B.E. (Civil Engineering) Fourth Semester (C.B.S.)

Structural Analysis – I

P. Pages : 3 **AHK/KW/19/2112**

Time : Three Hours Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
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6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

1. Analyse the continuous Beam by three moment theorem and draw BMD. Refer fig. 1. **14**

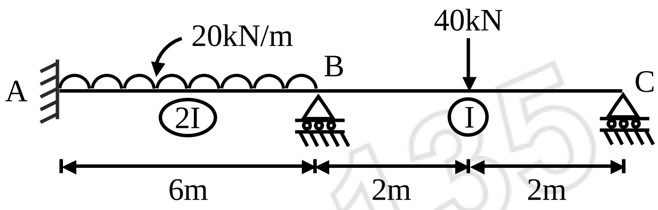

Fig. 1

OR

2. Analyse the continuous beam ABC shown in fig. 2 if support B sinks by 10 min. Given $E = 200\,kN/mm^2$ and $I = 1\times10^8\,mm^4$. **14**

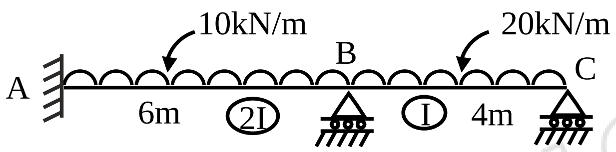

Fig. 2

3. Rolling load as shown in fig. 3, is moving left to right on 40 m girder. Find Max BM, Max SF @ 20 m from left support also calculate Absolute max BM and SF anywhere in the span. **13**

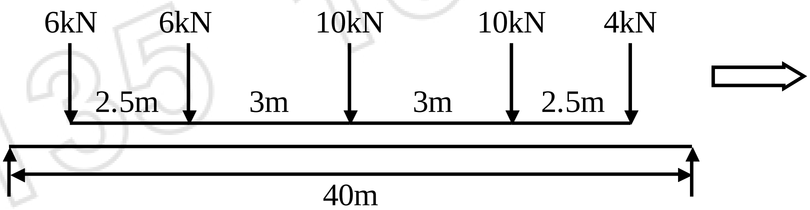

Fig. 3

OR

4. For the deck type of truss as shown in fig. 4. Draw ILD for **13**

i) Force in member BC
ii) Force in member BD
iii) Force in member BE

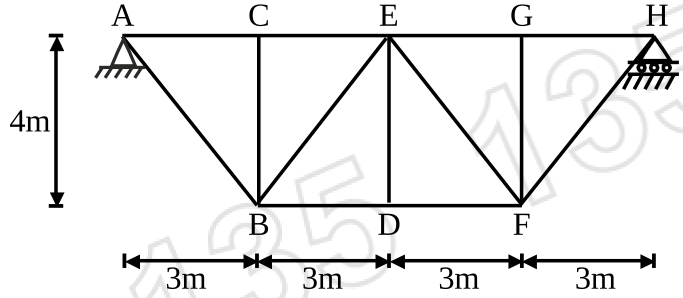

Fig. 4

5. Analyse the frame shown in fig. 5 by strain energy method and draw BMD. **13**

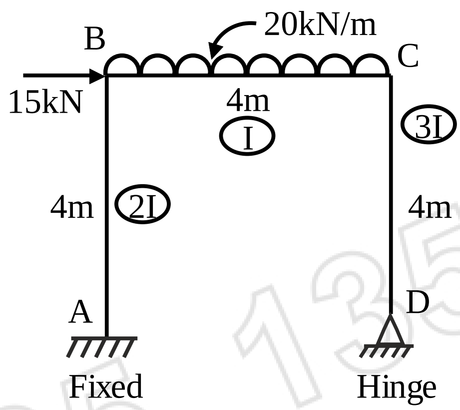

Fig. 5

OR

6. Find the forces in the member of the truss shown in fig. 6 by using strain energy method. The cross sectional area and modulus of elasticity of all members are the same. **13**

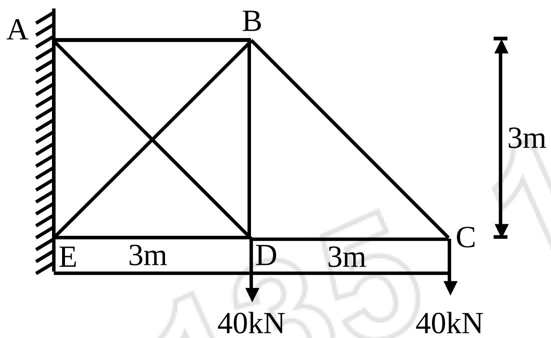

Fig. 6

7. a) Derive the Rankine's formula of buckling of column and clarify the statement "Rankine formula is applicable for any length of the column". **7**

b) Determine the ratio of the strength of a solid steel column to that of a hallow column of the same material and having the same cross – sectional area, the internal diameter of hallow column is ¾ of the external diameter Both the columns have same length with one end fixed and other end pinned. **6**

OR

8. A two hinged parabolic arch with 35 m span and 8 m rise is subjected to udl of 15 kN/m over left half of arch. Find the reactions at supports, normal thrust and radial shear at a section 12 m from left support Take $I = I_C \sec\theta$ with usual notations. **13**

9. Analyse the continuous beam shown in fig. 7 by slope deflection method, when support C sinks by 10 mm. The beam is of constant stiffness throughout. **14**

Assume $EI = 8 \times 10^9 \, kN - mm^2$.

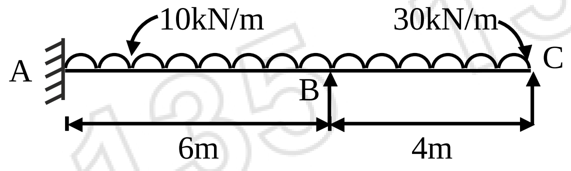

Fig. 7

OR

10. Analyse the frame shown in fig. 8 by cantilever method and draw BMD of beam and columns. **14**

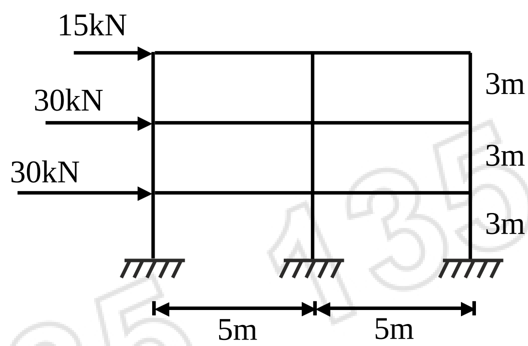

Fig. 8

11. Analyse the beam by flexibility method and draw BMD. Refer fig. 9. **13**

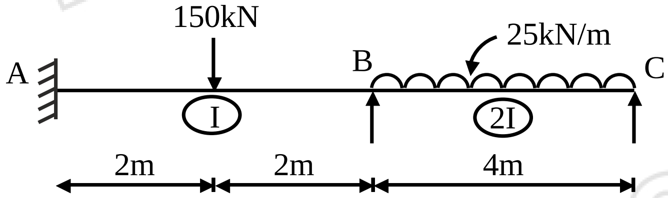

Fig. 9

OR

12. Analyse the fixed beam shown in fig. 10 by column Analogy method. **13**

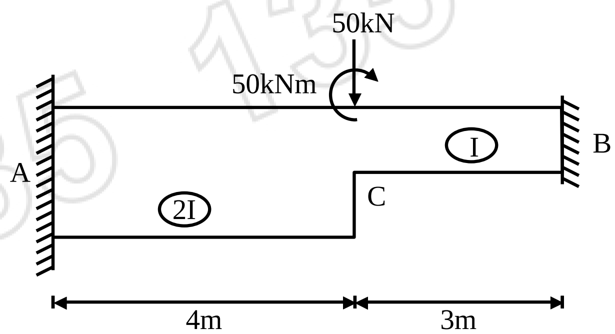

Fig. 10

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B.E. (Civil Engineering) Fourth Semester (C.B.S.)

Geotechnical Engineering-I

P. Pages : 2 **AHK/KW/19/2113**

Time : Three Hours Max. Marks : 80

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Notes :
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8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

1. a) What is geological cycle? Explain the phenomena of formation & transportations of soils? **6**

b) In a compaction test on a soil, the mass of wet soil when compacted in the Mould was 1.855 kg. The water content of the soil was 16%. If the volume of Mould was 0.945 litres, . Determine the **7**

a) Dry Density b) Void Ratio

c) Degree of saturation d) Percentage of air voids.

Take G = 2.68.

OR

2. a) Derive $y_d = \frac{(1-\eta_a)G\,y_w}{1+wG}$ **5**

b) An oven dry soil sample of volume 250 cc weight 430 g. If the sp. Gr. of solids is 2.70. What is the water content when the soil becomes fully saturated without any changes in its volumes? What will be the water content which will fully saturated the sample and also cause an increase in volume equal to 10% of the original dry volume? Draw the phase diagrams? **8**

3. a) What are the use of consistency limits? What are its limitations? **5**

b) A test for the determination for the liquid limit was carried on a soil sample. The following sets of observation were taken. Plot the flow curve & determine liquid limit, the flow index, consistency index & plasticity index if natural moisture content of the soil is 19% & plastic limit 22% **8**

No of blows	water content
40	42
34	45
24	51
20	55
16	59

OR

4. a) Explain the use of particle size distribution curve? **6**

b) Define shrinkage limit & shrinkage Ratio and Determine shrinkage limit & shrinkage Ratio for the oven dry mass of pat of clay is 0.8 gm. and the mass of mercury displaced on immersion is 84.2 gm. Take the specific gravity of solids is 2.72. **7**

5. a) The following data was recorded in a constant head permeability test. Calculate coefficient of permeability of soil. Also, determine the discharge & seepage velocity **8**
1) Diameter of sample = 75mm
2) Head loss in a length of 180 mm = 247 mm
3) Quantity of water collected in 60 sec = 626 mL
4) Void ratio = 0.785.

b) Discuss the various factor affecting permeability of soil? **6**

OR

6. a) What is Darcy's Law? What are its limitation. **6**

b) Find the ratio of average permeability in the horizontal to that in vertical direction for a soil deposit of three layers with thickness in the ratio 1:2:3. The permeability of the second layer is twice that of first and third is twice that of the second. **8**

7. a) Explain the construction & use of New Mark's influence chart? **6**

b) A footing of size 4m x 4m caries a uniformly distributed load of 150 kN/m^2. Compute vertical pressure at a depth of 6m below the centre and corner of the loaded area by equivalent load method. **7**

OR

8. a) Write a short note on:- **6**
i) Stress isobar ii) Vertical pressure distribution on horizontal plane.

b) A concentrated load of 1000 kN is applied at the ground surface. Compute the vertical pressure. **7**
i) At a depth of 4 m below the load ii) At a distance of 3m at the same depth.

9. a) What is the effect of compaction on the engineering properties of soil? **6**

b) The following results were obtained from a standard compaction test on a sample of soil. **7**

water content (%)	12	14	16	18	20	22
Mass of wet soil (gm)	1680	1850	1910	1870	1870	1850

volume of the mould used was 950 cm^3 & specific gravity 2.65. Calculate OMC & MDD Also calculate void ratio & Degree of saturation.

OR

10. a) Write down the assumptions of Terzaghi's theory of consolidation? Comments on the asumption? **6**

b) Explain **7**
i) Coefficient of compressibility ii) Coefficient of volume change
iii) Compression Index.

11. a) Explain Mohr – Coluomb theory for shear strength of soil? **7**

b) If the major & minor principal stresses on a specimen of soil at the instant of failure are 500 kN/m^2 & 150 kN/m^2 respectively. Calculate the Normal & shear stress on a plane inclined at an angle 65° with major principal plane? **7**

OR

12. a) Show that the angle of inclination of failure plane is $(45+ \phi/2)$ **6**

b) The stresses on a failure plane in a drained test on a cohesionless soil are as under **8**
Normal stress (σ) = 100 kN/m2
Shear stress (τ) = 40 kN/m^2
i) Determine the angle of shearing resistance and angle which the failure plane makes with the major principal plane.
ii) Find the major & minor principal stress.

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B.E. (Civil Engineering) Fourth Semester (C.B.S.)

Transportation Engineering-I

P. Pages : 3 **AHK/KW/19/2114**

Time : Three Hours Max. Marks : 80

Notes :
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7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.
11. Use of CBR chart is permitted.

1. a) What are the planning surveys? Enlist various planning survey. Explain Engineering survey in detail. **7**

b) What are the ideal requirement of an alignment? Explain. Discuss the obligatory points in detail. **7**

OR

2. a) Enlist various tests to be conducted on bitumen. Explain any one in detail. **7**

b) Based on the Group Index method, how the suitability of sub – grade soil is classified? **7**

3. a) Enumerate the purpose of providing camber to the carriage way. Discuss various types of camber. **4**

b) A national highway passing through a flat terrain has a horizontal curve of radius equal to the ruling minimum radius. If the design speed is 100 kmph. Calculate : **9**

i) Sight Distance

ii) Super elevation

iii) Extra – widening

Assume necessary data suitably.

OR

4. a) A vertical summit curve is formed at the intersection of two gradients + 3.0 & – 5.0 percent. Design the length of summit curve to provide a stopping right distance for a design speed of 80 kmph. Assume other data. **6**

b) Give the analysis of overtaking sight. Distance and clearly mention the minimum & maximum overtaking zones. **7**

5. a) What do you understand by the term Equivalent Single Wheel Load (ESWL)? Discuss how to calculate. **6**

b) Design a new flexible pavement for a two – lane undivided carriage way using the following data : **8**

Design CBR value of subgrade = 4.0%

Initial traffic = 400 CVD

Average growth rate of traffic = 6.0% per year.

Vehicle damage factor = 2.5

Lane distribution factor = 0.75

Design life of road = 10 years

Compute the total thickness. Use CBR charts. Also give composition of pavement.

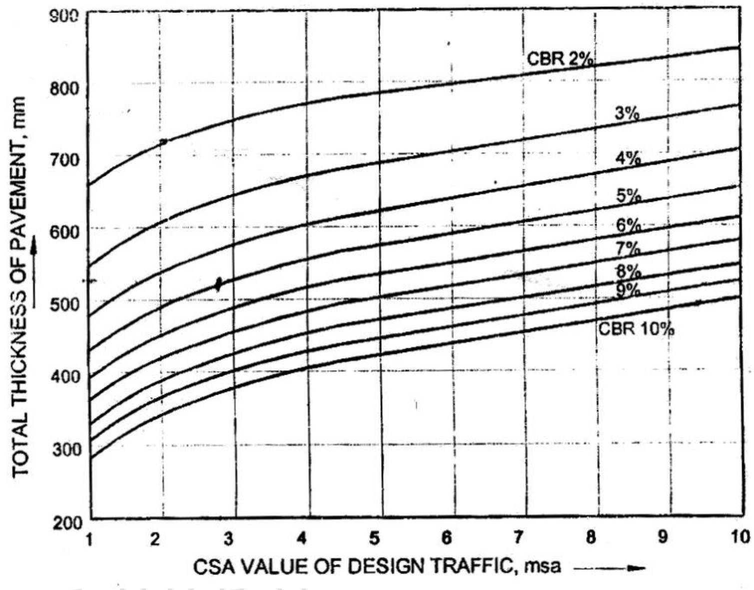

fig. : CRB design chart for determination of total pavement thickness for traffic with CSA of 1.0 to 10 msa.

OR

6. a) Discuss various joints in Rigid Pavements. **6**

b) Calculate the wheel load stresses at interior, edge & corner region of a cement concrete road using following data : **8**

Wheel load – 5500 kg.

Elastic mod. $E = 3.0 \times 10^5 \text{ kg/cm}^2$

Pav. Thick. h = 18 cm

Poisson's ratio, $\mu = 0.15$

Subgrade reaction $k = 6.0 \text{ kg/cm}^3$

Radius of contact area, a = 15 cm.

7. a) Discuss spot speed studies in detail. Also mention how the data is interpreted & represented. **6**

b) Discuss various parking systems in detail. **7**

OR

8. Write detailed note on **any four.** **13**

i) PIEV Theory.
ii) Traffic characteristics
iii) Accidents study
iv) 3E's of Traffic Engineering
v) 30^{th} Highest Hourly Volume of traffic
vi) O & D study.

9. a) What is mean by Economic span of a bridge? Derive the relation for the same. **7**

b) The flood discharge of a stream is $400\,m^3/s$. It is proposed to have a bridge over the stream. Find the max. Scour depth for the following cases. Also check for its value. **6**

a) Two spans of 40 m each
b) Three spans of 35 m each.

Given that f = 1.25. Assume any other data required.

OR

10. a) Estimate the afflux at bridge site using following data **6**

1) Natural waterway = 33 m.
2) i) No. of spans = 3
   ii) Length of each span = 8.5 m
3) Flood discharge $= 220\,m^3/s$
4) Depth of flood = 2.16 m.

Use Molesworth's equation.

b) Enlist various types of loads acting on a bridge. Discuss live loads in detail. **7**

11. a) Describe the construction process of well foundation. Discuss how the tilt of well is corrected. **7**

b) Discuss the factors affecting the choice of bridge superstructure. **6**

OR

12. Write detailed notes on **any four.** **13**

i) Cofferdams.
ii) Inspection & Maintenance of bridge
iii) Bridge Aesthetics
iv) Wing Walls.
v) Culverts
vi) Rating of Bridges

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B.E. (Civil Engineering) Fourth Semester (C.B.S.)

Surveying – I

P. Pages : 3
Time : Three Hours

AHK/KW/19/2115
Max. Marks : 80

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8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) Define surveying and explain briefly how plane surveying differs from geodetic surveying. **6**

b) Calculate the sag correction for a 30m steel tape under a pull of 100N in three equal spans of 10m each, mass of one cubic centimeter of steel is 7.96g. Area of cross section of tape is 0.09 sq.cm. **7**

OR

2. a) Write about temporary adjustment of prismatic compass. **6**

b) The following are the observed bearings of the lines of a traverse ABCDEA with a compass in a place where local attraction was suspected. **7**

Line	Fore Bearing	Back Bearing
AB	190° 15'	10° 30'
BC	120° 45'	300° 45'
CD	348° 10'	169° 45'
DE	339° 50'	160° 50'
EA	296° 00'	114° 00'

Find the correct bearings of the lines.

3. a) Differentiate between Collimation System and Rise and Fall system. **6**

b) Following is pages of spoiled field book complete it and show necessary check. Find the values in the X marked column. **8**

B.S	I.S	F.S	RISE	FALL	R.L
2.430					158.50
	X			0.320	X
3.210		1.040	1.710		X
	2,415		X		X
	3.575			X	X
2.150		X	2.615		X
	3.670			X	X
		X		2.550	X

OR

4. a) The following successive readings were taken with a dumpy level along a chain at common intervals of 20m. The first readings was taken on a chainage 160m. The RL of the second change point was 109.515 m the instrument was shifted after the third and eight readings. Calculate the RLs of all the points. **7**

2.950, 2.265, 1.525, 3.690, 2.512, 0.780, 2.325, 0.740, 1.953, 3.525 and 3.890m.

b) The following notes refer to reciprocal levels:- **7**

Instrument at	Staff Reading at		Remark
	A	B	
A	1.050	1.650	Distance AB = 1250m. RL of A = 245.500m
B	0.950	1.560	

Find-

i) True RL of point B

ii) Combined correction for curvature and refraction.

iii) Error in line of collimation.

5. a) Explain with neat sketches of characteristics of contours. **6**

b) A level was tested by the two-peg method and following results were observed. **7**

Instrument at	Staff Reading At		Remark
	A	B	Distance AB=150m
C	1.150	1.795	C is exactly mid – way between A and B
D	1.538	1.933	D lies on BA produced and 20m behind pt. A

Calculate the staff readings on A and B to give a horizontal line of sight.

OR

6. a) A theodolite was set up at a distance of 390 m from a tower, and the angle of elevation to its top was 12º50'. The staff reading on B.M. of reduced level 78.20 m with the telescope horizontal was 0.955. Find the R.L of the top of tower. **6**

b) Derive the expression to find the distance and elevation of object when the base of object is inaccessible. Consider instrument and object lies in the same vertical plane. **7**

7. a) Explain the repetition method of measuring horizontal angle. **6**

b) The record of a closed traverse is given below. **7**

Line	Length	Bearing
AB	76.80	140º12'
BC	195.60	36º24'
CD	37.20	338º48'
DA	?	?

Calculate the lengths and bearing of line DA.

OR

8\. a) Explain the terms **6**

i) Latitude

ii) Departure

iii) Consecutive Coordinate

b) What are the different fundamental axes of theodolite and list out the relation between them. **7**

9\. a) Explain radiation method of plane table. **5**

b) The following offsets are taken from a survey line to a curved boundary line: **8**

Dist. (m)	0	5	10	15	20	30	40	60	80	100
Offset (m)	2.5	3.80	4.60	5.20	6.10	4.70	5.80	3.90	2.20	3.5

Find the area between the survey line, the boundary line, and first and the last offsets by

i) Trapezoidal rule

ii) Simpsons rule.

OR

10\. a) State the advantages and disadvantages of plane table surveying. **7**

b) Explain the working principle of planimeter. **6**

11\. a) Explain the procedure of transferring the levels underground. **7**

b) What are the equipment's required for sounding? Explain the use of each equipment. **7**

OR

12\. Write short note on **any three.** **14**

i) EDM

ii) GPS

iii) Hydrographic Survey

iv) Optical Theodolite

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B.E. (Civil Engineering) Fourth Semester (C.B.S.)

Building Construction & Materials

P. Pages : 2 **AHK/KW/19/2116**

Time : Three Hours Max. Marks : 80

Notes :
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10. Use of non programmable calculator is permitted.

1. a) What are the essentials requirements of a good foundation? **6**

b) How would you provide foundation on a black cotton soil? **8**

OR

2. a) What are the failures of foundation and remedial measurer. **6**

b) Draw a neat sketch showing the details of under-reamed pile foundations. **8**

3. a) Explain the following term with sketch **any two**. **6**

i) Header ii) Stretcher
iii) Bed joint iv) Bullnose

b) What are the various requirements of good bricks? **7**

OR

4. a) What are the various causes of providing a cavity wall? Explain its construction with neat sketches. **7**

b) What is meant by reinforced brick work? When is it provided? **6**

5. a) What are the classification of stone masonry? Explain uncoursed rubble masonry. **7**

b) Enlist various stone lifting devices. Explain any one in detail with sketch. **6**

OR

6. a) What is the difference between Arch and Lintel? Explain R.C.C. lintels in brief with sketch. **7**

b) Discuss the causes and effects of dampness. **6**

7.	a)	Enlist various common materials used for flooring. Explain any two in brief.	**7**
	b)	Explain the construction of terrazzo flooring.	**6**

OR

8.	a)	Differentiate between pitched roof and flat roof.	**7**
	b)	Write short notes on **any two.** i) King-post truss. ii) Queen-post truss. iii) Lean to roof.	**6**
9.	a)	The inside dimensions of a staircase in a residential building are 2 m x 4.6 m. The height of floor is 3.30 m and roof consist of R.C.C. slab of 120 mm thickness. Design a proper layout of an R.C.C. stair for this building.	**8**
	b)	Write a short note on **any two** with sketch. i) Bay window. ii) Revolving doors. iii) Ventilators.	**6**

OR

10.	a)	Draw a cross section of Dog-legged stain.	**7**
	b)	Discuss the provisions of doors and windows in a structure with respect to the location, purpose and size.	**7**
11.	a)	What are the requirements of good plaster?	**6**
	b)	What is pointing? What are its different types?	**7**

OR

12.	a)	Write note on **any two.** i) White washing. ii) Bases for paints. iii) Defects in painting.	**6**
	b)	Differentiate between single scaffolding and double scaffolding.	**7**

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