

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2019
EXAMINATION CATEGORY: TECHNICAL**

PAPER III: SUBJECT SPECIALISATION PAPER FOR ARCHITECTURE

Date	: October 13, 2019
Total Marks	: 100
Writing Time	: 150 minutes (2.5 hours)
Reading Time	: 15 minutes (prior to writing 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 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 in 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 are required 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. The proportion of base to height for column as 1:6 is followed in
 - a) Ionic order
 - b) Corinthian order
 - c) Doric order
 - d) Renaissance

2. is defined as the ability of a structure member to sustain loads when in service.
 - a) Stress
 - b) Strength
 - c) Strain
 - d) load

3. A building of 3 floors with an area of 160sqm. per floor is to be constructed in a plot of an area of 400sqm. What will be the FAR of the building?
 - a) 1.8
 - b) 0.2
 - c) 1.5
 - d) 1.2

4. According to the “Bhutanese Architecture Guidelines 2014”, *Ma-go* is understood as the
 - a) main door.
 - b) opening of the window.
 - c) component of roof.
 - d) type of rabsey.

5. *Langa Dre-zhu* is one of an elaborated Bhutanese traditional architectural element and it is usually found in
 - a) kachen.
 - b) payab window.
 - c) rabsey.
 - d) chim-thok.

6. Work of which of the following Italian architect is noted to be the beginning of “High Renaissance”?
 - a) Brunelleschi
 - b) Bramante
 - c) Alberti
 - d) Michelangelo

7. All of the following are the types of contract, EXCEPT
- Time bound
 - Lump sum
 - Item rate
 - Labour contract
8. Structure and structural elements shall normally be designed using which one of the following methods?
- Ultimate load method
 - Working load method
 - Factor safety method
 - Limit state method
9. Lighting is an important component of architectural design and there are 3 important aspects of lighting to be considered while designing lighting for a space. Which of the following is NOT an aspect of lighting?
- Accent Lighting
 - Fluorescent Lighting
 - Ambient Lighting
 - Task Lighting
10. According to Goethe's natural colour circle, which of the following represent basic colours?
- Green – Orange – Violet
 - Red – Green – Orange
 - Red – Blue – Green
 - Red – Blue – Yellow
11. "Dormer window" are located on
- rear side of the building.
 - porch.
 - roof.
 - walls in the corridor.
12. Mason is traditionally referred as in Bhutan.
- zow
 - lha-rib
 - paap
 - dozop
13. The purpose of lamp is to
- convert electrical power (watt) into luminous power (lumen).
 - increase lighting of a space or area.
 - give light to a space.
 - All of the above.

14. Rotunda and Portico represent space layout of an important historical building. Which of following have the said spatial layout?
- Parthenon
 - Pantheon
 - Colosseum
 - Citadel
15. Factor of safety is defined as
- factor which gives safety.
 - ratio of working stress and ultimate stress.
 - ratio of ultimate stress and working stress.
 - factor which determines the rigidity of structure.
16. Florence Cathedral is work of
- Leonardo Da Vinci
 - Brunelleschi
 - Bramante
 - Michelangelo
17. Traditionally, *Rabsey* of a building have four categories as *Rab*, *Ding*, *Tha* and *Thali-tha* depending on number of elements incorporated and accordingly, *Rab* category is identified with which of the following:
- Sadung – Pem – Choetse
 - Jangu – Budhen
 - Sadung – Pem
 - Langa – Drezhu – Gyetsa
18. *Dzongs* are the most important historical buildings in Bhutan and generally Dzongs have typical layout with Utse- the central tower, Dochey- the courtyard and structures surrounding Utse and Dochey known as
- Shamar
 - Shab-khor
 - Wok-thok
 - Gey-gona
19. Mohenjo-Daro is one of the earliest civilization and known for its fortified citadel and the public bath. What is the purpose of 13m high brick platform in the citadel of Mohenjo-Daro city?
- Large gathering in the city.
 - Public bath during occasions.
 - Performances during celebrations and events.
 - Refuge in times of flood.
20. Building services is one of the integral component of building design and MEP is a frequently used abbreviation in building services. What does MEP stands for?
- Machineries, Electrical and Piping.
 - Machines, Electricity and Plumbing.
 - Mechanical, Electrical and Plumbing.
 - Mechanical, Electronics and Plumbing.

21. One decimal of land is equal to
- 430.5 sq. ft.
 - 435.5 sq. ft.
 - 436 sq. ft.
 - 435.6 sq. ft.
22. As per Bhutan Building Rules 2002, “covered area” shall mean
- the area covered by a building on the ground floor excluding the entry porch.
 - the total area of all the floors.
 - the area covered by building on the ground floor including the entry porch and balcony.
 - None of the above.
23. Which of the following is NOT TRUE as per the Bhutan Building Rules 2002 and 2018?
- The roof slope should be maintained 12-15 degree.
 - The cantilever should not exceed 2.5m.
 - For building of 2 floors, the set back on 3 sides should be 2m.
 - The plot coverage should not exceed 45%.
24. Timber is normally measured using(unit).
- cubic meter
 - cubic centimeter
 - cubic feet
 - All of the above.
25. Guggenheim Museum in Bilbao is designed by
- Le Corbusier
 - Frank ‘O’ Gehry
 - F L Wright
 - Ludwig Mies van der Rohe
26. Bhutanese architectural elements are always identified in a particular order. Identify the correct order from the following:
- Kachen – Kadhen – Dhung – Zhu
 - Bho – Cham – Pemchoetse – Dhung
 - Pemchoetse – Bho – Cham – Phana
 - Langa – Drezhu – Norbu bagam – Norbu Horzhu
27. Concrete is reinforced to improve
- compressive strength.
 - tensile strength.
 - ductile strength.
 - compressive and tensile strength.

28. As per the Bhutan Building Regulation 2002, “The height of the finished floor of the lowest floor level above the ground level” is referred to
- Plinth height
 - Floor height
 - Room height
 - Ceiling height
29. Thimphu city is developed over the period of time based on different Local Area Plans abbreviated as LAP and it is guided by Development Control Regulation (DCR). According to DCR 2016, parking requirement for restaurant, bars and cafes is
- 1 car per every 10 square meters.
 - 1 car per every 20 square meters.
 - 1 car per every 12 square meters.
 - 1 car per every 15 square meters.
30. Parthenon has rectangular plan and its construction followed Doric order, classical Greek architecture order and when it comes to number of columns on each side (longer and shorter side), there is specific thumb rule followed mainly based on the shorter side. If the number of columns on shorter side is “x”, what is the number of columns on longer side particularly in the case of Parthenon?
- $x+1$
 - $3x+1$
 - $2x+1$
 - $3x-1$

PART II – Short Answer Questions (20 marks)

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

- As an emerging technical professional working towards built environment, what do you think are the three sustainable concepts which can be easily adopted and propagated through your design without having to compromise on the essence of Bhutanese traditional architecture. Support your answer with reasons? (2+3 marks)
- Sketch the foundation details of load bearing 230mm thick brick wall with proper labelling. The details should also include dimensions. (1+4 marks)
- Bhutan is known to be one of the fastest developing countries in South Asia. The urban sprawling due to rapid urbanization is one of the developmental challenges faced by Bhutan. As an upcoming architect venturing into professional practice, what are your thoughts on the situation? (5 marks)
- Bhutanese architecture is characterized by few important features. List three features and explain how it characterizes a building to stand out as Bhutanese traditional buildings. Explain your answer with sketches and reasons. (2+3 marks)

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

1. Give a brief description of your Thesis Project and the description should include the following:
(15 marks)
 - a) Project title and site location.
 - b) Concept.
 - c) Basic Sketches (schematic plans, elevations and sections).
 - d) Lesson learnt which could be applied as a practicing architect.

2. Refer to one of the famous architects and his/her work which has influenced your design projects during your undergraduate studies. Explain how it has influenced your thought process and the explanation should include name of the architect, details on the work and any specific idea which inspired you as an architect. (15 marks)

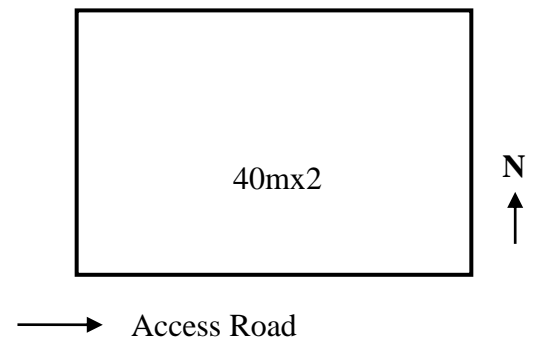
3. Bhutan is stated to be vulnerable to earthquake and with 3 consecutive episodes of earthquake in 2009, 2011 and 2015 respectively, buildings have suffered damages. Statistic shows that traditional buildings damaged have outnumbered the modern reinforced concrete buildings. Subsequently, there is a growing skepticism among the general public including the decision makers that traditional buildings are structurally not strong enough to resist the damage caused by earthquake. Therefore, reinforced concrete buildings have become the most preferred option. However, there are concerns that this kind of trend would result in reducing the stock of traditional buildings eventually changing the architectural landscape of the country.

What are your views and recommendations on the above? Support your views with proper reasons and justifications. (20 marks)

CASE II

Mr. Sonam and his wife Tshering are from Mongar and have been living in Thimphu over 25 years. They have two children, a 16 years old daughter and 12 years old son. The family has been living in core urban area of Thimphu in a rented apartment. Now they have managed to buy a plot of land measuring 40m x 25m in the out skirts of Thimphu. The family wanted to build a house in the plot to move away from chaotic urban environment. The plot is located on gentle slope facing the river down in the valley (towards south) as indicated in the figure below. The area is regulated with following regulation:

- i. Ground coverage – 40%
- ii. Set back – 3m on three sides and 5 m on side for septic tank
- iii. No. of floors – 3 floors.



Mr. Sonam and his wife have hired you as the consultant to prepare the design and drawings for construction of the house and you have been provided with the following basic requirement for the family:

- a) Bed rooms with attached toilet and bathroom (one for each family members)
- b) Kitchen
- c) Dining
- d) Living room
- e) Family room
- f) Choeshom

The family has relatives from their village visiting them regularly and needs to accommodate them. Further, Ms. Tshering prefers open spaces in the house and she loves to do gardening whenever she gets time. The family likes to spent time sitting and eating out together during holidays. Mr. Sonam has not been able to visit his village on regular basis due to his work commitment and thus, admires traditional vernacular houses as this makes him feel closer to his village. On the contrary, his children have very modern thought and preferences whereby they like to live in modern house.

Describe how would you approach the project and list the technical expertise required for the project and describe at what stage each of the technical expertise are required. Provide basic schematic drawings (plans, sections and elevations) to explain your design. Further, your design concept should also consider the preferences and liking of the family and their needs. The concept explanation should also include some crucial material specifications. The sketches to be drawn in a suitable scale and show north point in your drawings.

TASHI DELEK