BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

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

Sub : **ARCH 141** (Art and Architecture I)

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 with illustrations on any two of the following topics: (10×2=20)

  (a) Huts and tents of savage and barbarian period

  (b) Stonehenge

  (c) Stairway Mastaba.

2. (a) Elaborate with illustrations the phase of development of stepped Pyramid of Zoser,
Sakkara.   (15)

  (b) What are the components of a Pyramid Complex? Briefly describe with necessary
drawings.   (10)

3. (a) Describe the different parts of an Egyptian cult temple with an appropriate example.   (15)

  (b) What in your opinion are the similarities of the 'Temple of Queen Hatshepsut' and the
'Great temple of Abu Simbel'. Use sketches.   (10)

4. (a) Briefly describe the city of Babylon with necessary drawings.   (15)

  (b) Describe the Ziggurat of Tchoga-Zanbil with sketches.   (10)

SECTION – B

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

5. Write short notes with illustrations on any two of the following topics: (10×2=20)

  (a) Doric order

  (b) The Acropolis

  (c) The Rotunda

6. (a) What are the principle features of 'Temple of Erechtheion'? Describe with illustrations.   (15)

  (b) Illustrate and annotate the Entablatures of all three Greek orders.   (10)

7. (a) Describe the Basilica and Eorum of Trajan with necessary sketches.   (15)

  (b) How a typical rectangular Roman Temple is different from a Greek one?   (10)

8. (a) Elaborate the Flavian Architecture with sketches.   (15)

  (b) What are the differences between a Greek Theatre and a Roman Theatre?   (10)

-8- -1-

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

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

Sub : **ARCH 151** (Design Theory I)

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. (a) What are the plastic elements designers use while expressing their ideas? **(5)**

    (b) Describe in detail the role of form, line and texture, in the process of design. **(20)**

2. (a) According to Francis D. K. Ching, what are the visual properties of form? Explain any

    three of them. **(8$\frac{1}{2}$)**

    (b) Explain how a field of space can be reinforced with horizontal planes. **(14)**

3. (a) "Variety should develop out of unity" – explain with necessary diagrams. **(12$\frac{1}{2}$)**

    (b) "Form follows function" – describe with examples. **(10)**

4. Write short notes **(3× 7$\frac{1}{2}$=22$\frac{1}{2}$)**

    (i) Primary shapes

    (ii) Colour

    (iii) Families of form

SECTION – B

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

5. Write short notes on: **(15×2)**

    (i) Balance

    (ii) Analogic Design

6. (a) According to Broadbent, what are the distinct ways that architects generally use, to

    generate three – dimensional form? **(8)**

    (b) Explain in detail both Iconic and Canonic design processes. **(12)**

7. Discuss the principles of design with diagrams. **(20)**

8. Discuss in detail, how a 'domain of acceptable response' acts within a design process. **(20)**

-2-

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

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

Sub : **HUM 211** (Sociology)

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) Explain the steps of social research with an appropriate example. $(13\frac{1}{3})$

    (b) What is sociological imagination? Point out the steps of developing sociological imagination and cite example from your own society.   **(10)**

2. (a) Describe 'World System Theory' from the context of peripheral countries. $(13\frac{1}{3})$

    (b) Discuss 'Slavery', 'Caste' and 'Social Class' as the ideal type of social stratification.   **(10)**

3. (a) Discuss 'ethnocentrism' and 'cultural lag' as the elements of culture.   **(10)**

    (b) Define socialization. Describe the agents of socialization in a society. $(13\frac{1}{3})$

4. Write short notes on any <u>THREE</u> of the following: $(23\frac{1}{3})$

    (a) Deviance
    (b) Victimless crime
    (c) Juvenile delinquency
    (d) Cultural retreatism

SECTION – B

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

5. (a) What do you understand by urbanization and urbanism?   **(4)**

    (b) Briefly discuss the relationship between physical environment and social development. $(12\frac{1}{3})$

    (c) Discuss the classification of cities with examples, according to urban sociologists.   **(7)**

6. (a) What do you understand by globalization? Briefly discuss the social impacts of globalization.   **(10)**

    (b) What do you know about industrial revolution and capitalism? Write down the important characteristics of capitalism. $(13\frac{1}{3})$

HUM 211 (ARCH)

7. (a) What is meant by human migration? Briefly discuss Lee's theory of migration. **(10⅓)**

(b) What are the socio-economic factors that influence population growth? **(8)**

(c) Discuss the major pollution issues in Dhaka city. **(5)**

8. Write short notes on any <u>THREE</u> of the following: **(23⅓)**

    (a) Demographic Transition theory

    (b) Consequences of global warming

    (c) Growth of cities

    (d) Consequence of industrial revolution

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

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

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**.

1. (a) What are Lissajous' figures? Deduce the resultant vibration of a particle influenced by two mutually perpendicular simple harmonic vibrations, having equal time period but differing in amplitude and phase.   **(15)**

    (b) Define damped oscillation. Derive the differential equation of damped oscillatory motion and find its general solution. Write down the conditions of (i) Under-damped (ii) Over-damped and (iii) Critically-damped oscillations.   **(20)**

2. (a) Derive the differential equation of wave motion.   **(7)**

    (b) Find the expression of total energy per unit volume of a plane progressive wave.   **(14)**

    (c) Show that the antinodes are equidistant and separated by $\lambda/2$ for stationary waves.   **(14)**

3. (a) Define reverberation and reverberation time. In a good auditorium why it is necessary to keep the reverberation time negligibly small and on what factors reverberation time depends?   **(12)**

    (b) What is Doppler effect in sound? Obtain an expression for the apparent frequency of the sound wave heard by an observer, when the source moves towards the observer, and the observer moves away from the source.   **(18)**

    (c) Two trains A and B are approaching each other with a speed of 300 km/hr. If the frequency of whistle emitted by train A is 1000 Hz, calculate the apparent pitch of the whistle as heard by the passengers of train B. Velocity of sound in air = 350 m/s.   **(5)**

4. (a) Mention some important conditions for interference of light.   **(8)**

    (b) Explain how interference fringes are formed by a thin uniform film due to reflected and transmitted light.   **(20)**

    (c) In Young's double slit experiment, the separation between slits is 1.9 mm and the fringe spacing is 0.31 mm at a distance of 1 m from the slits. Calculate the wavelength of light used.   **(7)**

SECTION – B

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

5. (a) What do you mean by polarization of light? Explain dichroism.   **(10)**

    (b) State and explain Brewster's law. Explain how Nicol prism can work as a polarizer.   **(20)**

- 4 - 5 -

PHY 115

Contd … Q. No. 5

(c) Calculate the thickness of a calcite plate (quarter-wave plate) which would convert plane polarized light into circularly polarized light. **(5)**

[Given $\mu_0 = 1.658$, $\mu_e = 1.486$ and $\lambda = 5890\text{Å}$]

6. (a) Explain phosphorescence and fluroscence. **(8)**

(b) Describe Fraunhofer diffraction by a single slit in details. Obtain the conditions for maxima and minima. **(20)**

(c) The distance between the slit and biprism and between the biprism and eyepiece are 45 cm each. The obtuse angle of biprism is 178° and refractive index of the material of the biprism is 1.5. If the fringe separation is 15.6×10^{-3} cm, find the wavelength of light used. **(7)**

7. (a) Mention some of the properties of materials which are used for the measurement of temperature. **(3)**

(b) Briefly describe the principle, construction and working of a platinum resistance thermometer. **(10)**

(c) Show that the temperature difference between the gas scale thermometer t and resistance scale thermometer t_p for a platinum resistance thermometer is given by **(12)**

$$t - t_p = \delta\left[\left(\frac{t}{100}\right)^2 - \frac{t}{100}\right]$$

where $\delta = -\dfrac{\beta(100)^2}{\alpha + 100\beta}$, α and β are constants which depend on the nature of the material

of wire, and $t_p = \dfrac{R_t - R_o}{R_{100} - R_o} \times 100$, where the other symbols have their usual meanings.

(d) The values of the resistance of a platinum resistance thermometer are 2.585 ohms and 3.510 ohms at 0°C and 100°C respectively. When placed in a hot bath, the resistance found to be 9.098 ohms. Calculate the temperature of the hot bath on the gas scale. Assume $\delta = 1.5$ for platinum. **(10)**

8. (a) Write short notes on: **(15)**
    (i) Thermal conductivity
    (ii) Thermometric diffusivity
    (iii) Thermal radiation

(b) What is quantum theory of radiation? Show that Planck's law for the energy density of blackbody radiation in the frequency interval v to $v + dv$ at an absolute temperature T is

given by $E_v\, dv = \dfrac{8\pi h}{c^3} \dfrac{v^3}{\left(e^{\frac{hv}{kT}} - 1\right)}\, dv$, where the symbols have their usual meanings. **(15)**

(c) Show that Wien's formula is a particular case of Planck's formula. **(5)**

MATH-111

L-1/T-1/ARCH

Date : 06/12/2014

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

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

Sub : **MATH 111** (Calculus and Solid Geometry)

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) Given that the function *f(x)* defined as   (12

$$f(x) = \begin{cases} 1 & ; & -\infty < x < 0 \\ 1 + \sin x & ; & 0 \le x < \frac{\pi}{2} \\ 2 + \left(x - \frac{\pi}{2}\right)^2 & ; & \frac{\pi}{2} \le x < \infty \end{cases}$$

Discuss the continuity and differentiability of f(x) at x = 0 and x = $\frac{\pi}{2}$.

(b) Find the nth derivative of the function $f(x) = \log(ax + b)$.   (11⅓

2. (a) If $y = \exp(m \sin^{-1} x)$, prove that $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - (n^2 + m^2)y_n = 0$.   (12

(b) Discuss the maximum and minimum values of the function $f(x) = \dfrac{x^2 - 7x + 6}{x - 10}$.   (11⅓

3. Work out the following:

(a) $\int \dfrac{\log(x + 1)}{\sqrt{x + 1}} dx$ (5

(b) $\int \dfrac{x^5}{\sqrt{1 + x^2}} dx$ (6

(c) $\int \dfrac{1}{(5 + 4x)^2} dx$ (6

(d) $\int \dfrac{1}{\sin x + \sin 2x} dx$ (6½

4. (a) Evaluate the following integrals: (6+6=1)

(i) $\displaystyle\int_0^{\frac{\pi}{2}} \dfrac{\sin^2 x}{1 + \sin x \cos x} dx$ (ii) $\displaystyle\int_0^{\frac{\pi}{2}} x \cos^6 x \, dx$

(b) Find the entire area enclosed by the curve $a^2 y^2 = a^2 x^2 - x^4$.   (11½

-7-

8

MATH 111/ARCH

SECTION – B

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

5. (a) If the edges of a rectangular parallelopiped are a, b, c show that the angles between

the four diagonals are given by $\cos^{-1}\left(\dfrac{\pm a^2 \pm b^2 \pm c^2}{a^2 + b^2 + c^2}\right)$. $(12\frac{1}{3})$

(b) Find the angle between the two lines whose direction cosines are given by the

equations $l + m + n = 0$, $l^2 + m^2 - n^2 = 0$. **(11)**

6. (a) Find the distance of the point $(1, -2, 3)$ from the plane $x - y + z = 5$ measured parallel

to the line $\dfrac{x}{2} = \dfrac{y}{3} = \dfrac{z}{-6}$. **(11)**

(b) Find the magnitude and the equation of the line of shortest distance between the two

lines $\dfrac{x-3}{2} = \dfrac{y+15}{-7} = \dfrac{z-9}{5}$; $\dfrac{x+1}{2} = \dfrac{y-1}{1} = \dfrac{z-9}{-3}$. $(12\frac{1}{3})$

7. (a) Find the equation of the plane through the intersection of the plane $x - 2y + z - 6 = 0$

and $2x + y - 2z - 3 = 0$, which is also perpendicular to the plane $3x + 4y - 3z - 5 = 0$. **(11)**

(b) The axes are rectangular and a point P moves on the fixed plane $\dfrac{x}{a} + \dfrac{y}{b} + \dfrac{z}{c} = 1$. The

plane through P perpendicular to OP meets the axes in A, B, C. The planes through A, B,

C parallel to YOZ, ZOX, XOY intersect in Q. Show that the locus of Q is $(12\frac{1}{3})$

$$\frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} = \frac{1}{ax} + \frac{1}{by} + \frac{1}{cz}$$

8. (a) Find the equation of the sphere which passes through the circle $x^2 + y^2 + z^2 - 2x + 4y$

$- 10z + 5 = 0$, $3x + 2y - z - 7 = 0$ and the centre of the sphere $x^2 + y^2 + z^2 + 4x - 2y -$

$2z - 3 = 0$. **(11)**

(b) Find the equation of the tangent planes to the sphere $x^2 + y^2 + z^2 - 6x - 4y + 2z + 5 = 0$,

which are parallel to the plane $2x - y - 2z + 1 = 0$ and also find the coordinates of the

points of contact. $(12\frac{1}{3})$