

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

TH-I Structural Mechanics

Full Marks: 80

Time- 3 Hrs

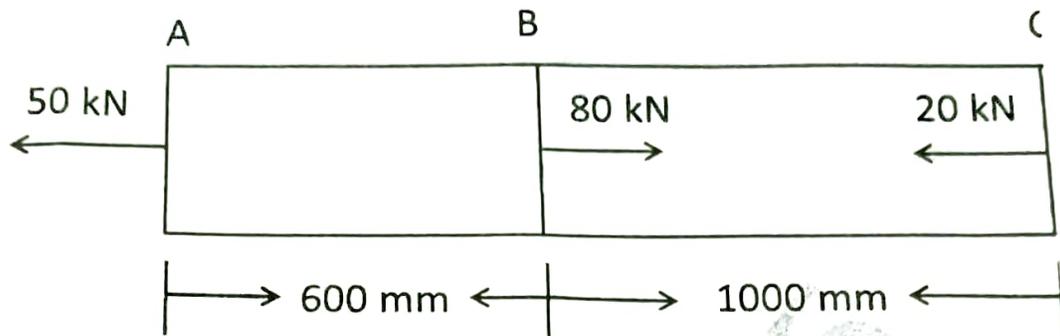
Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

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 $0.8 \times 10^5 \text{ N/mm}^2$. When a $6\text{mm} \times 6\text{mm}$ rod of this material was subjected to an axial pull of 3600N it was found that the lateral dimension of the rod changed to $5.9991 \times 5.9991\text{mm}$. 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 $E = 1.05 \times 10^5 \text{ N/mm}^2$.



- 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 150mm deep supports a uniformly distributed load over a span of 2 meters. 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 7 meters 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 x 150mm and web as 150mm x 50mm 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
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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

Full Marks: 80

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

2 x 10

1. Answer **All** questions

- 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.

5X6

2. Answer **Any Six** Questions

- 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

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 Any Six Questions

5x6

- a. Calculate the quantity of dry material for 10m³ 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.
 - i. Earth work in Excavation
 - ii. Brick work in foundation and plinth
- g. Calculate the dry materials required for 450m² of 25mm thick DPC in cement concrete of Proportion (1:1.5:3)?

2 ½ +

2½

3. Calculate the following items of work from Fig No 2.

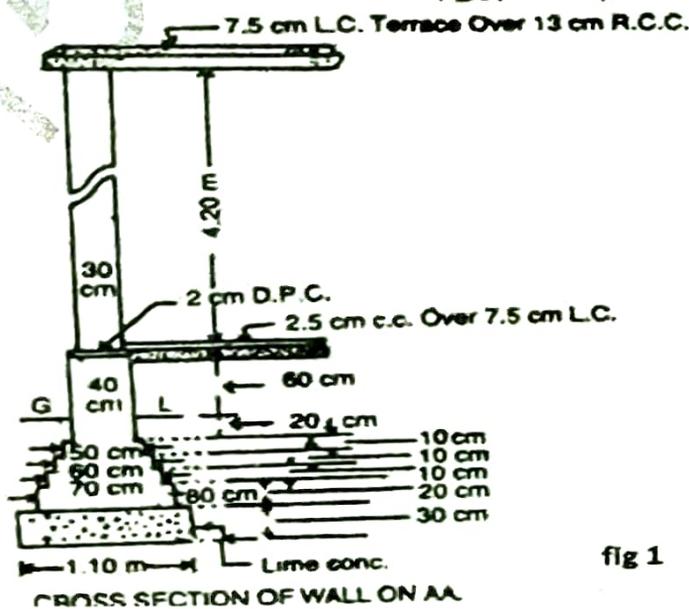
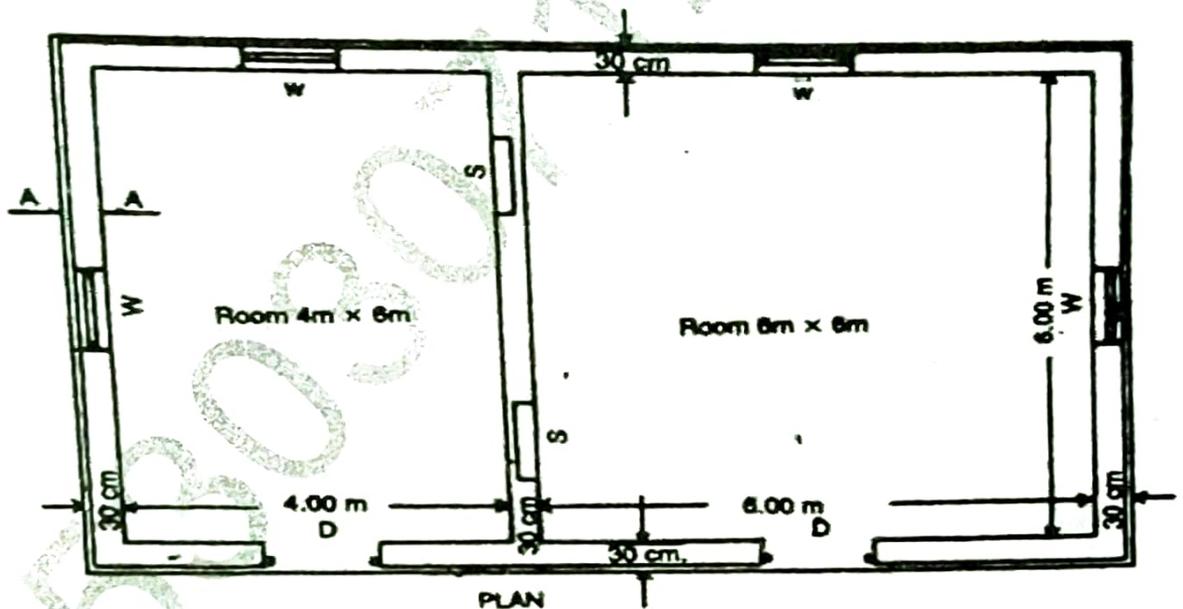
5+5

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

TWO ROOMED BUILDING



All Walls are of same section
Lintels over Doors, Windows and
Shelves are 15 cm thick R.B.

Doors D-1.20 m x 2.10 m
Windows W-1.00 m x 1.50 m
Shelves S-1.00 m x 1.50 m

fig 1

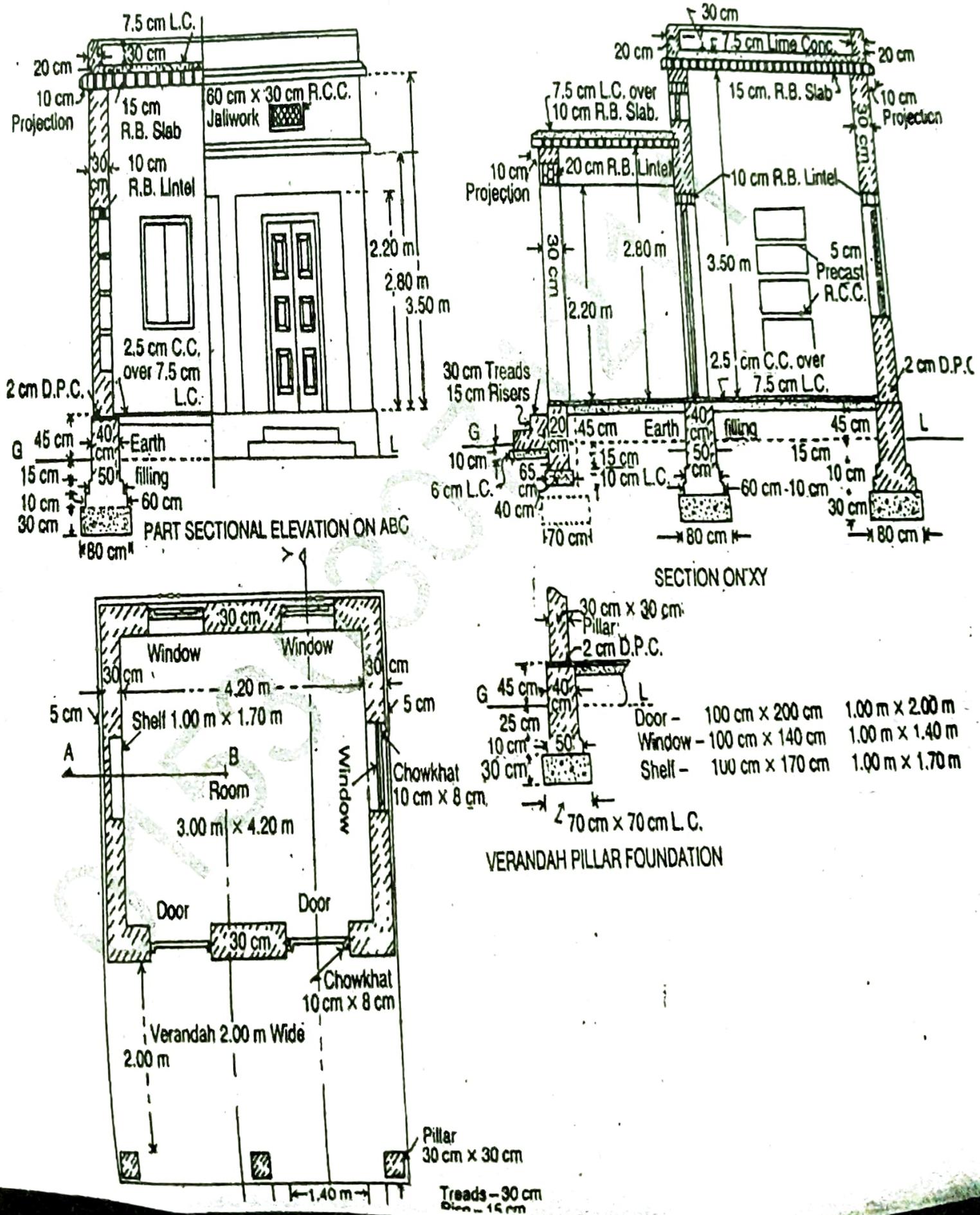
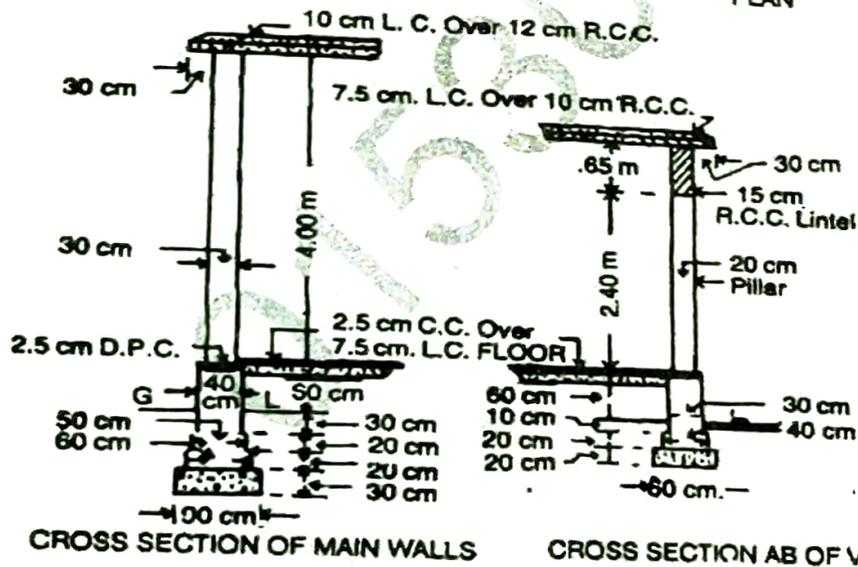
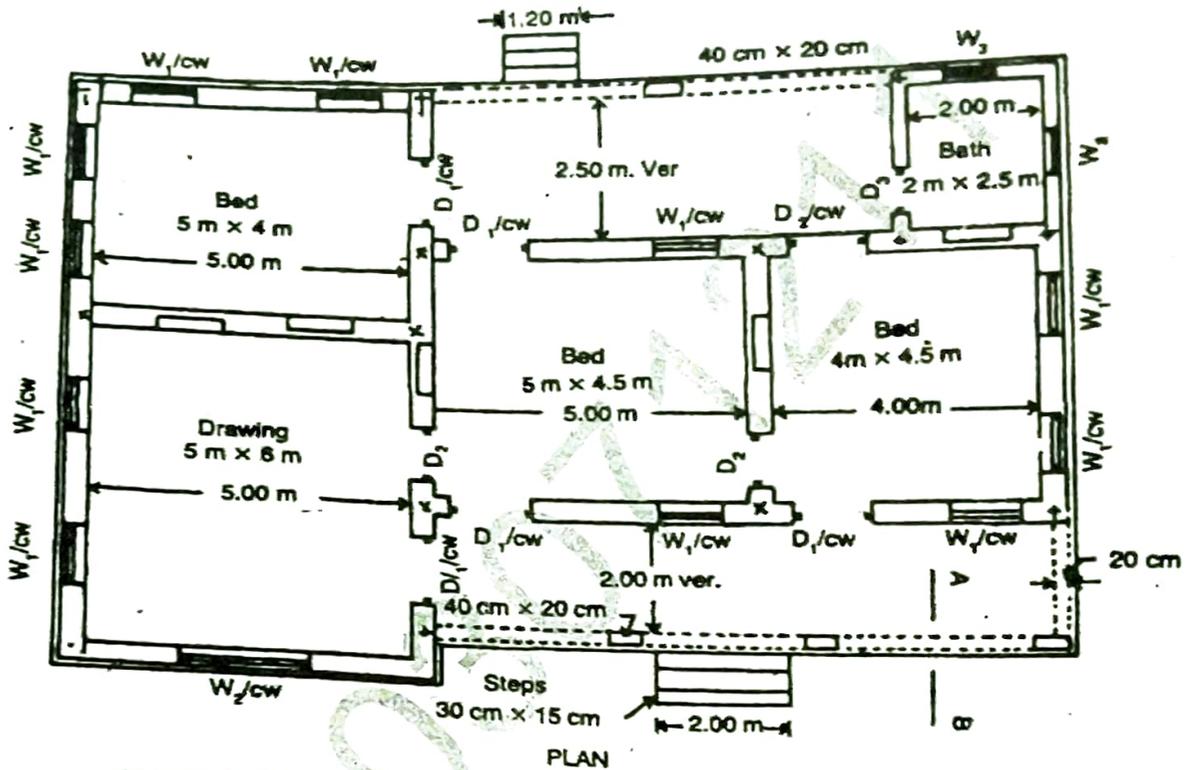


Fig 2

RESIDENTIAL BUILDING



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

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

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

All walls of Drawing Rooms and Bed Rooms have same section

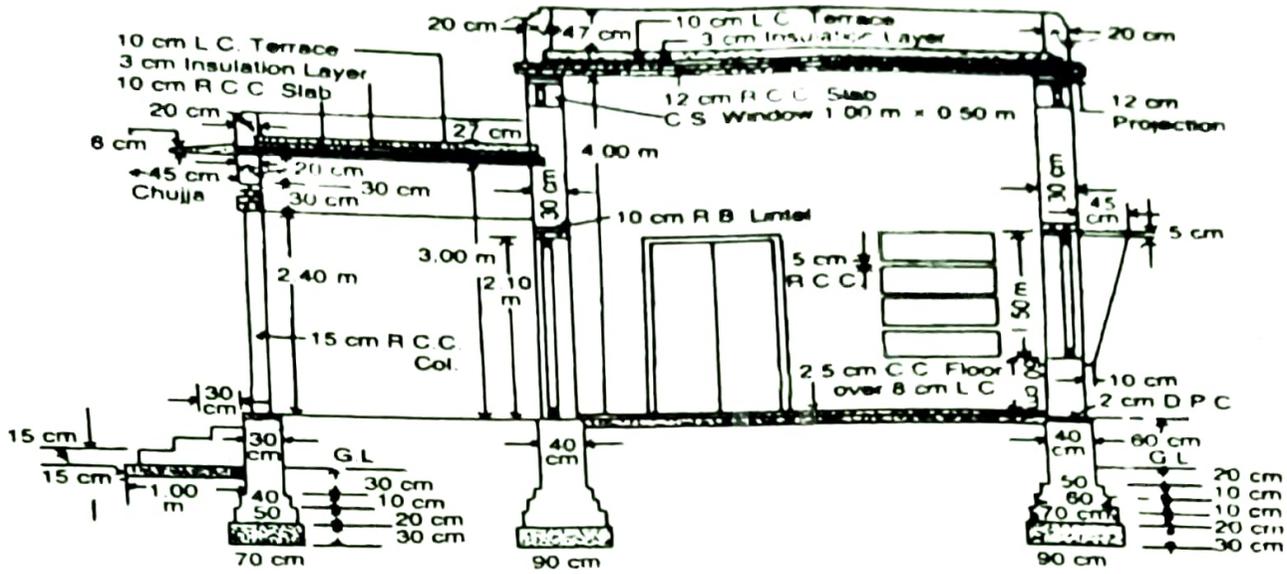
Bath Room Walls have similar section

Note—No beam has been shown in the plan.

fig 3

TWO-ROOM BUILDING WITH FRONT VERANDAH

CROSS-SECTION OF TWO-ROOMED BUILDING



SECTION ELEVATION ON CEFG

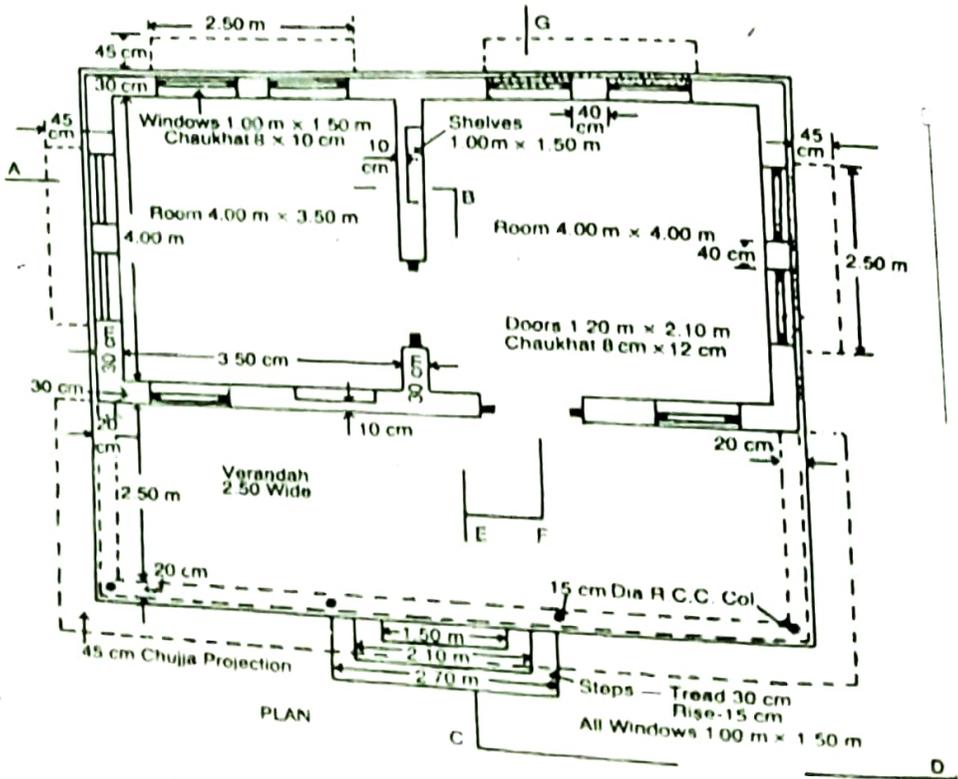


FIGURE-04

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