

TRIBHUVAN UNIVERSITY
 INSTITUTE OF ENGINEERING
Examination Control Division
 2078 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCE	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Building Technology (CE 652)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.



1. a) Define residential and institutional building. Explain types of mechanical ventilation system. Calculate the rate of air flow through two square openings of size 0.32m and 0.42m in a 4m×4m×4m room, with a wind of 5 km/hr blowing inclined at 45° to the opening. Take Coefficient of effectiveness =0.33. [10]
- b) Critically differentiate sound insulation & sound absorption. Explain common acoustic defects. [6]
2. a) What do you mean by the bearing capacity of the soil? Explain the different methods of improving the bearing capacity of soil. Discuss two common problem with existing foundations. [5+3]
- b) Describe the types of stone masonry. Explain step by step procedure for preparing cement mortar by manual process. [4+4]
3. a) Define the term Ridge, Hip and Purlin used in roof with suitable figure. Compare couple closed roof and collar roof over couple roof. [3+4]
- b) Define elevators and ramp. Design a dog-legged stair for a residential building with 3m floor height. (Assume the size of Stair-well yourself) [7]
4. a) Explain about the various types of door based on working mechanisms. [4]
- b) Explain in brief granites and tiles floor finishes. [4]
- c) Why is shoring necessary? Compare racking shores with flying shore. [2+4]
5. a) Define pointing & its types. [6]
- b) Write down the causes of cracks that occurs in a building and its remedial measures briefly. [4]
6. a) What are the types of Bands used in masonry structures? [5]
- b) Explain the term Building Services, Septic tank and Soak pit. [5]

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1. Differentiate between ventilation and air-conditioning. What are the factors to be considered on orientation of building? [4+4]
2. Define moisture. What are the sources of moisture in a building? Describe the method of moisture control in the basement. [1+3+4]
3. Define soil exploration. Explain what type of foundation will you recommend for the foundation on hard rock with justification. [2+4]
4. Describe random rubble and dry rubble masonry with figure. Find out the quantities of cement and sand of 200m^2 plastering area in 1:5 ratio if the thickness of plaster is 10mm. [4+4]
5. Why steel trusses have become popular nowadays as compared to timber? Briefly discuss about the types of triple timber roof. [3+5]
6. Plan a suitable staircase for public building in which stair room measures $5.5\text{m} \times 6.5\text{m}$. The vertical clear distance between floors is 3.4m and slab thickness is 150mm. [6]
7. Show in figure the general parts used in door and windows. Explain things to be considered in timber flooring with figure. [4+4]
8. Explain about the form work for column and beam with necessary sketch. Describe about the functions of cladding and its type. [4+4]
9. Write the steps for the painting work on metal surface. [4]
10. Write down the causes of cracks occurs in a building and its remedial measures briefly. [4]
11. Explain the various techniques of retrofitting in a building. Why retrofitting in existing building is important? [4+2]
12. List out the principle to be followed while laying out the water supply system in building. Discuss about different components of rainwater harvesting. [3+3]

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2076 Baisakh

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Year / Part	III / II	Time	3 hrs.

Subject: - Building Technology (CE 652)

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1. What do you understand by orientation of a building? How do the requirements for a building be met from orientation? [2+4]
2. Explain various methods of earthwork excavation in soft soil, hard rock and wet soil. [8]
3. Discuss in brief classification of stone masonry with figures. [8]
4. Explain different types of roof covering for pitched roof. Sketch Queen post truss with their corresponding elements. [4+4]
5. Explain different types of door based on shutter with necessary sketches. [8]
6. Differentiate between Damp-proofing and Water-proofing. [6]
7. Explain construction method of Mosaic flooring. [6]
8. Describe stay bracing and vertical sheeting. [6]
9. What is pointing work? Illustrate different types of pointing with sketches. [8]
10. Why retrofitting in existing building is important? How would you retrofit a brick masonry building? [8]
11. Explain briefly various methods of fire detection systems and also explain about fire extinguishing systems. [8]

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Subject: - Building Technology (CE 652)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
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1. Define the term acoustics and explain in brief general acoustic defects, and suggest remedial measures of each defect. [2+6]
2. Explain moisture movement through building component with figure. Describe positive and negative side water proofing system with figure. [3+3]
3. Write down the situations in which the pile foundation is preferred. List methods of improving bearing capacity of soil. [2+4]
4. Explain in brief functions and properties of mortar. Describe rubble and ashlar masonry with figure. [4+4]
5. Explain four types of single roof with figure and show its components. [8]
6. Design and draw plan of a stair for a hospital building in a lobby of size 6.0m * 4.5m. The floor to floor height is 4.2m, where you cannot keep more than 12 steps in one flight. [6]
7. Explain the various components of door and window with sketch. Describe about bay and dormer window. [4+2]
8. Describe about suspended ground floor with sketch. Differentiate between Terrazzo and Mosaic flooring. [3+3]
9. Define underpinning. Describe about the types of shoring with necessary sketch. [2+4]
10. Explain the classification of partition with respect to materials and loading systems. [4]
11. What is earthquake protection of building? Write down the principles generally adopted while constructing earthquake resistant building? Explain it briefly. [2+6]
12. Write short notes on: (Any two) [2×4]
 - a) Structural and non structural cracks in the building
 - b) Rain water Harvesting
 - c) Fire projection system in building

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1. What do you mean by orientation of building? What should be considered for orientation and planning of building? What are the requirements of ventilation? [8]
2. What do you understand by thermal comfort? Explain various methods of thermal insulation for exposed walls, doors and for windows with neat sketches. [8]
3. Briefly explain different methods of determining bearing capacity of soil for design purpose. List out the common foundation failures. [5+3]
4. What are the properties of mortar? Estimates the quantities of materials for 10 m³ brick work where, size of brick is 57mm*115mm*240mm, thickness of mortar is 10 mm and mortar of cement sand ratio is 1:6. [3+5]
5. Define pitched roof, its type and what factors should be considered while selecting a roof covering material? [4+4]
6. What are the essential requirement of good stair? State different type of stair as per shape. [4]
7. Explain elements of battered door shutter with sketch. [4]
8. Explain construction method of marble flooring. [6]
9. Differentiate between shoring and underpinning. Explain cantilever scaffolding with neat sketches. [1+3]
10. What do you mean by floor finished and wall cladding? Mention some common floor finishing materials. [6]
11. How earthquake protection can be achieved in building. Explain. [4]
12. Define retrofitting. Explain techniques used for seismic retrofitting of building. [6]
13. Explain rainwater harvesting, write down its reasons behind it and list out its basic components. Illustrate components of the rooftop rain water harvesting system. [1+1+2+2]

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1. Define principles of orientation and planning of a building briefly. What are the main factors to be considered for best orientation of building? [7+3]
2. What is damp proofing? Describe general methods of damp proofing. [2+6]
3. Define foundation. What are the basic requirement of foundation? Explain different types of shallow foundation with necessary sketches. [1+3+6]
4. Define mortars. Find out the quantities of cement and sand for 100 m² plastering area in 1:6 ratio if the thickness of plaster is 12mm. [2+6]
5. What do you mean by rainwater harvesting? Describe the fundamental requirements of Electrical wiring. [3+3]
6. Define single/double/multiple timber roofs. Draw neat sketch of king post truss labeling with corresponding elements. [3+5]
7. Define stair. Design a quarter turn staircase for a residential building in a lobby of size 5.5m * 4.0 m. The height of floor to floor is 3.0 m. Assume necessary data if required. Draw neat plan to justify your design. [1+6+1]
8. Explain shoring, list out its types. Describe flying shoring with necessary sketches. [1+3+4]
9. How do you define retrofitting? Explain RCC and steel jacketing with neat sketches. [2+6]
10. Write short notes on: (any two) [2×3]
 - a) Construction method of terrazzo flooring
 - b) Differentiate between plastering and pointing
 - c) Retaining wall

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1. a) Explain moisture movement through Building Component. Describe the methods to stop moisture entering to a building? [8]
- b) What do you mean by thermal comfort for the building purpose? Explain its classification with appropriate examples. [8]

OR

Illustrate the requirements of lighting in the building. What are the principle for the site selection and planning?

2. a) Describe the factor affecting the design of foundation. How can we improve the bearing capacity of soil? [8]
- b) What kind of member is queen post truss? Draw a queen post truss explaining their element's function. [8]

OR

Define the terms scaffolding, underpinning and shoring. Explain the methods to carry out underpinning work.

3. a) Explain the general parts and terms used in door and window with necessary diagram. Define casement, awning and hopper window. [8]
- b) Design a suitable staircase for public building in a hall of size 5.50 m * 7.50 m. The vertical clear distance between floor is 3.5 m and the RCC slab thickness in 150 mm. (assume any necessary criteria, if required). [8]
4. a) How earthquake protection can be achieved for a load bearing masonry building? What are the factors to be considered for improving Building for seismic safety? [8]
- b) What are the various techniques of retrofitting? Why retrofitting in existing building is important? [8]
5. Write short notes on: (Any four) [4×4]
 - a) Form works
 - b) Causes of cracks in Building
 - c) Cladding materials for wall
 - d) Rain water harvesting
 - e) Floor and wall tiles
 - f) Mortars used in plastering wones

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 - ✓ Attempt All questions.
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1. a) Explain various types of moisture movements in different components of building structures.
 b) What do you understand by orientation of building? Discuss the factors to be considered for the best orientation of a building.
 2. a) Explain different types of shallow foundation with neat sketches.
 b) Explain various types of stone masonry. Draw typical sketches to illustrate them.
 3. a) With the help of neat sketches, list and explain the terms used in pitched roof.
 b) Design a dog legged RCC stair for a residential building with a staircase of internal dimension of $4.6 \text{ m} \times 2.6 \text{ m}$ and 3.0 m floor to floor height. Draw both plan and section to justify your design.
 4. a) Give a list of materials which are commonly used as floorings and give a brief description of each.

OR

Discuss purpose and sizing of doors and windows. List different terms used in panelled doors.

- b) Define shoring with the help of neat sketches. Explain single flying shore.

OR

Explain methods of pointing and types of pointing.

5. a) How do you define retrofitting of building structure? Explain conventional jacketing with necessary sketches.
 b) Explain rainwater harvesting, write down process of treatment.

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1. a) Define essential factors of principles of orientation and planning of building.
 b) Explain factors determining thermal comfort.
2. a) Describe in detail the causes of foundation failure.
 b) Draw and explain corner wall of English and Flemish bond (two courses of each in plan and elevation).

OR

Explain with the help of neat sketches construction of cavity wall.

3. a) Describe collar timber roofs with necessary sketches.
 b) The inside dimension of a stair case in a residential building are $1.8 \text{ m} \times 3.9 \text{ m}$. The height of floor to floor is 2.4 m. The thickness of waist slab is 0.15 m. Design a proper layout with neat sketches.

OR

Explain elements of panelled and battened doors with neat sketches.

4. a) With the help of neat sketches explain solid and suspended ground floor.
 b) List out different types of shoring. Explain raking shore with necessary sketch.
5. a) Differentiate between structural and non-structural cracks and with the help of neat sketches. Write down its causes of occurrence.

OR

Explain conventional strengthening methods used for seismic retrofitting and retrofit of structures using innovative materials.

- b) Define rain water harvesting. Explain different methods of treatment of rain water.

OR

Explain ingredients of an oil borne paint.

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1. a) Explain different types of ventilation and design. [8]
- b) Explain with neat sketches the method of setting out of a building. [8]
2. a) Enumerate the situations demanding the use of piles as foundations. [8]
- b) Draw the neat sketches of cavity walls with vertical, horizontal sections and elevation with appropriate size of sections. [8]
3. a) Define pitched roof and define its various types. [8]
- b) What are the requirements of good staircase, explain in brief. [4]
4. a) With the help of neat sketches with appropriate sizes, explain elements of battened door shutter. [4]
- b) Explain construction method of marble flooring. [6]
5. a) With the help of neat sketches, explain timbering in foundation. [6]
- b) Explain fixing of suspended ceiling. [4]
6. a) What are the main causes of cracks in building? [4]
- b) Describe non-destructive test in building structure. [6]
- c) Explain rain water harvesting and its treatment. [6]

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1. a) Explain air conditioning. Explain design methodology of ventilation. [2+6]
- b) Explain with figure the orientation of a building. Describe with figure how moisture moves through the building and remedial measure. [3+5]
2. a) Explain with sketches the methods of determining the bearing capacity of soil. [8]
- b) Discuss in brief classification of stone masonry with figures. [8]
3. a) List the different types of pitched roof. Draw neat sketch of timber couple close roof. [3+5]
- b) Inside dimension of a stair room is $2.1 \text{ m} \times 4.5 \text{ m}$. Floor to floor height is 3.0 m. Design a proper layout of an RCC stair. [4]
- c) Draw plan and vertical section of a panelled door shutter. [4]
4. a) Explain method of construction of cement floor. [4]
- b) Explain shoring and its type with figure. Describe the necessity of underpinning work. [6+2]
5. a) Explain structural and non structural cracks in building. [8]
- b) Discuss building shape in plan and elevation. [6]
- c) Explain different types of rain water harvesting. [6]

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1. a) What is building? Explain various types of building with sketches. [8]
- b) Explain the consideration of heat, ventilation light, sound, orientation and moisture movement in a building with sketch where necessary. [8]
2. a) What are the functions of foundation? Explain the types of deep foundation with necessary sketches. [8]
- b) What is mortar? Describe the estimation of mortar requirement. [8]
3. a) What is roof used for? Sketch out different types of roof and show their parts. [8]
- b) Describe essential elements of a stair. Define ladders, lifts and elevators and ramps. [8]
4. a) Draw a section of solid ground floor with necessary details. [8]
- b) Define shoring. What are the objectives of shoring? Describe the types of shoring with necessary sketches. [8]
5. a) Explain the process of painting works on masonry surfaces. What may be the causes of cracks occurred in a building and what are remedial measure to cracks? [8]
- b) Describe septic tank and soak pit with necessary sketches. [8]

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1. a) What is heat phenomena in Building? [8]
- b) What are the principles of orientation and planning of a building? [8]
2. a) What is sub soil exploration? Explain a method of improving bearing capacity of soil. [8]
- b) What are the properties of mortar? Find out the quantities of cement and sand from the mortar used in 10 cum brick work. [8]
3. a) What are the requirements of roof? Describe coupled roof with necessary sketches. [8]
- b) Define stair. Illustrate elements of stair in a sketch. Give the types of stair with sketches. [8]
4. a) What do you understand by flooring? Write different types of floorings and explain any one special floor finish type. [8]
- b) Define underpinning. Illustrate types of underpinning. Describe procedure of underpinning. [8]
5. a) What are the causes of cracks in a wall of a building? [8]
- b) What is retrofitting of a building? Why it is necessary? [4+4]

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1. a) What do you understand by orientation of a building? How do the requirements for a building be met from the orientation? [4+4]
- b) Describe positive and negative side water proofing system. Illustrate with necessary sketch for provision of DPC for basement in ordinary soil. [2+6]
2. a) Discuss common problems with existing foundation. [8]
- b) What is first class brick work in 1:6 cement sand mortar? Calculate materials for 10 cum brick work except bricks. [3+5]
3. a) Show a flooring details of a floor (ground) that has a connection with external wall and floor finish with mosaic tiling. [8]
- b) Define shoring. Describe various types of shoring with necessary neat sketches. [8]
4. a) What do you understand by pointing works? Explain procedure of pointing work. [3+5]
- b) Why is rain water harvesting necessary in a building? Explain any method for harvesting rain waters. [4+4]
5. a) What are the factors to be considered for limiting fire spread? Clarify each point briefly. [2+6]
- b) Explain various remedial methods of causes of cracks in a building. [8]

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1. a) Define thermal comfort. Describe the factors of thermal comfort.
 b) What do you understand by Damp proofing in building? Illustrate the defects in building due to moisture?
2. a) Discuss factors to be considered in construction stage of trench excavation.
 b) Define Single, double and multiple timber roofs. Sketch, King post truss with their corresponding elements.
3. a) Describe essential elements of stair. Illustrate the types of stair with sketches.
 b) Define scaffolding. Describe the types of scaffolding with necessary sketches.
4. a) Can a building (an existing building) be protected from earth quake? Explain technique of retrofitting a building.
 b) Describe general rules or principles which are usually adopted in the construction of earthquake resistant buildings.
5. a) Define painting. Describe the procedure of painting in new and old woodworks.
 b) Describe septic tank and soak pit with neat sketches.

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1. a) What are the requirements of ventilation? Explain moisture movement through building components. [4+4]
- b) What do you understand by thermal performance of building components? Explain the various methods of thermal insulation for exposed walls and roofs. [8]
2. a) Define foundation. Describe types of foundation with necessary sketches. [8]
- b) What are the types of flooring? Explain the process of Terrazzo finish floor. [3+5]
3. a) Draw and explain different components of timber collar beam roof with their sizes. Explain different types of roof covering for pitched roof. [8]
- b) Explain the preparation of cement sand mortar (1:6). Differentiate between random rubble, coursed rubble and Ashlar stone masonry with sketches. [4+4]
4. a) Define stair. Illustrate the elements of staircase with figure. [8]
- b) With the help of neat sketches, differentiate between solid and suspended ground floor. [8]
5. a) How do you make a brick masonry buildings earthquake resistant? Explain with sketches various measures adopted. [8]
- b) Illustrate components of the rooftop rain water harvesting system. [8]
