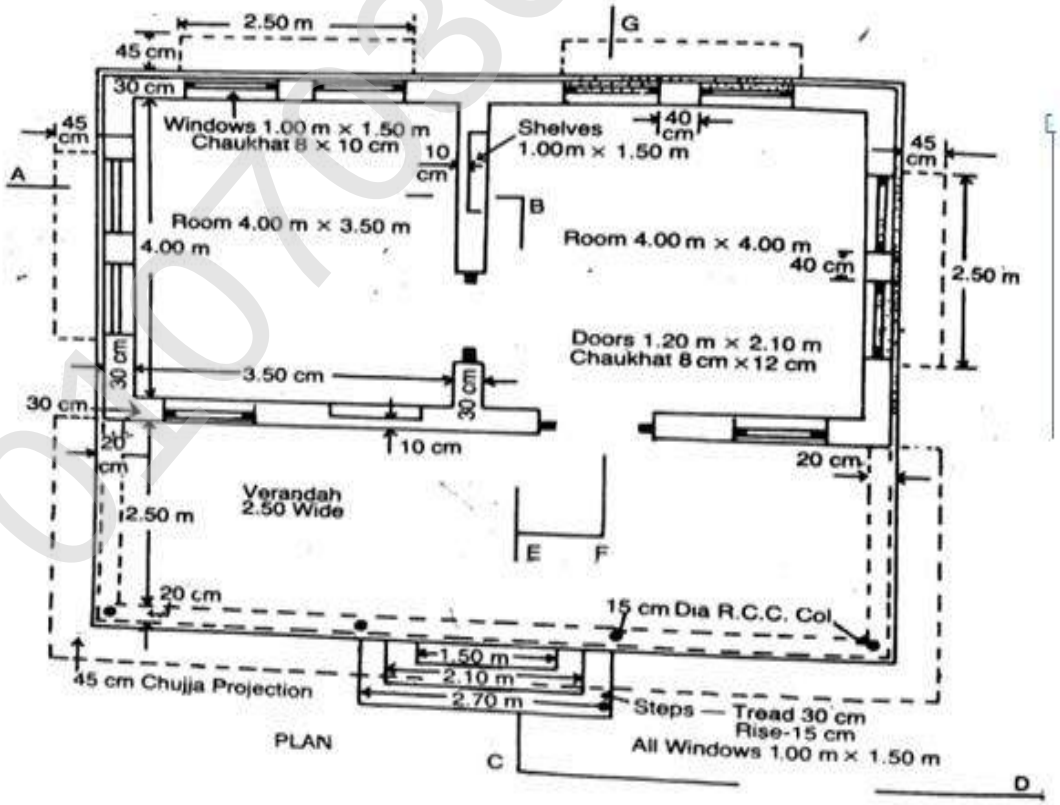


FIGURE-04

3rd Sem. Common 2021(W)

Th-5 Environmental Studies

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

   a. Define acid rain.
   b. What is ecological succession?
   c. What do you mean by soil erosion?
   d. Define genetics and species.
   e. Mention any two causes of marine pollution.
   f. Define environment.
   g. What is mortality?
   h. What do you mean by sustainable development?
   i. What leads to conflicts over water?
   j. Define water pollution.

2. Answer **Any Six** Questions 6 x 5

   a. Define and explain food chain with at least one example.
   b. Explain the changes caused by modern agriculture.
   c. Explain Biodiversity at National level.
   d. Give a brief note on ozone layer depletion along with its consequences.
   e. Discuss in brief 'Human Rights'.
   f. Discuss the needs of public awareness towards environment.
   g Explain cyclone disaster management.

3 Explain the effects of mine extraction on environment and tribal people. 10

4 Explain different threats to biodiversity. 10

5 Describe forest ecosystem. 10

6 Write down the causes, effects and controlling measures of soil pollution. 10

7 a Urban problems related to energy. 5

   b Family welfare program. 5