BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   B. Sc. Engineering Examinations 2015-2016

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

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) Explain the terms humidity, relative humidity and dew point. **(7)**

(b) What is hygrometer? Describe Regnault's dew point hygrometer with a schematic diagram. What are the advantages of this hygrometer? **(17)**

(c) The temperature of the physics class room in the Architecture department is observed to be 30°C. and dew point 16°C. If the temperature falls to 20°C calculate (i) the dew point and (ii) the pressure of the aqueous vapor in the air. Pressure of aqueous vapor at 14°C = 11.2 m of Hg and at 16°C = 12.3 mm of Hg. **(11)**

2. (a) What are the factors affecting the loss of heat from a hot body? State and explain the Newton's law of cooling. **(12)**

(b) Determine the specific heat of a liquid by cooling method with suitable diagrams. **(15)**

(c) A jar of liquid takes 10 minutes to cool from 90°C to 40°C. How much time will it take to cool from 80°C to 50°C? The temperature of the surrounding is 30°C. **(8)**

3. (a) Describe the terms temperature gradient, thermal resistance and thermal diffusivity. **(9)**

(b) In the case of rectilinear flow of heat along a metallic bar show that

$\dfrac{d\theta}{dt} = h\dfrac{d^2\theta}{dx^2} - \mu\theta$, where the symbols have their usual meanings. **(18)**

(c) Define solar constant and calculate the temperature of the sun surface. **(8)**

4. (a) What do you mean by resonance of sound waves? **(5)**

(b) Discuss analytically the interference of sound waves, and obtain the condition for maximum and minimum intensity. With the help of intensity distribution curve, explain how the total energy remains conserved in interference of sound waves. **(23)**

(c) A tuning fork with a frequency of 440 Hz is sounded together with a note played on a piano. Eight beats are heard in 2 seconds. What is the frequency or pitch of the piano note? **(7)**

PHY 115

SECTION – B

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

5. (a) What do you mean by damped Oscillation and forced oscillation? Write down their differential equations. **(10)**

    (b) Deduce an expression of motion of a particle, when it is influenced simultaneously by two simple harmonic oscillations at right angles. For what condition, the shape of Lissajous' figure can be a circle? Explain in details. **(18)**

    (c) A spring of mass 100 gm is allowed to oscillate simple harmonically. When the spring is loaded with 200 gm, it extends by 10 cm. Calculate the time-period and spring constant. **(7)**

6. (a) Explain briefly about the major concerns of the architectural acoustics of a room. **(10)**

    (b) Show that the total energy per unit volume of a progressive wave can be expressed by the equation: $E = 2\pi^2 n^2 A^2 \rho$, where the symbols have their usual meanings. **(15)**

    (c) The volume of a room is 600 m^3. The wall area of the room is 220 m^2, the floor area is 120 m^2 and the ceiling area is 120 m^2. The average sound absorption coefficient, (i) for the walls is 0.03; (ii) for the ceiling is 0.80, and for the floor is 0.06, calculate the average sound absorption coefficient and the reverberation time. **(10)**

7. (a) Show with a suitable diagram how coherent sources are produced in Fresnel's biprism experiment. **(7)**

    (b) Find an expression for the fringe width produced by a wedge shaped thin film. **(18)**

    (c) In a Fresnel's biprism experiment, the fringe width observed is 0.13 cm. If the slit separation is reduced by $\frac{1}{4}$ of its original value, what will be the fringe width? **(10)**

8. (a) Define luminous intensity. Write down the laws of illumination. Derive Malus law of polarization. **(15)**

    (b) State and prove Brewster's law. Write down two applications of it. **(15)**

    (c) A polarizer and an analyzer are parallel so that maximum light is transmitted. When the analyzer is rotated through 30°, to what percentage of its maximum value is the intensity of transmitted light reduced? **(5)**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   B. Arch. Examinations 2015-2016

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 followings (any two):   **(10×2=20)**

    (a) Göbekli Tepe

    (b) Stair way Mastaba

    (c) Creat Bath of Mohenjo Daro

2. (a) Illustrate the plan, section and perspective view of a home and town centre of
    Yangshao culture at Banpo, China.   **(10)**

    (b) Describe the development of temples in Eridu and Uruk during 3500 BCE with
    necessary sketches.   **(15)**

3. (a) Using Dholavira as an example, discuss the key considerations for establishing a city
    in the Indus-Ghagger Hakra region.   **(10)**

    (b) Compare the rationales for the stone circles in Nabta Playa, Egypt during the early
    cultures and in Europe during 3500 BCE.   **(15)**

4. (a) Describe the salient features of the Ziggurat at Ur with illustrations.   **(10)**

    (b) Show the evaluation of the step Pyramid from a Mastaba using sketches and brief
    description.   **(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 any TWO of the followings: **(10×2=20)**

    (a) Treasury of Atreus

    (b) Salinas de Chao, Peru

    (c) Kaminaljuyu Temple Complex.

6. (a) What are the similarities and differences between the Minoan Palace at Knossos and
    Myeenaean Place at Pylos?   **(15)**

    (b) "Iron age affected the global economy" - Elaborate.   **(10)**

ARCH 131

7. (a) Illustrate the plan of the Egyptian Cult Temple at Karnak and show different parts of it. **(10)**

    (b) Describe the salient features of the city of Babylon with necessary illustrations. **(15)**

8. (a) Evaluate the concept of "Walled city" during Zhon Dynasty with necessary example and sketches. **(10)**

    (b) How the social context in China influenced the architectural characters of Built forms during the Warring states period (About 400 BCE)? **(15)**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   B. Arch. Examinations 2015-2016

Sub : **MATH 111** (Mathematics)

Full Marks : 140   Time : 3 Hours

The figures in the margin indicate full marks.

Symbols have their usual meaning.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. (a) Evaluate: $\lim\limits_{x \to 0} \dfrac{8^x - 2^x}{x}$.   **(6)**

    (b) A function $f(x)$ is defined by $f(x) = -x$, when $x \le 0$

    $\qquad\qquad\qquad\qquad = x$, when $0 < x < 1$

    $\qquad\qquad\qquad\qquad = 2 - x$, when $x \ge 1$.

    show that $f(x)$ is continuous at $x = 0$ and also at $x = 1$.   **(9)**

    (c) If $y = \sin(m \sin^{-1} x)$, then find the value of $(1 - x^2)y_{n+2} - (2n+1)xy_{n+1} + (m^2 - n^2)y_n$.   **(8⅓)**

2. (a) Investigate for what values of x, $f(x) = 5x^6 - 18x^5 + 15x^4 - 10$, is a maximum or

    minimum.   **(12)**

    (b) If $u = \sin^{-1}\dfrac{x}{y} + \tan^{-1}\dfrac{y}{x}$. Show that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = 0$.   **(11⅓)**

3. Carry out the following integrals:

    (a) $\displaystyle\int \dfrac{dx}{x^6 \sqrt{1 + x^2}}$,   (b) $\displaystyle\int (x - 3)^3 \sqrt{6x - x^2}\ dx$,   (c) $\displaystyle\int e^x \dfrac{1 + \sin x}{1 + \cos x} dx$.   **(7+9+7⅓)**

4. (a) Evaluate the following: **(8+7⅓)**

    (i) $\displaystyle\int_0^\pi \dfrac{x}{1 + \sin x} dx$ (ii) $\displaystyle\int_0^{16} \dfrac{x^{1/4}}{1 + x^{1/2}} dx$

    (b) Determine the area between the curve $y^2(2a - x) = x^3$ and its asymptote.   **(8)**

MATH 111

SECTION – B

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

5. (a) Define direction cosines and direction ratios of a straight line. Find the direction cosines of two lines which are connected by the relation $l - 5m + 3n = 0$ and $7l^2 + 5m^2 - 3n^2 = 0$. **(11⅓)**

   (b) Let the edges of a rectangular parallelepiped be a, b and c. Show that the angles between the four diagonals are given by $\cos^{-1}\left(\dfrac{\pm a^2 \pm b^2 \pm c^2}{a^2 + b^2 + c^2}\right)$. **(12)**

6. (a) Determine whether the planes $x - 3y + 4z = 4$ and $5x + y - z = 4$ are orthogonal, parallel, or neither. Find the angle of intersection and the set of parametric equations for the line of intersection of the plane. **(15)**

   (b) If the product of distances of the point (1, 1, 1) from origin and the plane $x - y + z + k = 0$ be 5, find the value of k. **(8⅓)**

7. (a) Find the distance of a point (2, 3, 1) from the line y + z − 1 = 0 = 2x − 3y − 2z + 4. **(10)**

   (b) Find the shortest distance between the lines $\dfrac{x-3}{3} = \dfrac{y-8}{-1} = \dfrac{z-3}{1}$; $\dfrac{x+3}{-3} = \dfrac{y+7}{2} = \dfrac{z-6}{4}$. Find also the equations and the points in which it meets the given lines. **(13⅓)**

8. (a) Define great circle. Find the equation of the sphere for which the circle $3x^2 + 3y^2 + 3z^2 + 21y - 6z + 6 = 0$, $2x + 3y + 4z = 8$ is a great circle. **(13⅓)**

   (b) Find the equation of the tangent plane to the ellipsoid $9x^2 + 18y^2 + 27z^2 = 4$ at the point $(4/9, 2/9, 2/9)$ and prove that it touches the sphere $17(x^2 + y^2 + z^2) = 4$. **(10)**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   B. Arch. Examinations 2015-2016

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 **FIVE** questions in this Section. Answer any **FOUR** questions.

1. Discuss the origin and development of architectural research.   (17½)

2. Discuss the methods used in Urban Macro-ethnography.   (17½)

3. Briefly describe the habitat theory of culture and habitat research.   (17½)

4. Discuss the relationship between habitat research and architectural anthropology.   (17½)

5. Write notes on any two of the following: (17½)

   (a) Ethnology and Ethnography

   (b) The evolutionary theory of Architecture

   (c) Housing Research.

SECTION – B

There are **FIVE** questions in this Section. Answer any **FOUR** questions.

6. Define anthropology. Briefly discuss the main branches of anthropology.   (17½)

7. "Anthropologists try to study the full breadth of human existence, past and present" –

   Discuss.   (17½)

8. Discuss the differentiation between urbanism and sociological research.   (17½)

9. Describe the objective and subjective methods in anthropological research.   (17½)

10. Write short notes on any TWO of the following: (17½)

    (a) The usefulness of anthropology.

    (b) Urban anthropology.

    (c) Urban fieldwork.

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   B. Arch. Examinations 2015-2016

Sub : **ARCH 603** (Design in the tropics)

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 topics. (any TWO)   **(2×=20)**

   (a) The earth-sun relationship

   (b) PMV and PPD

   (c) Heat exchange mechanism of a human body.

2. What are the considerations of various levels of passive solar urban design, in the context of Bangladesh?   **(25)**

3. Differentiate between the climatic characteristics of warm-humid climate and hot-dry desert climate.   **(25)**

4. What are the heat exchanger processes of a building? What should be the design considerations of a building in Dhaka city to ensure appropriate heat exchange processes?   **(25)**

SECTION – B

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

5. Write short notes on any to from the following: **(10×2)**

   (a) Wind Catcher

   (b) Radiative Cooling

   (c) Thermal Inertia

6. What are the physiological objects for shelter design in warm-humid climate? Review 'form and planning' of shelters in the humid tropics with examples.   **(5+20)**

7. Briefly describe the environmental heat sinks. Illustrate with figure Heat sources and methods of preventing overheating.   **(10+15)**

8. Discuss control of heat gain in building in terms of: **(25)**

   (a) Microclimate and Site Design

   (b) Building Shape

   (c) Building Envelope

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2015-2016

Sub : **HUM 701** (Principles of Economics)

Full Marks : 140 Time : 3 Hours

The figures in the margin indicate full marks.

Symbols have their usual meaning.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. (a) What are the assumptions of a perfectly competitive market? Explain them. **(10)**

   (b) Graphically explain the short run equilibrium of a firm under perfect competition. **(13⅓)**

2. (a) Define fixed cost and variable cost. **(10)**

   (b) Complete the following table and sketch the graph explaining the relations among the various short run cost curves. **(13⅓)**

(1) Quantity of output	(2) Total fixed cost	(3) Total variable cost	(4) Total cost	(5) Average fixed cost	(6) Average variable cost	(7) Average total cost	(8) Marginal cost
1	80	30					
2	80	40					
3	80	45					
4	80	55					
5	80	75					
6	80	120					

3. (a) What do you understand by localization of industries? What are the causes of localization of industries? **(13⅓)**

   (b) Explain the advantages of localization of industries. **(10)**

4. (a) What do you understand by division of labour? Explain different types of division of labour. **(8⅓)**

   (b) What are the advantages and advantages of division of labour? Explain them. **(15)**

SECTION – B

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

5. (a) What do you know about the fundamental economic problems that every economy has to face? **(10)**

   (b) How these problems are solved with reference to the mixed economic system? **(6)**

   (c) What are the prerequisites for an effective demand in economics? Describe the exceptions to the law of demand. **(7⅓)**

HUM 701

6. (a) What do you understand by 'change in quantity supplied' and 'change in supply? **(5⅓)**

(b) Graphically explain the determination of equilibrium price and output of a commodity in the free market economy. **(8)**

(c) From the following demand and supply functions. **(10)**

$$Q_D = 1350 - 75Pz$$
$$Q_S = 680 + 25Pz$$

find the equilibrium price and quantity of the commodity Z. If Government provides a subsidy of Tk. 2.50 per unit, what will be the new equilibrium price and quantity?

7. (a) Define price elasticity and cross-price elasticity of demand. How would you derive the formulae for measuring these two types of elasticity of demand? **(10)**

(b) From the given table, calculate the cross elasticity of chicken when case A is considered to be the starting point. What are the implications of the results you have obtained. **(6)**

Cases	Price of Mutton	Amount of Chicken demand
A	Tk. 550	100 MT
B	Tk. 600	125 MT
C	Tk. 650	135 MT

(c) Describe the basic determinants of elasticity of demand in your own words. **(7⅓)**

8. (a) Evaluate the critique of the cardinal theory of utility analysis. **(6)**

(b) Clarify the concept of an indifference curve and present its properties. **(7⅓)**

(c) Illustrate the equilibrium of the consumer using indifference curve approach. **(10)**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   B. Arch. Examinations 2015-2016

Sub : **ARCH 601** (Ergonomics)

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) What are the fundamental measures to be considered in various lifting situation?   **(4)**

   (b) Describe the guidelines to reduce the discomfort level and enhance the working environment during the manual lifting position. (Use necessary sketches).   **(12⅓)**

   (c) Explain the steps to be considered to maintain the comfort level while pulling and pushing activity occurs.   **(7)**

2. (a) What are the general principles of ergonomics? Explain in detail the Biomechanical background in relation to the human body.   **(3+12)**

   (b) Describe the importance of anthropometric principle to the ergonomics.   **(8⅓)**

3. (a) Define the posture and draw the selection procedure for the best possible basic posture.   **(8⅓)**

   (b) State the advantages of sitting position. Describe the necessary steps to establish an effective sitting position.   **(10)**

   (c) What are the recommendations for improving the working environment while standing position over long period?   **(5)**

4. Write short notes (any two):   **(23⅓)**

   (a) Carrying posture

   (b) Ergonomics and its social significance

   (c) Change of posture

SECTION – B

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

5. (a) What are the five environmental factors that effect people's safety, health and comfort?   **(5)**

   (b) State the Guidelines on noise with necessary figure to address the ergonomical issues.   **(7)**

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Contd ... Q. No. 5

(c) Describe the fundamental measures to reduce the noise level at source through workplace design and work organization. **(11 ⅓)**

6. (a) Explain the necessary guidelines on light intensity for different tasks, activities and application. **(8)**

(b) Discuss the various steps to be taken to improve lighting condition in visual field (use necessary diagrams and sketches). **(15 ⅓)**

7. (a) What are the four climatic factors to be considered to improve the comfort level of indoor activities? Discuss in detail the measures to guide the thermal comfort. **(4+10)**

(b) How hot and cold weather affects over daily activities and describe the various means to improve the activity comfort. **(9 ⅓)**

8. Write short notes (any two): **(23 ⅓)**

(a) Hearing conversation

(b) Vibration in relation with whole body and hand-arm

(c) Characters as a tool in visual field

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   B. Arch. Examinations 2014-2015

Sub : **HUM 709** (Human Psychology and Environment)

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** questions.

1. (a) What are the different sub-fields of psychology?   **(6)**

   (b) What are the major approaches used by contemporary psychologists?   **(17⅓)**

2. (a) What do you mean by absolute and difference thresholds?   **(6)**

   (b) Discuss Gestalt Laws of perceptual organization.   **(17⅓)**

3. (a) Describe Maslow's hierarchy of needs approach to salvation.   **(6)**

   (b) What are the interval sources of frustration?   **(17⅓)**

4. (a) What are the types of emotion?   **(6)**

   (b) Describe main theories of emotion.   **(17⅓)**

SECTION – B

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

5. (a) Discuss main personality tests.   **(6)**

   (b) Discuss the "Big Five" model of personality.   **(17⅓)**

6. (a) What is IQ and how is it measured?   **(6)**

   (b) Describe the basic theoretical Orientation of intelligence.   **(17⅓)**

7. (a) What are the main Concepts of forgetting?   **(6)**

   (b) Describe the structures of memory.   **(17⅓)**

8. (a) What is learning?   **(6)**

   (b) Describe Pavlov's classical conditioning.   **(17⅓)**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   B. Arch. Examinations 2015-2016

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 **FIVE** questions in this Section. Answer Q. No. 1 and any **THREE** from the rest.

1. Mention the classification of visual Art with example.   **(25)**

2. Define sculpture and discuss the traditional means of making sculpture.   **(5+10)**

3. What are the functions and types of drawing? Discuss with example.   **(15)**

4. How do you appreciate and analyse visual Art? Explain with example.   **(15)**

5. What is Art and discuss the relevance of Art appreciation subject in architecture studies.   **(15)**

SECTION – B

There are **FIVE** questions in this Section. Answer Q. No. 6 and any **THREE** from the rest.

6. What is contemporary art? Write short notes on any FOUR of the followings"   **(6 ¼ ×4=25)**

    (a) Generative Art   (b) Environmental Art   (c) Interactive Art   (d) Bio Art

    (e) Computational Design.

7. Give s short account of the Modern Art Movement in Bengal.   **(15)**

8. 'They were dubbed "impressionist" by a critic who objected to the sketchy quality of

    their paining.' Who were they? Write short notes on their painting style.   **(15)**

9. Write short notes on any THREE of the following: **(5×3=15)**

    (a) Pointillism   (b) Neoclassicism   (c) Realism   (d) Post impressionism.

10. What is conceptual Art? Write short history and philosophy behind conceptual Art.   **(15)**