

SUBJECT SPECIALISATION PAPER FOR ARCHITECTURE
ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2025
EXAMINATION CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECIALISATION PAPER FOR ARCHITECTURE

Date	:	October 11, 2025
Total Marks	:	100
Writing Time	:	150 minutes (2.5 hours)
Reading Time	:	15 Minutes (prior to examination time)

GENERAL INSTRUCTIONS:

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is to check the number of pages of the Question Paper, printing errors, clarify doubts and to read the instructions. You are NOT permitted to write during this time.
3. This paper consists of **TWO SECTIONS**, namely SECTION A & SECTION B:
 - **SECTION A** has two parts: Part I - 30 Multiple Choice Questions
Part II - 4 Short Answer Questions
All questions under SECTION A are COMPULSORY.
 - **SECTION B** consists of two Case Studies. Choose only **ONE** case study and answer the questions of your choice.
4. All answers should be written on the Answer Booklet provided to you. Candidates are not allowed to write anything on the question paper. If required, ask for additional Answer Booklet.
5. All answers should be written with correct numbering of Section, Part and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating the Section, Part and Question Number will NOT be evaluated and no marks will be awarded.
6. Begin each Section and Part on a fresh page of the Answer Booklet.
7. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
8. Use of any other paper including paper for rough work is not permitted.
9. You must to hand over the Answer Booklet to the Invigilator before leaving the examination hall.
10. This paper has **8 printed pages**, including this instruction page.

GOOD LUCK!

SECTION A

PART I: Multiple Choice Questions [30 marks]

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 31 (d). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. What does "FAR" (Floor Area Ratio) represent in site planning?
 - a) The ratio of open space to built area
 - b) The ratio of total building floor area to the size of the plot
 - c) The height restriction of a building
 - d) The percentage of parking space required
2. Which principle of design emphasizes the visual weight and balance of elements in a composition?
 - a) Rhythm
 - b) Hierarchy
 - c) Symmetry
 - d) Contrast
3. The "Venturi Effect" in building design is related to:
 - a) Natural ventilation through pressure differences
 - b) Structural load distribution
 - c) Acoustic performance
 - d) Fire resistance
4. The pointed arch, ribbed vault, and flying buttress are key features of which architectural style?
 - a) Baroque
 - b) Romanesque
 - c) Gothic
 - d) Neoclassical
5. The 'point of contraflexure' in a beam occurs where:
 - a) Shear force is maximum
 - b) Bending moment changes sign
 - c) Deflection is zero
 - d) Torsional stress peaks
6. The Villa Savoye, a pioneering example of modernist architecture, was designed by:
 - a) Frank Lloyd Wright
 - b) Le Corbusier
 - c) Ludwig Mies van der Rohe
 - d) Walter Gropius
7. The ziggurat was a monumental structure associated with which ancient civilization?
 - a) Egyptian
 - b) Mesopotamian
 - c) Greek
 - d) Indus Valley

8. The Parthenon in Athens is a prime example of which architectural order?
 - a) Ionic
 - b) Corinthian
 - c) Composite
 - d) Doric
9. A simply supported beam with UDL will have maximum deflection at:
 - e) Supports
 - f) Quarter span
 - g) Midspan
 - h) Any random point
10. The process of protecting steel reinforcement in concrete from corrosion is called:
 - a) Passivation
 - b) Galvanization
 - c) Curing
 - d) Carbonation
11. The primary binder in Portland cement is:
 - a) Gypsum
 - b) Calcium silicate hydrate
 - c) Lime
 - d) Alumina
12. Autoclaved Aerated Concrete (AAC) blocks are preferred for:
 - a) High-load-bearing walls
 - b) Thermal insulation and lightweight construction
 - c) Earthquake-resistant structures
 - d) Waterproofing applications
13. To mitigate flanking noise in a building, the most effective strategy is:
 - a) Using double-glazed windows
 - b) Installing acoustic panels on walls
 - c) Creating structural discontinuities
 - d) Adding soft furnishings
14. The primary purpose of a "chiller" in an HVAC system is to:
 - a) Filter airborne pollutants
 - b) Remove humidity from air
 - c) Cool water for air conditioning
 - d) Distribute warm air through ducts
15. Which lighting strategy is most effective for reducing energy use while maintaining visual comfort in workspaces?
 - a) Uniform fluorescent lighting at 1000 lux
 - b) High-intensity discharge (HID) lamps in all areas
 - c) Decorative pendant lights at 200 lux
 - d) Task lighting combined with daylight harvesting

16. What does a "Bench Mark" (BM) indicate in a site survey?
- a) A permanent reference point with known elevation
 - b) A temporary survey point
 - c) The boundary between two properties
 - d) The center point of a construction site
17. When introducing new services (e.g., electrical wiring) in a heritage building, the principle of "reversibility" mandates that:
- a) All additions must match the historic aesthetic exactly
 - b) Modifications can be removed without damaging original fabric
 - c) Services should be hidden within false ceilings
 - d) Only traditional materials (e.g., clay conduits) be used
18. What is the primary purpose of a "Right of Supervision" clause in an architect's contract?
- a) To transfer design liability to the contractor
 - b) To allow periodic site visits to verify general compliance with design intent
 - c) To authorize the architect to hire subcontractors
 - d) To eliminate the need for building permits
19. Which of the following combinations is NOT correct?
- a) Kachen~zhu
 - b) Boh~phana
 - c) Mago~shathung
 - d) Pem~choetseg
20. A simply supported beam of span 4m carries a point load of 10kN at its midspan. What is the maximum bending moment (M_{max}) developed in the beam?
- a) 5 kNm
 - b) 10 kNm
 - c) 15 kNm
 - d) 20 kNm
21. What is the primary function of a "poché" in architectural drawings?
- a) To indicate glass/mirrored surfaces
 - b) To mark electrical conduits
 - c) To show landscaping elements
 - d) To represent solid mass with a filled pattern
22. When using CAD software, what does the "layer 0" convention typically signify?
- a) The default layer that should remain empty
 - b) The layer containing all dimensions
 - c) The base reference layer for blocks/xrefs
 - d) The layer reserved for temporary sketches
23. The "Incremental Housing" approach advocates for:
- a) Government-built high-rise apartments
 - b) Phased self-construction by residents with core infrastructure provided first
 - c) Luxury gated communities
 - d) Relocating slum dwellers to rural areas

24. The "Placemaking" approach focuses on:
- a) Maximizing floor area ratio (FAR) in developments
 - b) Standardized highway interchange designs
 - c) Privatization of urban parks
 - d) Community-driven design of public spaces to enhance social interaction
25. A contractor estimates a 10m³ brick wall with 1:6 cement mortar. If the rate of bricks is Nu. 5,000 per 1,000 units and mortar cost is Nu. 800/m³, what is the total material cost (Assume 500 bricks/m³ and 30% mortar volume)
- a) Nu. 25,400
 - b) Nu. 29,600
 - c) Nu. 27,200
 - d) Nu. 31,800
26. A 15th-century rammed-earth Buddhist temple has developed hairline cracks on its rear wall. Which conservation method is MOST appropriate?
- a) Wall stitching by inserting hardwood blocks into grooves
 - b) Complete dismantling and rebuilding with new rammed earth
 - c) Partial dismantling and reconstruction with stone masonry
 - d) Reconstruction of the structure from its base
27. One feet = _____
- a) 30.84 cm
 - b) 31.48 cm
 - c) 31.84 cm
 - d) 30.48 cm
28. In Bhutan, painter is traditionally referred to as _____.
- a) Zow
 - b) Lha-rib
 - c) Paap
 - d) Dozow
29. Which traditional timber joint is primarily used to connect two members at right angles while resisting tension and compression?
- a) Butt Joint
 - b) Dovetail Joint
 - c) Mortise and Tenon Joint
 - d) Lap Joint
30. A residential project in a hot-arid climate prioritizes passive cooling. Which design principle is MOST effective to achieve thermal comfort?
- a) High thermal mass walls and shaded courtyards
 - b) Large south-facing glazing
 - c) Cross-ventilation with operable windows
 - d) Lightweight steel construction

PART II – Short Answer Questions [20 marks]

This part has 4 Short Answer Questions. Answer ALL the questions. Each question carries 5 marks.

1. Explain any five fundamental principles of sustainable architecture, along with relevant examples. **(5 marks)**
2. Explain the key stages involved in preparing a conservation plan for a historic building, along with one challenge faced at each stage. Support your answer with suitable examples. **(5 marks)**
3. Describe and illustrate the *Parob Rabtsel*, a traditional architectural feature of Bhutan. **(3+2 marks)**
4. Design and sketch a floor plan of a powder room adjoining to a living room with a maximum area of 2.5 square meters. Clearly label all fixtures, and provide accurate wall-to-wall measurements as well as the relative dimensions of the fixtures from the internal walls. **(5 marks)**

SUBJECT SPECIALISATION PAPER FOR ARCHITECTURE
SECTION B: CASE STUDY [50 marks]

Choose either CASE I or CASE II from this section. Each case study carries 50 marks. Mark for each sub-question is indicated in the brackets.

CASE I

Question 1

Analyse the defining characteristics of Dzong architecture in Bhutan. Discuss how these structures reflect the socio-political dynamics of the time and the historical significance. Support your answer with a labelled sketch highlighting key architectural elements. **(15 marks)**

Question 2

Explain the concept of adaptive reuse in heritage conservation, highlighting its significance in contemporary architecture. Discuss key considerations an architect must address while adapting a historic building for modern use, supported by relevant examples. Evaluate the challenges and benefits of this approach. **(15 marks)**

Question 3

Bhutan's traditional settlements stand as embodiments of sustainable coexistence between human habitation and the natural world, where every architectural element, agricultural practice, and social space reflects a deep-rooted Buddhist ethos of harmony. Describe how Bhutan's vernacular architecture, shaped by local topography and climate, creates a dialogue with its surrounding environment. Examine the intricate relationship between cultivated landscapes and wild ecosystems, highlighting how centuries-old farming techniques have sustained biodiversity while meeting community needs. Explore the role of sacred spaces in weaving spiritual consciousness into daily life and shaping collective identity. Finally, illustrate through a sketch how these elements converge in a typical Bhutanese settlement, demonstrating their organic integration with the natural world. Support your analysis with specific examples from different regions of Bhutan. **(20 marks)**

CASE II

"Embodied Harmony: A Mindful Villa for Gelephu's Contoured Landscape"

Design Brief:

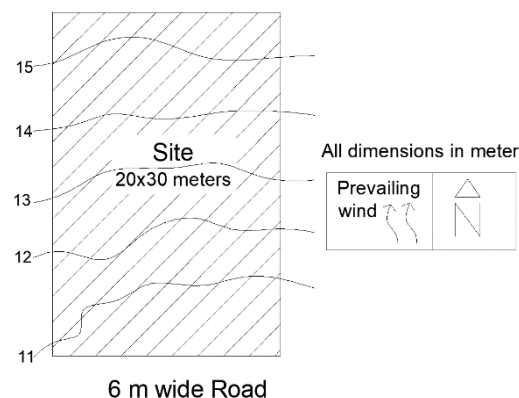
Design a serene hillside Villa nestled into the gentle 10-degree slope of a 600 sq.m (20m × 30m) property in Gelephu (site plan provided below). The design should embrace the land's natural contours while framing panoramic views across the sweeping plains below. This peaceful home must thoughtfully express Bhutan's deep spiritual connection between the natural world, cultural traditions, and mindful living through its architecture.

Area Program

1. Main Living Areas
 - Meditation room with viewing deck
 - Combined living and dining area
 - Modern kitchen area
2. Bedroom Areas
 - Three bedrooms, each with:
 - Dressing areas
 - Relaxing bathroom spaces
 - Cozy sleeping areas facing important views
3. Special Connecting Spaces
 - Welcoming entrance courtyard
 - Outdoor sitting areas

Deliverables

1. Design concept **(10 marks)**
 - Drawings/sketches showing your main concepts
 - Short explanation of your thoughtful design choices
2. Site Plan **(10 marks)**
 - Drawing showing:
 - Location of building in relation to site boundaries and topography
 - Eco-friendly features
 - Sun movement and shadows
3. Technical Drawings (Indicate/explain in the drawings the integration of your design concept, sustainable systems, cultural elements, nature connectivity etc.) **(30 marks)**
 - Floor plans
 - Section along the slope
 - Main elevation



TASHI DELEK