L-1/T-1/ARCH **Date : 25/03/2023**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2021-2022

Sub : **ARCH 131** (Architecture of Ancient Civilization)

Full Marks : 140 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. Write short notes on the following: **(15×2=30)**
   (a) Göbekli Tepe
   (b) Stair Way Mastaba

2. What were the contextual characteristics that the large cities of 'Indus-Ghaggar-Hakra' region adopted to live with flood? **(20)**

3. Discuss the significance of the 'Bent Pyramid' in the development process of building the 'True" pyramid. **(20)**

4. Show the evolution of 'Stone henge' with necessary illustrations. **(20)**

SECTION – B

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

5. Write short notes on the following: **(15×2=30)**
   (a) Treasury of Atreus
   (b) Ashokan Pillar

6. What are the similarities and differences between the Temple of Queen Hatshepsut and the Temple of Abu Simbel in terms of their style and character? **(20)**

7. Elaborate on the Ritual Complex at Fengchu, Shaanxi Province, China with necessary sketches. **(20)**

8. How the religious atmosphere in ancient India influenced the 'Ghats' during the vedic period. **(20)**

L-1/T-1/ARCH **Date : 02/04/2023**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch Examinations 2021-2022

Sub : **ARCH 133** (Design Theory)

Full Marks : 140 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer **Q. No. 4** and any **TWO** from the rest.

1. Analyze the characteristics of spaces generated due to 'L-shaped' and 'U-shaped' vertical planes with examples and sketches. **(20)**

2. (a) Identify the procedures of forming Additive Form. **(5)**

   (b) Illustrate briefly the features of different types of Additive Forms with necessary sketches. **(15)**

3. Describe the relationship that exist between 'Adjacent Space' and 'Space within a Space'. **(20)**

4. Write short notes on the following **(15×2=30)**

   (a) Scale

   (b) Primary Shapes

SECTION – B

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

5. Write short notes on any TWO (2) of the following: **(15×2=30)**

   (a) Attributes of color

   (b) Axis and Symmetry

   (c) Rhythm and Transformation

6. Describe the psychological effects of different shapes in Visual Art. Use relevant examples. **(20)**

7. "Surface quality of an object should be appropriate to purpose, material and form, space and color" – Describe the statement with reference to Texture. **(20)**

8. Establish "Hierarchy" as a principle of design with necessary sketches. **(20)**

L-1/T-1/ARCH **Date : 03/05/2023**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2021-2022

Sub : **ARCH 605** (Building Technology)

Full Marks : 140 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. Write short notes on the following.

   (a) Structural Loads **(10)**

   (b) Geodesic Dome **(10)**

2. (a) Describe the challenges of constructing slabs in RCC and steel structure buildings. **(10)**

   (b) Compare different types of RCC slabs with neat sketches. **(15)**

3. (a) Illustrate various types of trusses used in construction, also mention the distinctive characteristics of each type. **(10)**

   (b) Explain the structural efficiency and overall sustainability of the space frame system in construction. **(15)**

4. (a) Discuss the benefits and limitations of using vaults in building and design. **(10)**

   (b) Explain how the geometry of a dome influences its strength and stability. **(15)**

SECTION – B

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

5. Write short notes on the following. **(5×4=20)**

   (a) Plywood

   (b) Cross laminated timber

   (c) Metal joineries and connections

   (d) Vulcanized rubber

6. (a) Describe various types of rubber materials and plastic. **(10)**

   (b) Illustrate different structural stabilizing elements in buildings (with sketches). **(15)**

Contd P/2

ARCH 605

7. (a) What is rammed earth? **(5)**

   (b) What are the advantages of using rammed earth in construction? **(5)**

   (c) Describe the various construction techniques and methods of rammed earth. **(15)**

8. (a) What is Cement Earth Block (CEB)? **(5)**

   (b) What are the production techniques of CEB? **(5)**

   (b) Compare CEB with gas-burn brick in building construction. **(15)**

L-1/T-1/ARCH Date : 03/05/2023

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2021-2022

Sub : **ARCH 703** (Art Appreciation)

Full Marks : 140 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. Mention the classification of Visual Art with example. **(30)**

2. Define sculpture and discuss the traditional means of making sculpture. **(20)**

3. Discuss types of Watercolour. Write a short history of Watercolor. **(5+15=20)**

4. What is Creativity? What are the outstanding characteristics of creative people? **(20)**

SECTION – B

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

5. Write short notes on any THREE (3) of the following **(3×10=30)**
   (a) Nano Art.
   (b) Environmental Art.
   (c) Interactive Art.
   (d) Bio Art.

6. What is art? Discuss the relevance of the Art Appreciation subject in architecture studies. **(20)**

7. How do you appreciate or analyze Visual Art? Explain with examples. **(20)**

8. What is Conceptual Art? Write short history and philosophy behind Conceptual Art. **(5+15=20)**

L-1/T-1/ARCH **Date : 29/04/2023**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2021-2022

Sub : **MATH 111** (Mathematics)

Full Marks : 140 Time : 3 Hours

The figures in the margin indicate full marks.

Symbols used have their usual meaning.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. (a) A function $f(x)$ is defined in the way: $f(x)=\begin{cases}4x; & x\le -1\\ cx+d; & -1<x<2\\ -5x; & x\ge 2\end{cases}$. **(11)**

Find for which values of c and d the function is continuous everywhere. Also discuss the differentiability of $f(x)$ at -1 and 2.

(b) Use numerical evidence to make a conjugate about the value of $\lim_{x\to 2}\frac{x^3-2x^2}{x-2}$.

Verify your result graphically. **(7)**

(c) Show that: $\lim_{x\to 0}\frac{a^x-1}{x}=\log_e a$. **(5⅓)**

2. (a) State and prove Leibnitz's theorem. **(13)**

(b) If $y=e^{m\cos^{-1}xa}$ then show that $\left(1-x^2\right)y_{n+2}-(2n+1)xy_{n+1}-\left(n^2+m^2\right)y_n=0$. **(10⅓)**

3. (a) Find the local and global extrema of the function $f(x) = 1 + 2\sin x + 3\cos^2 x$. **(11)**

(b) Integrate $\int e^{6x}\sin\left(e^{2x}\right)dx$ using integration by parts formula. **(7⅓)**

(c) If $u = e^{xyz}$ then show that $\frac{\partial^3 u}{\partial x\partial y\partial z}=\left(1+3xyz+x^2y^2z^2\right)e^{xyz}$. **(5)**

4. (a) Evaluate $\lim_{n\to\infty}\left[\frac{1}{1^3+n^3}+\frac{2^2}{2^3+n^3}+\ldots\ldots+\frac{n^2}{n^3+n^3}\right]$ using integral formula. **(13)**

(b) Find the area of the region bounded by the curves $y = x^2$, $y = 2 - x$ and $y = 0$. **(10⅓)**

Contd P/2

MATH 111/ARCH

SECTION – B

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

5. (a) The direction cosine of two straight lines are given by the relations $al + bm + cn = 0$ and $ul^2 + vm^2 + wn^2 = 0$. Prove that the straight lines will be perpendicular if $a^2(v + w) + b^2(w + u) + c^2(u + v) = 0$ and parallel if $\frac{a^2}{u} + \frac{b^2}{v} + \frac{c^2}{w} = 0$. **(15)**

   (b) Find the distance of (–2, 3, 4) from the line through the point (–1, 3, 2) whose direction cosines are proportional to 12, 3, –4. **(8 ⅓)**

6. (a) A line makes angles $\alpha, \beta, \gamma, \delta$ with the four diagonals of a cube, prove that **(11)**

   $$\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = \frac{4}{3}$$

   (b) Find the equation of the plane which is perpendicular to the plane $5x + 3y + 6z + 8 = 0$ and which contains the line of intersection of the planes $x + 2y + 3z - 4 = 0$ and $2x + y - z + 5 = 0$. **(12 ⅓)**

7. (a) Show that the lines $\frac{x+3}{2} = \frac{y+15}{3} = \frac{z-7}{-3}$ and $\frac{x+1}{4} = \frac{y+1}{5} = \frac{z+1}{-1}$ are coplanar and find the equation of plane containing them. **(12 ⅓)**

   (b) Find the shortage distance between the lines $\frac{x-8}{3} = \frac{y+9}{-16} = \frac{z-10}{7}$ and $\frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}$. **(11)**

8. (a) Find the equation of tangent plane of the sphere $x^2 + y^2 + z^2 - 4x + 2y = 4$ which is parallel to the plane $2x - y + 2z = 1$. **(11)**

   (b) Find the equation of tangent plane to the ellipsoid $9x^2 + 18y^2 + 27z^2 = 4$ at the point $\left(\frac{4}{9}, \frac{2}{9}, \frac{2}{9}\right)$ and prove that it touches the sphere $17(x^2 + y^2 + z^2) = 4$. **(12 ⅓)**

L-1/T-1/ARCH Date : 09/04/2023

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2021-2022

Sub : **PHY 115** (Physics (Light, Heat and Sound))

Full Marks : 210 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. (a) What does forced oscillation mean? Consider a body is oscillating under the influence of a damping force with the constant 'b'. An external driving force $F_e = F_0 e^{iqt}$ is applied to keep the body oscillating. Establish the differential equation for this damped-driven oscillator. **(10)**

   (b) Solve the differential equation for the damped-driven oscillator mentioned in 1(a) to determine the equation of displacement. Define resonance and find the expression of resonance frequency. **(18)**

   (c) Consider a damped-driven oscillator of mass 6 g. During the oscillation a force constant 135 dyne/cm, a damping constant 17 dyne-s/cm and a periodic driving force with the maximum value 3500 dynes are acting on the oscillator. Find the resonant frequency of the oscillator. **(7)**

2. (a) How waves are classified in terms of medium? Distinguish between transverse and longitudinal waves. **(10)**

   (b) Suppose a wave following the equation $y_1 = a \sin\frac{2\pi}{\lambda}(vt - x)$ originated at the end of a stretched string is moving towards the positive X-direction. The wave is reflected at another end of the string which is rigidly tied up with a stand. Find the equation of the resultant standing wave. Describe the changes in particle displacement, velocity and acceleration with respect to the change of position (x). **(18)**

   (c) Consider that the stationary wave formed by reflection as described in question 2(a). The wave velocity is 320 m/s and frequency is 256 Hz. Find out the positions where the 2^{nd} node and first antinode occur. **(7)**

3. (a) What do the terms intensity and loudness mean? Establish the relation between intensity and loudness and hence define decibel (dB) unit of measuring intensity level of sound. **(10)**

   (b) Use the analytical treatment to derive the expression of growth and decay of sound intensity in a room. Find the expression for reverberation time. **(18)**

Contd P/2

PHY 115/ARCH

Contd ... Q. No. 3

(c) A meeting room has the volume 167 m^3 where 30 persons can sit for a meeting at a time. A laptop speaker emits a sound of frequency 500 Hz inside a room. Calculate the reverberation time for the room considering the existence of the following absorbents including 30 persons inside it. **(7)**

Table: 3(c)

Surface	Area (m^2)	Absorption coefficient (Sabine)
Plaster (ceiling and walls)	52	0.02
Wood (window frames, doors and furniture)	35	0.07
Carpet and Curtains	10	0.80
Glass	36	0.18
For a person present in the room		0.50

4. (a) What is convection of heat? Describe trade winds and central heating system with proper diagram. **(10)**

(b) What is a blackbody? State Stefan-Boltzmann law of blackbody radiation and hence obtain Newton's law of cooling from that law. **(15)**

(c) An aluminum foil of relative emittance 0.1 is placed in between two concrete spheres at temperature 300 K and 200 K, respectively. Calculate the temperature of the foil after the steady state is reached. Assume that, the spheres are perfectly blackbody radiators. Also calculate the rate of energy transfer between one of the spheres and the foil. **(10)**

SECTION – B

There are **FOUR** questions in this section. Answer any **THREE** questions.
Symbols have their usual meanings.

5. (a) What is thermal conductivity? Describe briefly a setup for determining the thermal conductivity of a good conductor with proper diagram. **(15)**

(b) Show that, the general equation for the rectilinear flow of heat along a bar is, **(10)**

$$\frac{\partial^2\theta}{\partial x^2} = \frac{\rho S}{K}\frac{\partial\theta}{\partial t} + \frac{Ep}{KA}\theta$$

where the symbols have their usual meaning.

(c) The brickwork produced by a bricklayer of a terrace is built up of layers laid of the fire clay, and red brick and the space between the two layers of brick work is filled with crushed diatomite brick. The fire clay is 120 mm thick. The thickness of the diatomite filling is 50 mm and thickness of the red brick layer is 250 mm. The thermal conduction of these three materials are 0.93, 0.13, 0.7 W/m°C, respectively. What should be the thickness of red brick layer of the brickwork which is to be laid without the diatomite filling between the two layers so that the heat flux through the brickwork remain constant. **(10)**

Contd P/3

PHY 115/ARCH

6. (a) Define emissive power and absorptive power. Draw the energy distribution graph of a blackbody radiation and express the variation of energy with respect to temperature and wavelength. **(10)**

   (b) State and discuss Wien's displacement law and Rayleigh-Jeans of radiation. Write down Planck's radiation law and hence discuss the consequences for **(17)**

   (i) Shorter wavelength and

   (ii) Longer wavelength of radiation.

   (c) Spectral energy distribution of the Sun (Temp. = 6050 K) has a maximum at 475 nm. At which temperature the spectral energy distribution of a star is maximum at 950 nm compared to that of the Sun? **(8)**

7. (a) Mention the factors upon which the illumination of a surface depends. Write some differences between luminous flux and luminous intensity. **(10)**

   (b) Consider that the two slits of Young's double-slit experiment represent coherent sources from which two sinusoidal waves of the same angular frequency ω at a constant phase difference φ are interfering at any point on a screen. Draw the sketch of the experiment. Show that the average intensity of light at any point on the screen is given by **(17)**

$$I \approx I_{\max} \cos^2\left(\frac{\pi d}{\lambda L} y\right),$$

   where the terms have their usual meaning.

   (c) A light source emits visible light of two wavelengths 410 nm and 470 nm which is used in a double-slit interference experiment. A screen is placed at distance 1.20 m and the slit width is 0.024 mm. Find the separation distance between the fourth-order bright fringes to these two wavelengths. **(8)**

8. (a) Define transmission and reflection grating and draw these showing the order. Mention some difference between diffraction grating and prism based on spectral lines. **(10)**

   (b) Derive an expression for the dispersive power of a transmission grating. **(15)**

   (c) State and explain Brewster's law and hence show that the reflected and refracted rays are at right angles to each other. **(10)**

L-1/T-1/ARCH Date : 03/05/2023

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2021-2022

Sub : **HUM 709** (Human Behavior & Environment)

Full Marks : 140 Time : 3 Hours

The figures in the margin indicate full marks.

Symbols indicate their usual meaning.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. (a) Why is psychology a scientific study of behavior and mental process? **(6)**
   (b) How do you apply the knowledge of psychology as a student of architecture? **(17 1/3)**

2. (a) Define absolute and difference thresholds with appropriate examples. **(6)**
   (b) Explain "Gestalt Laws of Perceptual Organization" drawing clear pictures. **(17 1/3)**

3. (a) Why are emotions necessary for human beings? **(6)**
   (b) Draw and appropriately label Maslow's need hierarchy theory of motivation. **(17 1/3)**

4. (a) Differentiate between personal space and territoriality. **(6)**
   (b) How is environmental psychology related to architectural design? **(17 1/3)**

SECTION – B

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

5. (a) What are the difference between classical and operant conditioning? **(6)**
   (b) Explain different types of reinforcement citing appropriate examples. **(17 1/3)**

6. (a) Show the flow of information in the three-stage structure of human memory. **(6)**
   (b) Why do we forget information? **(17 1/3)**

7. (a) How is IQ calculated? Give examples. **(6)**
   (b) Critically discuss any one theory of intelligence. **(17 1/3)**

8. (a) Define personality. **(6)**
   (b) Briefly discuss Freud's psychoanalytic theory of personality. **(17 1/3)**

L-1/T-1/ARCH Date : 03/05/2023

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2021-2022

Sub : **HUM 713** (Anthropology)

Full Marks : 140 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. (a) Discuss the major historical events and intellectual movements that contributed to the emergence and development of anthropology as a discipline. **(10)**

   (b) Explain the nature and scope of anthropology. **(13 ⅓)**

2. (a) Briefly discuss how the applied anthropology contributes to the development strategies for the marginalized communities. **(10)**

   (b) Explain the pros and cons of participant observation for collecting field data. **(13 ⅓)**

3. (a) What distinguishes anthropology from other fields that study individuals and society? **(10)**

   (b) Discuss the main sub fields of anthropology with suitable examples. **(13 ⅓)**

4. (a) Explain how the various elements of culture, such as language, symbols, and material culture interact with each other to shape the beliefs and behaviors of individuals within a society. **(10)**

   (b) Briefly discuss the significant features of culture. **(13 ⅓)**

SECTION – B

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

5. (a) Using Gerhard Lenski's theory of "Socio-cultural Evolution". Illustrate the phases of human society as they exist today. **(13 ⅓)**

   (b) Illustrate the stages of gradual formation and subsequent development of "ideas, passions, and aspiration of mankind from the bottom of the scale" identified by L. H. Morgan. **(10)**

Contd..... P/2

HUM 713

6. (a) How would you define kinship? Use the proper symbols to demonstrate five generations of matrilineal kinship. **(13 1/3)**

   (b) Define family. Discuss the fundamental features of family. **(10)**

7. (a) Describe the distinctions between 'reciprocity' and 'commercial exchanges' using appropriate examples. **(13 1/3)**

   (b) Describe the nature of access to land among different primitive societies. **(10)**

8. Write short notes on any **THREE** of the following **(23 1/3)**

   (a) The "Kula Ring"

   (b) Redistribution

   (c) Band organization

   (d) Tributary production.
