ROYAL CIVIL SERVICE COMMISSION

BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2012

EXAMINATION CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECIALIZATION PAPER for ARCHITECTURE

Date : **14 October 2012**
Total Marks : **100**
Examination Time : **2.5 hours**
Reading Time : **15 Minutes (prior to Exam Time)**

INSTRUCTIONS

1. Do not write anything during the first 15 minutes. This time is provided to check the number of pages of this Question Booklet, to check for printing errors, to read the instructions, and to clarify doubts.

2. Write your Roll Number clearly on the Answer Booklet in the space provided in the Booklet. No other particulars that would indicate the identity of the candidate shall be written either in the Question or the Answer Booklet.

3. Write all answers either in Blue or Black ink only. For drawings you may use pencils and other colours where applicable.

4. Write all answers in the Answer Booklet provided. You are not allowed to write anything in the Question Booklet. Please note that any answer written in the Question Booklet shall not be marked.

5. Write answers neatly and legibly. Illegible writing shall not be marked.

6. This Question Booklet consists of **9** pages. The questions are divided into **TWO** sections, **SECTION A** and **SECTION B**.

7. **SECTION A** consists of **TWO** parts, **PART I** and **PART II**.

   - **PART I** consists of 30 multiple choice questions and each question carries one (1) mark. Answer all 30 questions.

   - **PART II** consists of 4 short answer questions and each question carries five (5) marks each. Answer all 4 questions.

8. **SECTION B** consists of **2 Case Study** questions of fifty (50) marks each. Choose and answer only **ONE** question from this section.

SECTION A – PART I: MULTIPLE CHOICE QUESTIONS

(30 marks – 1 mark for each question)

Instructions for Section A- Part I:
Answer all 30 questions in this section. Please copy the question number and the letter of the answer of your choice onto the Answer Booklet.

1. The architectural style that features skeletal type stone structures with large expanses of stained glass, external flying buttresses and ribbed stone vaults is known as

   a) Medieval architecture
   b) Neo Greek architecture
   c) Gothic architecture
   d) Classical architecture

2. New forms and revolution in Roman architecture was made possible mainly by the invention and technology of

   a) high bridge spans and metal bars
   b) the arch and concrete
   c) leaner engineered timber beams and columns
   d) thinner and taller buttress forms

3. The Fransworth house by Mies van der Rohe is a famous architectural expression of the

   a) Environmental Style
   b) Metal Structural style
   c) International Style
   d) Minimalistic Style

4. The Cathedral of the Sagrada Familia in Barcelona was designed by the Architect

   a) Christopher Wren
   b) Walter Gropius
   c) Alvar Aalto
   d) Antoni Gaudi

5. Rem Koolhaas, one of the most prominent contemporary architects, is famous for the design of

   a) the CNN Headquarters in London
   b) the CCTV Headquarters in Beijing
   c) the Chinese Government Offices in Beijing
   d) the CNN towers in Shanghai

6. Adobe walls are constructed with

a) stone bricks
b) mud bricks
c) cement bricks
d) lime bricks

7. Rammed earth walls constructed from local earth are

a) more environmentally friendly than stone walls
b) less environmentally friendly than stone walls
c) equally environmentally friendly compared to stone walls
d) none of the above

8. Natural stone is

a) strong in compression
b) weak in compression
c) malleable in compression
d) ductile in compression

9. Tensile Stress is present when a material

a) Compresses or contracts
b) Stretches or elongates
c) Deforms in a perpendicular
d) Shortens

10. The average Shear Stress is calculated by

a) dividing an internal force by an area parallel to that force
b) subtracting an internal force by an area parallel to that force
c) multiplying an internal force by area
d) adding an internal force with an area

11. Dead Loads are normally exerted in a

a) horizontal plane
b) vertical plane
c) perpendicular plane
d) diagonal plane

12. Strain is the term applied to

a) deformation (or change of shape) of an object when brittle and frozen
b) deformation (or change of shape) of an object when a load is placed on it
c) shortening of an object when malleable
d) all of the above

13. "Strength" is the mechanical property of a material that normally indicates the

a) resistance to the load that will just cause fracture
b) resistance to the ability to shorten along a plane
c) resistance to the load that will cause slippage
d) resistance to the load that will cause malleability.

14. Ductility of a material is the property which

a) enables a material to be drawn out in the direction of its length
b) enables a material to break off under force
c) enables a material to shorten under force
d) enables a material to resist lengthening

15. During earthquakes, a regular square shaped building performs

a) worse than an L-shaped building
b) better than an L shaped building
c) worse than a rectangular shaped building

16. The R-value of a material is a measure of

a) thermal allocation
b) thermal resistance
c) strength resistance
d) thermal transmission

17. The best orientation of the main living spaces in a building for passive solar energy gain in Bhutan is

a) West
b) North
c) South
d) East

18. The process of supplying and removing air through an indoor space without using mechanical systems is known as

a) Mechanized ventilation
b) Tangent ventilation
c) Natural ventilation
d) Active ventilation

19. A passive solar home normally costs

a) more than an active solar home
b) less than an active solar home
c) same as an active solar home

20. LED light bulbs are usually

a) more energy efficient than standard incandescent lights
b) less energy efficient than standard incandescent lights
c) equal in energy efficiency to standard incandescent lights
d) All of the above

21. The maximum permissible number of floors for a building in the core of Thimphu city is

a) 5 floors
b) 4 floors
c) 6 floors
d) 7 floors

22. The minimum plinth height of a building from ground level requirement according to the "Thimphu Municipal Development Control Regulations 2004" is

a) 100 mm
b) 300 mm
c) 400 mm
d) 600 mm

23. In traditional Bhutanese architecture, a "zhu" under a "kachen" helps to

a) increase the length of a beam to decrease load bearing capability
b) decrease the length of a beam to increase load bearing capability
c) shorten the load bearing capability of the kachen
d) increase the kachen length along the sides

24. A "jamthog" roof in traditional Bhutanese architecture is a

a) raised gable roof over walls
b) raised shed roof over columns
c) raised gable roof over another roof
d) square roof over walls

25. In traditional Bhutanese architecture *thobthag* , the "norbu bagam" is placed

a) on top of pem, choetseg and dhung
b) under pem, choetseg and dhung
c) besides the pem, choetseg and dhung
d) inside the pem, choetseg and dhung

26. "Khemar" in traditional Bhutanese architecture is found in

a) Dzongs
b) Lhakhangs
c) Chortens
d) All of the above

27. The wattle and daub type of wall construction in vernacular Bhutanese buildings is known as

a) Shami
b) Ekra
c) Shamley
d) None of the above

28. In the traditional construction practice of Bhutan, the stone mason is known as

a) Parp
b) Zow
c) Dozow
d) Lhadrip

29. The main timber beam in traditional Bhutanese architecture is called

a) Kachen
b) Dhung
c) Phana
d) Loshop

30. Rammed earth walls in traditional Bhutanese architecture tapers and becomes narrower as the height of walls increases to mainly

a) improve the aesthetics of the façade
b) improve the width of the building
c) provide structural stability to the walls
d) save on the costs of the construction

SECTION A – PART II: SHORT ANSWER QUESTIONS

(20 marks – 5 marks for each question)

Instructions:
Answer all 4 questions in this Section. Copy the question number and write the answers to the question in the Answer Booklet.

Question 31:

Outline the conclusions and lessons you learned in your 5th Year Thesis submission and briefly explain how you will use them in your work as an Architect in Bhutan.

Question 32:

Rapid urbanization is taking place in many areas in Bhutan and reinforced concrete buildings are replacing our vernacular architecture. As an emerging Architect, what are your thoughts on this trend in Bhutan? Support your answer with brief explanations.

Question 33:

It is said that "an architectural style is a specific method of construction, characterized by the features that make it notable. A style may include such elements as form, method of construction, materials, and character".

List the 2 key **design** elements that you feel characterizes traditional Bhutanese architecture? Support your answer with basic sketches.

Question 34:

Environmentally sensitive "green" architecture is emerging in significance in the policies of the Government of Bhutan and the Bhutan Green Buildings Guidelines are being drafted.

List 2 key environmentally sensitive principles you would employ in the design of buildings in Phuntsholing and briefly explain how you would incorporate them in your design. Use sketches to support your answer where applicable.

SECTION B: CASE STUDY QUESTIONS

(50 marks)

Instructions:
Select and answer only ONE Question in this section. Copy the question number and write the answers in the Answer Booklet. Note that the mark for this section is 50% of the total marks.

Question 35:

a) Some practicing Architects in Bhutan claim that the "Traditional Guidelines" and Building Regulations in Bhutan compromise and restrict their creativity while others argue that these Guidelines and Regulations are necessary for a country like Bhutan.

What is your take as an emerging Architect on the "Traditional Guidelines" and Building Regulations in Bhutan? List some of the advantages and disadvantages and specify any necessary changes you would propose for the development of architecture in Bhutan? Please support your answer with explanations, examples and sketches.

b) The celebrated Brazilian Architect Oscar Niemeyer made this famous comment on his design philosophy:

"I am not attracted to straight angles or to the straight line, hard and inflexible, created by man. I am attracted to free-flowing, sensual curves. The curves that I find in the mountains of my country, in the sinuousness of its rivers, in the waves of the ocean, and on the body of the beloved woman. Curves make up the entire Universe, the curved Universe of Einstein."

What are the foremost design philosophies or theories that influence you as an emerging Architect? Please support your answers with explanations and examples. You may use illustrations where necessary.

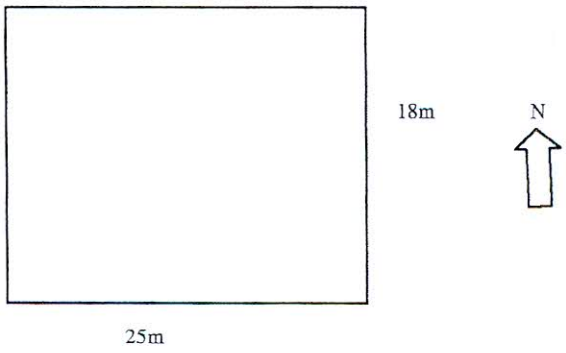
Question 36:

Mr. Tenzin and his wife Dorji Yangzom are professionals in their 40s. They have studied and travelled widely around the world. They have 2 children in their early teens. The couple recently bought a plot of land on a gentle mountain slope just outside of Thimphu (on the way to Paro). They would like to have their dream house designed for their family.

The budget for the project is not a big restriction but it must be cost efficient. The couple would like an environmentally friendly and energy efficient house built mainly with natural materials wherever feasible. They would like a design that is creative and they are flexible about the spatial requirements and layouts (which they will leave up to the recommendations of the Architect). Besides the other spaces, they would like a home office space for 2 people with a view that faces the valley below to work on their projects during the weekends.

The plot is 25 m x 18 m and is rectangular in shape.
The longer side faces South and the valley below.

The best views are to the East.
The road access to the plot is from the West.



- Explain how you would approach this project to meet the Client's objectives and dreams while being creative as an Architect and abiding by local regulations for construction.

- Propose a design concept with explanations of why and how you have arrived at the concept.

- Support your design concept with basic schematic design illustrations (site layouts with access roads, parking and landscaping details, floor plans, elevations and sections). Please do not forget to indicate the North direction in your illustrations.

- List and briefly explain the standard different Phases of Services and Deliverables for each Phase of Work that you as an Architect will provide to the Clients during the Design Phase and also during the Construction Phase of the Project.