

**ROYAL CIVIL SERVICE COMMISSION  
CIVIL SERVICE COMMON EXAMINATION (BCSE) 2011  
EXAMINATION CATEGORY: TECHNICAL**

**PAPER III: SUBJECT SPECIALIZATION PAPER for ARCHITECTURE**

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**Date** : 28 October 2011  
**Total Marks** : 100  
**Examination Time** : 2.5 hours (150 minutes)  
**Reading Time** : 15 minutes

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**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.
3. Write all answers either in Blue or Black ink only. For drawings use pencil and colour, where applicable.
4. Write all answers in the Answer Booklet provided. You are not allowed to write anything in the Question Booklet. 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 **8** 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 of 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.

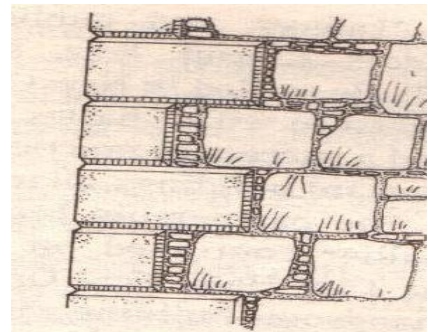
## SECTION A – PART I: MULTIPLE CHOICE QUESTIONS

(30 marks – 1 mark for each question)

**Instructions: Answer all 30 questions in this section. Copy the question number and the letter of the answer of your choice onto the Answer Booklet.**

1. In a typical Greek order, the top of an order which includes the architrave, frieze, and cornice is known as
  - a) Shaft
  - b) Capital
  - c) Entablature
  - d) Pediment
  
2. Arches, ribbed vaults, flying buttresses, elaborate sculptures and stained glass window are characteristics of
  - a) Classical architecture
  - b) Romanesque architecture
  - c) Gothic architecture
  - d) Baroque architecture
  
3. A series of arches is known as
  - a) Colonnade
  - b) Arcade
  - c) Architrave
  - d) Archivolt
  
4. A typical Roman arch is often made up of small stones called voussoir and a large central stone called
  - a) Dry-stone
  - b) Through-stone
  - c) Arch- stone
  - d) Keystone
  
5. The invention of this construction material helped the Romans to build arches, domes, aqueducts and baths
  - a) Concrete
  - b) Plaster of Paris
  - c) Bricks
  - d) Tile

6. The two construction materials that was predominantly used during the Industrial Revolution were
- a) Timber and sun baked bricks
  - b) Timber and stone
  - c) Glass and wrought iron
  - d) Wrought iron and stone
7. The Glass pyramid of Louvre, a museum in Paris was designed by
- a) Oscar Niemeyer
  - b) Ieoh Ming Pei
  - c) Jørn Utzon
  - d) Renzo Piano
8. The Spanish architect known to avoid straight lines and flat surface in his designs is
- a) Antonio Gaudi
  - b) Frank Lloyd Wright
  - c) Le Corbusier
  - d) Norman Foster
9. A Buddhist monument laid out in a form of a giant tantric Buddhist mandala is
- a) Borobudur
  - b) Mahabodi temple
  - c) Sanchi Stupa
  - d) Horyuji temple
10. In the sketch below, the use of several slivers of stone or small pebbles to fill in the gaps between rubble masonry stone work is called as
- a) Diaper
  - b) Galleting
  - c) Trellis
  - d) Mosaic



11. A series of horizontal timbers spanning the space between walls and supporting a floor or a ceiling is called
- a) Posts
  - b) Studs
  - c) Joists
  - d) Rafters

12. Brickwork infill panel set in a timber frame is known as
- a) Lattice
  - b) Wattle-and-daub
  - c) Stucco
  - d) Nogging
13. Which of the following stone has maximum water absorption by volume?
- a) Slate
  - b) Shale
  - c) Sandstone
  - d) Granite
14. Which is of the following is NOT an objective of seasoning the timber
- a) Reduction in shrinkage and warping
  - b) Reduction of weight
  - c) Increase in strength and durability
  - d) Reduction of natural defects in timber
15. The drawback of electric seasoning of timber is
- a) Checks
  - b) Cracks
  - c) Splitting
  - d) Reduces strength
16. After addition of cement, the gauged mortar should be used within
- a) 10 minutes
  - b) 1 – 2 hours
  - c) 8 – 10 hours
  - d) 24 hours
17. Cement concrete is a mixture of
- a) Water, cement, sand and aggregate
  - b) Water, cement and sand
  - c) Water, cement and aggregate
  - d) Cement, sand and aggregate
18. Higher water cement ratio in concrete results in
- a) Stronger mix
  - b) Better workable mix
  - c) Poor workable mix
  - d) Less bleeding

19. The compressive strength of Fe500 reinforcement steel bar is
- a) 5 MPa
  - b) 50 MPa
  - c) 500 MPa
  - d) 5000 MPa
20. A steel beam supporting loads from the floor slabs as well as from wall is termed as
- a) Stringer beam
  - b) Lintel beam
  - c) Header beam
  - d) Spandrel beam
21. Some of the structural members when subjected to long time sustained loads deform progressively with time at elevated temperatures. This phenomenon is called
- a) Fatigue
  - b) Creep
  - c) Fracture
  - d) Crack
22. When a retaining wall moves away from the back-fill, the pressure exerted on the wall is termed as
- a) Passive earth pressure
  - b) Swelling pressure
  - c) Pore pressure
  - d) Active earth pressure
23. Which of the following is NOT practiced with regard to building walls in Bhutan?
- a) Stone masonry in mud mortar
  - b) Stone masonry in lime mortar
  - c) Stone masonry in cement mortar
  - d) Brick masonry in cement mortar
24. The Dzong shown in the sketch below is
- a) Wangduephodrang Dzong
  - b) Jakar Dzong
  - c) Trashigang Dzong
  - d) Dagana Dzong



25. There are several type of choeten built all over Bhutan. The picture below represents

- a) Jangchub choeten
- b) Jarung-kha-shor choeten
- c) Khangza choeten
- d) Khang-nyim choeten



26. In a typical traditional Bhutanese house, the narrow and tall windows usually located on the ground floor of the building is known as

- a) Lobur Rabsel
- b) Gomang Rabsel
- c) Payab
- d) Geykar

27. Which of the following architectural element is not permissible in a contemporary Bhutanese house

- a) Dung
- b) Horzhu
- c) Sertog
- d) Bogh

28. The unit of illuminance measured in lumens per square meter ( $\text{lm}/\text{m}^2$ ) is called

- a) watt
- b) lux
- c) candela
- d) lamp

29. 1 meter is equivalent to

- a) 0.3281 feet
- b) 3.281 feet
- c) 32.81 feet
- d) 328.1 feet

30. Design and construction practices that significantly promote energy efficiency and renewable energy, conserve materials and resources and promote indoor environmental quality is called as

- a) Good building
- b) Modern building
- c) Traditional building
- d) Green building

## 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:

What is Passive design? Support your answers by sketches.

### Question 32:

List the salient features of Bhutanese architecture and describe them briefly. Support your descriptions with sketches.

### Question 33:

If you are to promote green building in Bhutan, do you think that this would require compromising Bhutanese architectural features that are currently mandatory while constructing a building in Bhutan? Support your answers by sketches.

### Question 34:

As an architect, do you think that the architectural guidelines and building rules and regulations in Bhutan restrain you from delivering creative and iconic designs? Support your answers by listing the advantages and disadvantages.

## 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) The damages brought about by the recent earthquakes in Bhutan have raised many questions on the earthquake resistance of traditional Bhutanese buildings. There is a possibility that many Bhutanese might resort to either building their homes with R.C.C framed structure or opt for single floor houses using light frame structure. These risk mitigation measures in the field of construction would eventually contribute towards changing the overall architectural landscape in Bhutan. What are your views and recommendations regarding this situation? (25 marks)
- b) Architecture is one of the tangible aspects of Bhutanese culture. For a country that values and promotes culture as one of the guiding principles of development, how would you recommend to continue promoting traditional Bhutanese construction techniques and local materials in light of the earthquake risks in Bhutan? (25 marks)

### Question 36:

Mr. Dorji and his wife Mrs. Dema live in Thimphu with their 10 year old daughter and a 6 year old son. They have recently bought a plot of land measuring 50 m x 25 m near Namseling in Thimphu. This plot is located 50 m above the main highway and it already has a comfortable access way from the main highway.

The couple wants to build a duplex house on this plot of the land, so that in future both the children can inherit a house of their own from their parents. For the time being, Mr. Dorji wants one part of the duplex to be their residence and the other to be leased out so that the income from this rent can help them pay off their mortgage. Since the family has several relatives staying with them for short duration of time, they have specifically asked you to include a guest room in addition to the bedrooms for the parents and each of the children. Furthermore, as the couple wants to engage their children in outdoor activities, they want you to be creative about designing the outdoor spaces in addition to including parking and gardening spaces.

Describe how you would approach this project to meet the client's objectives. Propose design concepts and describe why you have arrived at it. Provide basic schematic design drawings (site layouts with necessary landscaping details, floor plans, elevations and sections – do not forget to indicate the north direction). (50 marks)

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