BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1  B. Arch. Examinations 2013-2014
Sub: ARCH 265 (Building Technology)

Full Marks: 140  Time: 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION
The figures in the margin indicate full marks.

SECTION – A
There are FOUR questions in this section. Answer any THREE.

1. (a) What is a space frame? Explain the structural principles of space frame.
(b) What is Mero system space frame? Why it is widely used in modern space frame construction?

2. (a) How did the concept of folded plates developed from Nature?
(b) How stiffeners help folded plates structurally? How it can take more pressure than flat plates?

3. (a) Why Metal is important in Architecture?
(b) What are the precious metals and why they are called so?
(c) What do you know about Metal Alloys?

4. (a) What is a Geodesic dome?
(b) Why Geodesic dome is a very economic system of construction? How it saves money? What are the advantages and disadvantages of a Dome-house?

SECTION – B
There are FOUR questions in this section. Answer any THREE.

5. (a) Write short notes on (Any FOUR)
   (i) Modular Co-ordination
   (ii) Element and modular element
   (iii) Module and Multimodule
   (iv) Axial reference
   (v) Controlling Dimensions
(b) Why do we prefer Modular Co-ordination?
6. (a) What are the main causes of waste in Conventional Construction? (13 ½)
   (b) What are the disadvantages of pre-fabrication? (10)

7. (a) What is Plastic? What is the difference between rubber and plastic? How the modern
   life is influenced by plastic? (15)
   (b) How do we get rubber from nature? (8 ½)

8. (a) Why sustainable housing is important? (8 ½)
   (b) Discuss three sustainable materials for sustainable construction in Bangladesh
   specified by UN-HABITAT. (15)
SECTION A

There are FOUR questions in this section. Answer question NO. 1 and any other TWO from the rest.

1. Read the following passage carefully and answer the questions given below:

People may ask how you define success. This is really difficult to answer. Success is a relative term; not everybody wants to put together a four-billion-dollar conglomerate, or become President of the United States, or win the Nobel Peace Prize. It is usually a mistake to begin with such grandiose ambitions, which tend to degenerate into lazy daydreams. The best way to succeed is to begin with a reasonably realistic goal and attain it, rather than aiming at something so far beyond your reach that you are bound to fail. It's also important to make a habit of succeeding, and the easiest way to start is to succeed at something, however small, everyday, gradually increasing the level of your ambitions and achievements like a runner in training, who begins with short distances and works up to Olympic levels.

Try to think of success as a journey, an adventure, not a specific destination. Your goals may change during the course of that journey, and your original ambitions may be superseded by different, larger ones. Success will certainly bring you the material things you want, and a good, healthy appetite for the comforts and luxuries of life is an excellent road to success, but basically you'll know you have reached your goal when you have gone that one step further, in wealth, fame or achievement, that you ever dreamt was possible.

How you become a success is, of course, our business. Morality has very little to do with success. I do not personally think it is necessary to be dishonest, brutal, and unethical in order to succeed, but a great many dishonest, brutal and unethical people in fact do succeed. You'd better be prepared for the fact that success is seldom won without any tough infighting along the way.

Questions:

(i) What is the main theme of the passage?
(ii) What, according to the writer, is the best way to succeed?
(iii) Why does the writer compare success with a journey or an adventure?
(iv) According to the writer, what role does morality play in achieving success?
(v) Give a suitable title to the passage and justify it.
(vi) Give the meanings of the following words as used in the passage:
    Relative, destination, appetite, grandiose, seldom.

Contd ........... P/2
2. (a) Suppose you are the chief engineer of a firm. Now write a letter to a firm complaining against the supply of damaged and defective goods. (10)

(b) Write phonetic transcriptions of the following words: (Any five)

Thank, page, among, doubt, match, poor. (10)

3. (a) Write a dialogue between two friends about their planning for a vacation. (10)

(b) Write a short essay on any one of the following topics:

(i) Talent Hunt
(ii) Natural Beauty of Bangladesh
(iii) Skyscrapers: Luxury not Life. (10)

4. (a) Transform the following sentences as directed: (Any five)

(i) He admitted his mistake. (Complex)
(ii) I ran fast but I could not get the train. (Simple)
(iii) He was so angry that he left the room immediately. (Compound)
(iv) He told me that he loved me. (Compound)
(v) He began late but finished first. (Complex)
(vi) I called her, but she did not answer. (Simple) (10)

(b) Write short notes on any two of the following:

(i) Principles of writing business letter
(ii) Diphthongs
(iii) Components of Front Matter of a Report. (10)

SECTION – B
There are FOUR questions in this section. Answer question No. 5 and any other TWO from the rest.

5. (a) Explain with reference to the context any one of the following:

(i) "How singular is life, and how full of changes! How small a thing will ruin or save one!"
(ii) "In the opinion of some of them the death penalty ought to be replaced everywhere by imprisonment for life." (8)

(b) Answer any one of the following:

(i) Give a description of how the lawyer spent his fifteen years in jail.
(ii) 'Circ's Garden' is a story of fight between good and evil in which good comes out victorious over evil. — Discuss. (10)

(c) Answer any three of the following:

(i) What did the Loisel couple decide to do when they found the necklace missing?
(ii) Describe the things that the lawyer was not allowed to do during his imprisonment.
(iii) Why did the banker decide to kill the lawyer?
(iv) What do you know about Hermes? (12)

Contd ………... P/3
6. Recast and correct any ten of the following sentences:
   (i) They made less mistakes with the new calculating machine.
   (ii) The jury is arguing among itself.
   (iii) Here comes my brother and his friend.
   (iv) It is the Robinsons whom, I feel certain, are to come.
   (v) It was me whom you saw yesterday.
   (vi) Last week our clergyman reminded us that living the upright life was a discipline.
   (vii) He decided to work slow and easy.
   (viii) He is something better today.
   (ix) The highways were slippery due to the ice.
   (x) We haven't scarcely any sugar.
   (xi) This box is more square than that one.
   (xii) He is as tall as, if not taller, than his brother.

7. (a) Give the meaning of any ten of the following words.
   Admonish, beckon, cataclysm, deprecate, entice, fluffy, hubbub, meddle, prudence, promulgate, sinuous, tyro.

   (b) Make sentences with any ten of the following words.
   Audacious, brandish, clemency, Eulogy, hilarious, moron, rebut, smolder, tamper, vestige, wrinkle, yelp.

8. Write a précis of the following passage with a suitable title.
   Writing is one of the most marvelous things ever invented by man. Indeed, our present civilization depends largely upon writing. But for it, the nations of the world could at this very moment know little about one another and would still be in a state of ignorance and savagery. Who was the creator of this marvelous invention? Some cavemen most likely, a man in appearance like an ape, yet a man who was filled with desire to make some lasting record of the strange things he saw about him. This man was the world's first artist, for the first writing was picture writing, and took the form of picture of the bears and stags and other animals which lived in the forests round the cavemen's home. How do we know this? The answer is that in certain parts of the world there are caves on the world of which such a picture may be seen, drawn and painted many thousands of years ago. These ancient cavemen had minds like small children's. Just as they drew pictures of things, they saw in the world about them. So to say, if you give a small child pencil and paper, he will draw pictures of houses and cows and men and women long before he learns to write.
SECTION - A
There are FOUR questions in this section. Answer any THREE.

1. (a) Define demand function. 
   (b) What are the main determinants of demand? Explain them.
   (c) What are the exceptions to the law of demand?

2. (a) How is price determined in an economy under competition? What will happen to the equilibrium price and quantity due to change in demand?
   (b) From the following demand and supply functions, calculate equilibrium price and quantity and show the result in a graph. What will happen to the equilibrium price and quantity if government imposes a tax of Tk 5 per unit?
   \[ QD_x = 1200 - 5P_x \]
   \[ QS_x = -500 + 12 P_x \]

3. (a) Define budget line and budget set.
   (b) Explain consumer's equilibrium with the help of budget line and indifference curve.

4. (a) What is an indifference curve? What are the assumptions of an indifference curve analysis?
   (b) Explain the properties of an indifference curve.

SECTION - B
There are FOUR questions in this section. Answer any THREE.

5. (a) When does a firm emerge as a monopolist?
   (b) Explain the short run equilibrium of a firm under monopoly.
   (c) Prove that \( MR = P \left(1 - \frac{1}{e}\right) \) in case of a monopolist.
6. (a) Define net national product (NNP) at market price. (5)
(b) What are the methods of measuring national income? Explain any two of them. (8½)
(c) What are the problems of measuring national income? Discuss. (10)

7. (a) What do you understand by localization of industries? Explain the main causes of localization of industries. (10)
(b) What are the advantages of localization of industries? Explain them. (13½)

8. (a) Explain the concept of division of labour. Discuss different types of division of labour. (13½)
(b) Illustrate the disadvantages of division of labour. (10)
SECTION – A

There are FOUR questions in this section. Answer Q. No. 1 and any TWO from the rest.

1. Define foundation. Describe the various types of spread foundation. (20)

2. (a) What are the sources of dampness in a building? (10)
   (b) Describe damp proofing treatment to basement in ordinary soil and in damp soil. (15)

3. (a) Discuss the points to be considered while selecting a particular type of floor construction. (10)
   (b) Describe the construction of Terrazzo floor. Draw the section of a Terrazzo floor for ground floor. (15)

4. Write short notes on: (any five) (5×5=25)
   (a) Eccentrically loaded footings
   (b) Pre-cast concrete piles
   (c) Friction piles
   (d) Sheet piles
   (e) Integral treatment of damp proofing
   (f) Ridge, Rafter, Gable.

SECTION – B

There are FOUR questions in this section. Answer Q. No. 5 and any TWO from the rest.

5. Describe with sketches the different types of stairs used in buildings. (20)

6. (a) Define King closure, Queen closure, Bevelled closure, Bull stretcher, String Course. (10)
   (b) Draw the following brick bonds.
      Header bond, Dutch bond, Flemish garden wall bond, Diagonal bond, Herring-bone bond. (10)
   (c) Briefly discuss about different types of brick pointing. (5)

Contd ........... P/2
7. (a) Discuss major planning considerations in designing Kitchens and Toilets. (15)
   (b) What are the points to be considered while locating doors and windows in a building. (10)

8. Differentiate between (5×5=25)
   (a) English bond and Flemish bond
   (b) English garden wall and Flemish garden wall bond
   (c) Sheet pile and Compaction pile
   (d) Battened-ledged door and Battened-ledged braced door
   (e) Weather joint and Concave joint.
SECTION - A

There are FOUR questions in this section. Answer any THREE.

1. (a) What do you understand by 'Planning'? Explain with examples how can we plan for others. (7+6=13)
   (b) Illustrate the characteristics of planning with examples. (10½)

2. (a) What aspects are considered in the analysis of environment? (4)
   (b) Explain the procedures of selecting an alternative in planning process. (6)
   (c) What do you understand by stakeholder analysis? What are the benefits of involving stakeholders in planning process? (6½+7=13½)

3. (a) Give an overview of the purpose of spatial planning. (5)
   (b) Explain different levels of planning with a neat diagram. (6½)
   (c) Write down the difference between
      (i) Allocative and Innovative Planning
      (ii) Indicative and Imperative Planning (6×2=12)

4. (a) What are the classical models of urban land use? Describe with diagram the ecological model put forth by Harris and Ullman. (14½)
   (b) What is the main difference between Burgess and Hoyt's urban land use models? Discuss why these two models are criticized. (2+7=9)

SECTION - B

There are FOUR questions in this section. Answer any THREE.

5. (a) What do you understand by the term "human settlements"? What are the contents of a human settlement? (5)
   (b) Describe the evolution of cities from cave life to city life. (18½)

Contd .......... P/2
6. (a) Describe the characteristics of early Mesopotamian cities.  
(b) What do you know about Babylon in Nebuchadnezzar's era? Describe from historian Herodotus' point of view.  
(c) Name three major towns from Cretan civilization.  

7. (a) Name the ancient cities of Indus Valley. What are the important features of them?  
(b) Which period is known as Renaissance? Describe the characteristics of society and city in Renaissance period.  
(c) What were the speciality in the design of "Baroque City"?  

8. (a) What major initiatives were taken by Hippodamus in greek city planning?  
(b) Describe the "public spaces" in greek city plans.  
(c) What major change did the appearance of "gun powder" bring in Neo-classic city structures?
1. Find the 'Y' coordinate of the centroid of the following hatched area. Point of origin is shown in the Figure-1.

2. Show that the summation of 'moment of inertia' of any area about two perpendicular axes is a constant.

3. Using 'Pappus & Guldinus Theorem', determine the generated volume due to 180° revolution of the shaded area about its bottom edge (Figure-2).

4. An area is enclosed by the curve \( Y = 0.5 \times X^2 \) and two lines- \( Y = 0 \) and \( X = 4 \). Find the moment of inertia of this area about its centroidal X axis (Figure-3).

Contd .......... P/2
5. Find the moment of inertia of the following area about its centroidal Y axis. Point of origin and the axes are shown in the Figure-4.

6. Determine the member forces on members BC, FD and GD of the following truss (Figure-5).

7. State assumptions made for the analysis of a truss. What are the mathematical conditions for checking the stability and determinacy/indeterminacy of a truss? Name four different types of Bridge truss.

8. The block in the following figure is subjected to different forces as shown in the Figure-6. Given, the weight of the block = 700 lb and the coefficient of friction between the surface of the block and the plane on which it is resting on, \( f = 0.25 \). If the magnitude of force \( P \) is gradually increased from 0 (zero) to a value when the block starts moving, determine whether the block will slide or topple (roll over) first.
9. A rectangular body $P$ is on a rough plane $AB$ as shown in the Figure-7. Given, weight of $P = 60$ kip and the coefficient of static friction between the surface of $P$ and the plane $AB$, $f_s = 0.30$. The other forces acting on the system are as shown in the figure. Determine the maximum friction force that can act on body $P$. Also determine whether the system will be at rest or not? If not, then determine the direction of movement for $P$, upward or downward.

![Figure 7](image)

SECTION - B

There are FIVE questions in this section. Answer any FOUR.

10. (a) Two spheres are at rest against smooth surfaces, as shown in Figure-8. Sphere $A$ weighs 3200 lb and sphere $B$ weighs 400 lb. Let, $F = 1000$ lb and $\theta = 75^\circ$, and find the reactions at $C$, $D$ and $E$.

(b) The permissible internal force on timber $AB$ shown in Figure-9, is 4 kips. If, $\theta = 30^\circ$, what maximum safe load may be suspended at $B$?

11. (a) In the system of sheaves shown in Figure-10, what force $F$ will hold a weight of $W = 800$ lb. in equilibrium? Also determine which cable is in maximum tension and also determine the magnitude of the tension. All the contact surfaces are smooth.

(b) Determine support reactions of the beam shown in Figure-11.

12. (a) For the frame in Figure-12, if $F = 50$ lb., $Q = 100$ lb. and $\theta = 30^\circ$, find the components of the pin reactions at $A$ and $B$. Also determine member forces of AD and CE.

(b) In Figure-13, let weight of $A$ & $B$ and force $R$ be 2000, 500 and 8000 lb. respectively. Neglecting all friction, find the force $Q$ on top of the wedge $B$ for equilibrium.

Contd .......... P/4
13. (a) In Figure-14, a pipe is supported by hanger rods AE of negligible weights. The hanger is hinged on the removable pin A. If the reaction at B should be \( W/6 \), what must be the dimension \( L \)?

(b) In Figure-15, find the components of reactions at A. Also determine the tension in cable BC. Let \( F = 3000 \text{ lb} \) and neglect self-weight of the members.

14. (a) Write down the conditions for a cord to form a parabolic curve. For the cord shown in Figure-16, derive the expression for tension at point O, tension in the cord at any abscissa \( x \), tension at the support B, slope of the curve at any point and at support B and total length of the cord.

(b) A wire weighing 4 oz. per ft. is strung between two supports 300 ft apart. One support is 15 ft higher that the other and the sag, measured from the lower support, is 5 ft. Compute the tension at each support and the length of the wire. 16 oz. = 1 lb.
12. In Figure 12, a pipe is supported in three rigid rods, E, F, G, of negligible weight. The tension in the center rod E is to be determined. Also determine the reactions at the supports and the component of reactions at G. Also determine the tension in the center rod E.

13. Determine the tension in the center rod E.

14. In Figure 14, a rope is tied to point P and supports a weight of 300 lb. The rope is 50 ft. long. Determine the tension in the rope at point P and at support B and at support C.

15. In Figure 15, a cable is supported at points A and B. Determine the tension in the cable at point C.

16. In Figure 16, a uniform load of w lb. per ft. is supported on a hanger. Determine the sag of the hanger and the reaction at support B.

Figure 12

Figure 13

Figure 14

Figure 15

Figure 16
L-2/T-1/ARCH

Date: 15/01/2015

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1  B. Arch. Examinations 2013-2014

Sub: ARCH 231 (Environment and Design II: Visual and Sonic Environment)

Full Marks: 140  Time: 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

There are FOUR questions in this section. Answer any THREE.

1. Write notes on:
   (a) Daylight
   (b) Skylight
   (c) Sunlight
   (d) Daylight Factor
   (e) Electromagnetic Spectrum

2. Describe the importance and application of daylight simulation for sustainable building design.

3. Discuss the supplementary artificial lighting within the indoor environment.

4. Elaborate with annotated sketches the daylighting features of an internationally renowned architectural project.

   SECTION – B

There are FIVE questions in this section. Answer Q. No. 5 and any THREE from the rest.

5. (a) Write short notes on the following (any THREE):
   (i) Noise
   (ii) Octave Band
   (iii) Acoustics
   (iv) Reverberation Time

   (b) Calculate the Reverberation Time (RT) at 500 Hz for the room shown in Fig. 1. From the result, make comments if the room is suitable for speech in English.
6. (a) In an enclosed space, how does sound behave in terms of absorption, reflection and diffusion? (4×3=12)

(b) Explain the statement: "Architectural means should ensure acoustic performance of a space, while electro-acoustics would only supplement". (4)

7. (a) What are the effects of diffraction, refraction and transmission of sound in a space? (4×3=12)

(b) What is Sound Transmission Class (STC)? (4)

8. (a) Elaborate the following singular phenomena: (4×3=12)

(i) Echo
(ii) Colouration
(iii) Whispering Gallery

(b) What are the general requirements for acoustic design? (4)

9. (a) Describe with figures how noise transmission can be controlled in following conditions: (4×3=12)

(i) From room to room through air-conditioning ducts
(ii) From floor to floor through floor slabs due to mechanical equipments.
(iii) From outdoor to indoor through walls.

(b) In schematic plans, show examples of 'poor' and 'good' acoustic treatments for a space with circular plan. (4)
Fig. 1

<table>
<thead>
<tr>
<th>Materials</th>
<th>250 Hz</th>
<th>500 Hz</th>
<th>1 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Carpet on concrete</td>
<td>0.06</td>
<td>0.14</td>
<td>0.37</td>
</tr>
<tr>
<td>Glass</td>
<td>0.25</td>
<td>0.18</td>
<td>0.12</td>
</tr>
<tr>
<td>Wood panel on wall</td>
<td>0.25</td>
<td>0.20</td>
<td>0.17</td>
</tr>
<tr>
<td>Brick wall, plastered</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Note: Ignore absorption by the volume of air in the room