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

Structural Analysis-I

P. Pages : 3 **NRT/KS/19/3348**

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.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
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. A continuous beam is loaded as shown in fig. 1 if support 'B' sinks by 10 mm, find the moments and reaction at support and Draw BMD by three moment theorem. **13**

Take E = $2 \times 10^8 kN/m^2$ & $I = 8.5 \times 10^{-5} m^4$.

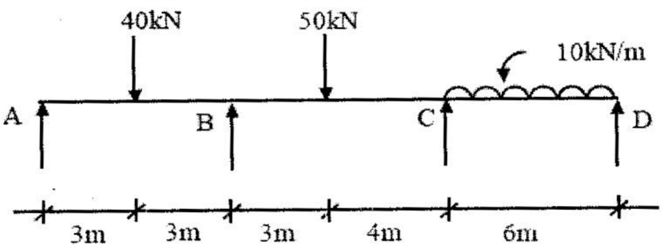

Fig. 1

OR

2. Analyse the continuous beam as shown in fig. 2 by using three moment equation and draw BMD assume uniform EI. **13**

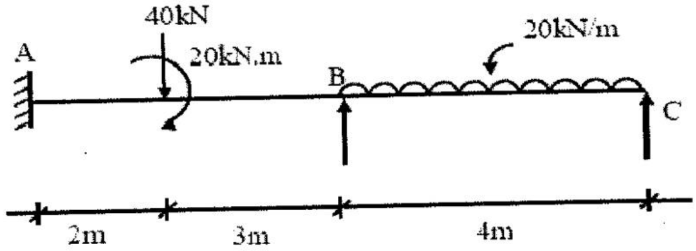

Fig. 2

3. Four loads as shown in fig (3) are travelling over a girder of 25m span from right to left with 8kN load leading. Calculate the maximum bending moment and shear force at 7m from left support. Also calculate the absolute maximum bending moment. **14**

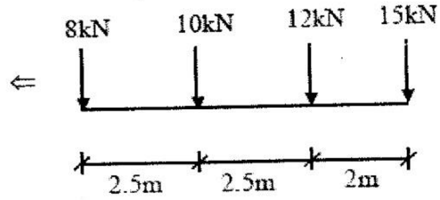

Fig (3)

OR

4. Draw the influence line diagrams for forces in the members U_2U_3, L_3U_3, L_3L_4 and U_3L_4 of truss shown in fig (4) if uniformly distributed load of 50kN/m, longer than the span traverses along the bottom chord members. **14**

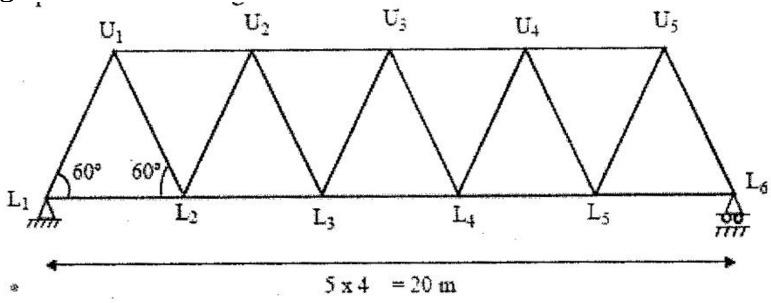

Fig. 4

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

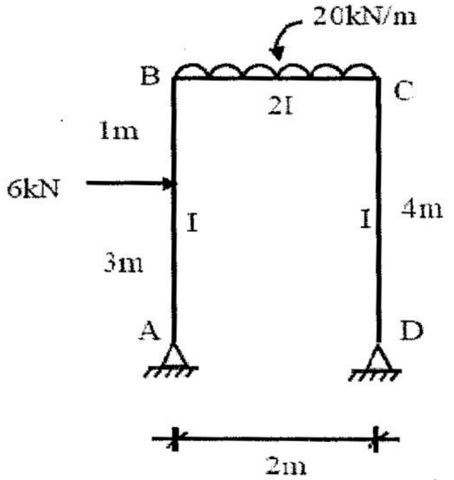

Fig. 5

OR

6. Using the strain energy method find forces in all the member of truss loaded as shown in fig. 6. The c/s area of all the members is same and they made up of same material. **13**

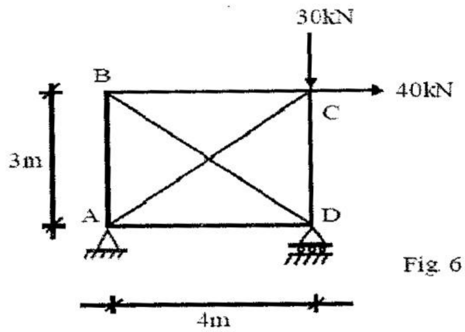

Fig 6

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

b) Derive from the first principle, Euler's crippling load for the column for length 'l' with both end hinged. **7**

OR

8. A two hinged parabolic arch with 35m span and 8m rise is subjected to udl of 15kN/m over left half of arch. Find the reactions at supports, normal thrust and radial shear at a section 12m from left support. **14**
Take $I = I_c \sec\theta$ with usual notations.

9. Analyse the portal frame shown in fig. (7) using slope deflection method and draw BMD. **13**

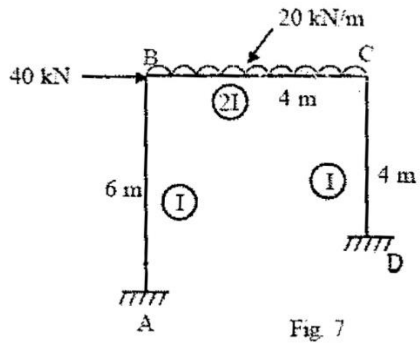

Fig. 7

OR

10. Analyse the frame shown in fig. (8) by portal frame method and draw BMD of beams and columns. **13**

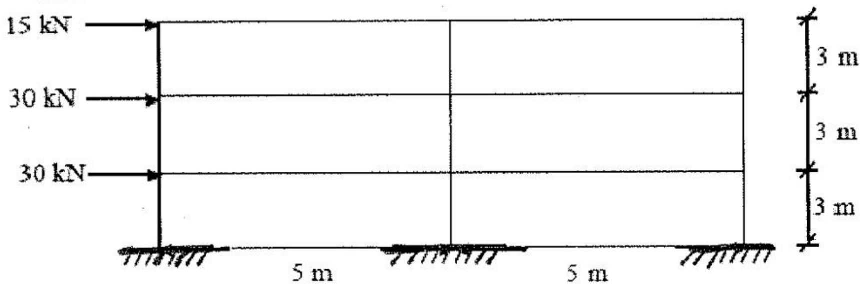

Fig. 8

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

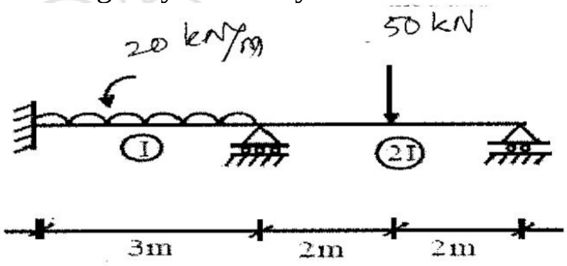

Fig. 9

OR

12. Analyse the fixed beam shown in fig. 10 by column analogy method. Draw BMD. **13**

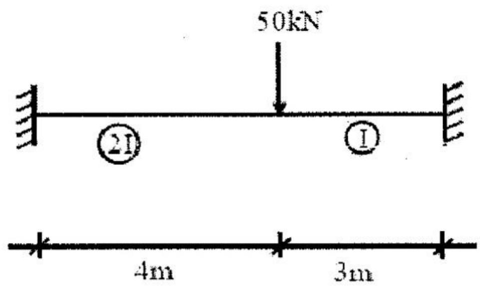

Fig. 10

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

Geotechnical Engineering-I

P. Pages : 3 **NRT/KS/19/3349**

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.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
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) Derive Relation between r (Bulk unit weight), G (Specific Gravity), e (void Ratio) and S (Degree of saturation from basic principle). **6**

b) A fully saturated clay sample has a volume of 1.8 cc and weights 320 gm. if the specific Gravity of the soil grains is 2.6, find the void Ratio, porosity, moisture content and unit weight. **7**

OR

2. a) Differentiate between Residual Soil and Transported soil **6**

b) A core cutter 12.6 cm in height and 10.2 cm in diameter weighs 1071 gm. when empty. It is used to determine the in situ unit weight of an embankment. The weight of core cutter full of soil is 2970 gm. If the water content is 6% what will be the in situ dry weight of soil? **7**

3. a) Write short note on Textural classification of soil. **6**

b) A Test was carried out for determination of liquid limit of soil sample. The following sets of observation were taken. **7**

No. of Blows (N)	38	27	20	13
Water content (%)	47.5	49.5	52	54

i) Calculate liquid limit of given soil sample.
ii) Calculate Toughness index of soil sample.

OR

4. a) Explain consistency limit of soil with. **6**

b) The Atterberg limits of a clay soil are: liquid limit 52%, plastic limit 30%, and shrinkage limit 18%. If the specimen of this soil shrinks from a volume of 39.5 cm^3 at the liquid limit to a volume of 24.2cm^3 at the shrinkage limit, calculate the true specific gravity? **7**

5. a) State Darcy law and define coefficient of permeability. What are the limitations in the application of Darcy's law to flow through soil media. **7**

b) Calculate the coefficient of permeability of a soil sample 6 cm in height and 50 cm^2 in cross sectional area. If a quantity of water equal to 430 cc passed down in 10 Minutes under an effective constant head of 40 cm. **7**
On oven drying the test specimen weighed 4.98 N. Taking G = 2.65, calculate the seepage velocity of water during test.

OR

6. a) Write short note on quick sand condition. **7**

b) A Deposit of fine sand with porosity of soil, 40% as 2m thick. The unit weight of soil particles is 26.7 kN/m^3. Determine the head of water flowing in an upward direction that will develop quick sand condition in deposit. **7**

7. a) Discuss Assumption and limitations of Boussinesq approach as applied for determination of stress induced in a soil mass due to surface loading. **7**

b) A point load of 5 tonnes acts on the surface of ground. Calculate the vertical pressure due to this load at depths of 5.00 and 6.00 m at 3.00 m, Horizontally away from the axis of loading in both the cases. **7**

OR

8. a) Write a short note on following. **7**
i) Stress isobar.
ii) Vertical pressure distribution of horizontal plane.
iii) Vertical pressure distribution on vertical line.

b) A Uniformly loaded rectangular area 2×3m has a loading intensity of 200 kN/m^3 calculate the component of vertical stress at a depth of 3m below the center and at the corner of loaded area. **7**

9. a) State the factors affecting compaction. **6**

b) The following are the results of a proctor compaction test performed on a soil sample. **7**

Water content (%)	9.2	12.7	15.5	18.3	20.2
Bulk Density (gm/cc)	1.524	1.749	1.949	2.049	2.019

i) Plot the water content Vs Dry density relationship and determine the optimum moisture content and the corresponding maximum dry density of soil.

OR

10. a) State the equation for final consolidation settlement and explain the terms in this equation. **6**

b) In a laboratory consolidation test, the void ratio of the sample reduced from 0.85 to 0.73 as the pressure was increased from 1 to 2 kg/cm^2. **7**
If the coefficient the permeability of the soil be 3.3×10^{-4} cm/sec.
Determine.
i) Coefficient of volume change.
ii) Coefficient of consolidation.

11. a) Explain what is meant by sensitivity of soil. How soil are classified on the basic of sensitivity. **6**

b) A soil sample is subjected to a major principal stress of 2 kg/cm^2 and a minor principal stress 1.1 kg/cm^2.Determine at 30^o to the major principal stress. **7**

OR

12 a) Explain Mohr – coulomb failure theory. Derive Relation between principal stresses at failure and shear strength parameters. **6**

b) A sample of dry coarse sand is tested in the laboratory triaxial apparatus in the undrained condition under a cell pressure of 2 kg/cm^2, The sample failed when the deviator stress reached 4.38 kg/cm^2. **7**

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

Transportation Engineering-I

P. Pages : 2

Time : Three Hours

NRT/KS/19/3350

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.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
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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.

1. a) State the ideal requirement of highway alignment. Explain how the obligatory points influences the alignment of a new road. **7**

b) Explain in detail, First 20 year Road development plan and its salient features. **6**

OR

2. a) Write a short notes on Geosynthetics. **6**

b) Describe the abrasion test on aggregate with IRC recommended values. **7**

3. a) Calculate the safe stopping sight distance for design speed of 50kmph for, **7**

a) Two-way traffic on a two lane road

b) Two-way traffic on a single lane road

b) Define Camber. Describe its types with suitable sketches. **6**

OR

4. a) Design the rate of super elevation for a horizontal highway curve of radius 500m and speed 100kmph. **7**

b) Calculate the extra widening required for a pavement of within 7m on a horizontal curve of radius 250m if the longest wheel base of vehicle expected on the road is 7m. Design speed is 70 kmph- **6**

5. a) What is ESWL. Explain in brief. **7**

b) Differentiate between Flexible & Rigid Pavement. **7**

OR

6. a) Calculate the wheel load stresses at corner, edges & interior region from the given details. **8**

i) Design wheel load = 4500kg

ii) Tyre pressure = $6.1\ kg/cm^2$

iii) Modulus of subgrade reaction = $4\,kg/cm^2/cm$

iv) $E = 2\cdot5\times10^5\,kg/cm^2$, $\mu = 0\cdot15$

v) Thickness of slab = 13cm.

b) Briefly explain the construction of cement concrete road. Comment on dowel bar. **6**

7. a) Discuss 'spot speed studies' in detail. Explain how the data is represented. **7**

b) Discuss Road user characteristic in detail. **6**

OR

8. a) Discuss the traffic volume study in detail. Comment on "30th highest hourly volume of traffic". **7**

b) Write short note on: **6**

i) 3E's of Traffic Engineering

ii) Passenger Car Unit (PCU).

9. a) Enlist the various forces, Loads and stresses which are to be considered in the design of a bridge. Explain any three in detail. **7**

b) What is economic span? Derive a formula to determine the economic span for Bridge. **7**

OR

10. a) The approximate cost of one pier & one superstructure span for a multi span bridge for various lengths of span are tabulated as follows, **7**

Span in (m)	Cost of One Pier (Rs.)	Cost of One Super Structure (Rs.)
10	25500	7000
15	28500	13820
20	32500	31000
25	33700	36500
30	34800	41400

Determine economic span.

b) What are the points to be considered while selecting site for a new bridge. **7**

11. a) Discuss the inspection & repairs of bridges. **6**

b) Discuss the purpose and types of Bearings provided in a bridge. **7**

OR

12. Write short notes on : **13**

i) Well Foundation

ii) Cofferdams

iii) Wing walls

iv) Bridge Aesthetics

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

Surveying – I

P. Pages : 3 **NRT/KS/19/3351**

Time : Three Hours Max. Marks : 80

Notes :
1. Solve Question 1 OR Questions No. 2.
2. Solve Question 3 OR Questions No. 4.
3. Solve Question 5 OR Questions No. 6.
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5. Solve Question 9 OR Questions No. 10.
6. Solve Question 11 OR Questions No. 12.
7. Assume suitable data whenever necessary.
8. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Explain with neat sketch reciprocal Ranging. **6**

b) Describe with neat sketch, the construction and use of an optical square. **7**

OR

2. a) Describe the Temporary adjustment of prismatic compass. **5**

b) The following are the bearing observed in traversing with a compass, an area were local attraction was suspected find the amount of local attraction at Different station, the correct Bearing of the lines and the included angles. **8**

Line	FB	B. B
AB	$59° 0'$	$239° 0'$
BC	$139° 30'$	$317° 0'$
CD	$215° 15'$	$36° 0'$
DE	$208° 0'$	$29° 0'$
EA	$318° 30'$	$138° 45'$

3. a) A man at a position 10 m above sea level observes the peak of a Hill. The distance between the man and the hill is 80 km. Find the height of the hill. **6**

b) The following consecutive reading were taken with a level and 4 m levelling staff on a continuously sloping ground at common interval of 30 m : **7**

0.855 (on A), 1.545, 2.335, 3.115, 3.825, 0.455, 1.380, 2.055, 2.855, 3.455, 0.585, 1.015, 1.850, 2.755, 3.845 (on B).

The RL of A was 380.500. Make entries in a level book and apply the usual check. Determine the gradient of AB.

OR

4. a) Explain with neat sketch. Indirect method of contouring. **6**

b) In testing a level, the following records were noted while undertaking reciprocal levelling. **7**

Instrument at	Reading at	
	A	B
A	1.725	1.370
B	1.560	1.235

Is the line of collimation in adjustment? What should be the correct staff reading at A, During the second set up to make the line of collimation Truly Horizontal? Find the amount of collimation error also.

5. a) In conducting the two peg test of a Dumpy level the same set up at a station '0' exactly midway between pegs A and B 90 mts apart. The staff reading on Pegs A and B were found to 1.325 m and 1.565 m. The instrument was moved and setup at a point '0', beyond peg A in line BA produced at a distance 15 mt from A. The staff reading on pegs A and B were 1.110 and 1.375 m. Calculate the staff reading on peg A and B to give horizontal line of sight. **7**

b) Enlist the fundamental lines of level and describe relationship between them. **6**

OR

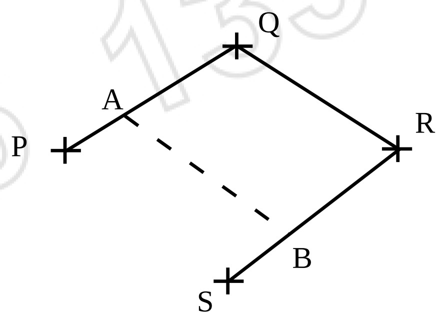
6. a) Explain the method of calculation of reduced level. Height of instrument system (H.I.). **6**

b) Explain with neat sketch reciprocal levelling. **7**

7. a) What are the temporary adjustment of theodolite? Explain in details. **7**

b) The following particulars are given for a Traverse Survey, where the length of the line AB is required to be measured. Point A is 50.0 m from P, and B is 75.0 m from R. **7**

Line	Length (m)	Bearing
PQ	125.5	N30°15′E
QR	80.25	S40°30′E
RS	150.75	S60°30′W



OR

8. a) Explain the measurement of Magnetic Bearing by theodolite. **7**

b) Find the area of the closed traverse having the following data by the co-ordinate method. **7**

Side	Latitude	Departure
AB	+ 225.5	+ 120.5
BC	– 245.0	+ 210.0
CD	– 150.5	– 110.5
DA	+ 170.0	– 220.0

9. a) Describe the method of orienting plane table by back sighting. **6**

b) An embankment of width 10 m and side slop $1\frac{1}{2}$: 1 is required to be made on a ground which is level in a direction transverse to the centre line. The central height at 40 m interval are as follows. **7**
0.90, 1.25, 2.15, 2.50, 1.85, 1.35 and 0.85
Calculate the volume of earth work according to
i) The Trapezoidal formula ii) The Prismoidal formula.

OR

10. a) Explain the resection method of plane table surveying. **6**

b) A railway embankment of width of 8 m and side slope 2 : 1 is to be constructed. The ground level along the centre line is as follows : **7**

Chainage	0	50	100	150	200	250
G. L (m)	115.75	114.35	116.80	115.20	118.50	118.25

The embankment has a rising gradient of 1 in 100, and the formation level at zero changes is 115.00. Assuming the ground is level across the centre line, compute the volume of earth work.

11. a) What is sounding? Explain any two method of locating sounding. **7**

b) Explain the measurement of velocity of flow with neat sketches. **7**

OR

12. a) Explain the procedure of transferring the levels underground. **6**

b) Write short note on : **8**

i) GPS ii) EDM.

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

Building Construction & Materials

P. Pages : 2 **NRT/KS/19/3352**

Time : Three Hours

* 0 6 3 4 *

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.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
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.
12. Solve all questions.

1. a) What is foundation ? State the essential requirement of good foundation. **6**

b) Differentiate between load bearing and framed structure. **7**

OR

2. a) What measures would you take while constructing foundation in black cotton soil ? Explain in detail. **6**

b) Design the foundation for brick pillar 400 mm x 400 mm to carry axial load of 90 kN safe bearing capacity of soil is 60 kN/m^2. The angle of repose is 25° and wt. of soil is 16 kN/m^3. Draw the neat dimensional sketch. **7**

3. a) Define 'Bond' in brick masonry work. Explain in detail English Bond with neat sketch. **7**

b) Write a short note on : **6**

i) Stretcher Bond

ii) Header Bond

iii) Closer Bricks

OR

4. a) Compare the English and Flemish bond with sketches. **6**

b) Briefly explain the following terms : **7**

i) Coping

ii) Cornice

iii) Weathering & Throating

5.	a)	Enumerate the causes & effects of dampness in to the structure.	**7**
	b)	What are the appliances used for lifting heavy stones ? Explain with sketches.	**7**

OR

6.	a)	What are the functions of Arches and lintels ? Give relative merits and demerits of lintel over arches.	**7**
	b)	Discuss the causes & ill-effect of dampness of structures.	**7**
7.	a)	Enumerate good requirements of floors.	**6**
	b)	Enlist the various type of pitched roofs and explain any one in detail.	**7**

OR

8.	a)	Explain the construction of IPS flooring.	**6**
	b)	Discuss the various factors affecting the choice of flooring materials.	**7**
9.	a)	Explain essential requirement of good stairs.	**6**
	b)	Draw the diagram of paneled door and explain it parts : i) Hold fast ii) Rails iii) Mullion	**7**

OR

10.	a)	Plan and design a dog-legged-stair for the hall size of 3.0 m x 4.5 m with clear headroom 3.5 m. Draw the sketch of plan & elevation.	**6**
	b)	Write short note on : i) Pivoted Window. ii) Casement window.	**7**
11.	a)	State the objective of painting. Describe briefly various types of painting.	**7**
	b)	Discuss the length at process of underpinning.	**7**

OR

12.	a)	Define scaffolding. Explain with neat sketch brick-layers scaffolding.	**7**
	b)	Enumerate good requirements of paint. Also list the typical constituent of paints.	**7**

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