L-1/T-1/ARCH **Date : 12/07/2011**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2009-2010

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

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 any three (03) of the following: **(3×30)**
   (a) Design and culture.
   (b) Related colour schemes.
   (c) Variety within unity in design.
   (d) Interrelation of elements of design.

2. Briefly describe the ways of arriving at unity in design. Use masterpieces of art and architecture as examples for your answer. **(20)**

3. Describe the effects of kue, value and intensity with reference to art and architecture. **(20)**

4. Discuss continuing and Balance as two major principles of design. **(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 Two (02) of the following with proper examples: **(20)**
   (a) Pragmatic Design
   (b) Canonic Design
   (c) Craft Evaluation

6. Describe the reasons why 'Design by Drawing' prevails as the most preferred way designing in the modern world. **(20)**

7. Discuss the six determinants of architectural form as proposed by architect Paul Rudolf. **(20)**

8. Explain with neat sketches the significance of Axis and symmetry as ordering principles of design. **(20)**

L-1/T-1/ARCH **Date : 01/08/2011**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2010-2011

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 (2) of the following topics: **(10×2=20)**
   (a) Ziggurats of Ur Nammu
   (b) Stonehenge
   (c) Temple of Abu-Simbel

2. (a) Illustrate with sketches of Great Pyramid of Cheops, Gizeh. **(8)**
   (b) Describe the great temple of AMMON, Karnak at Thebes with illustrations. **(17)**

3. (a) Describe basic characteristics of "Palace of Persepolis". **(8)**
   (b) Describe the city of "Babylon" with illustrations. **(17)**

4. (a) What are the main characteristics of Mesopotamian Architecture? **(8)**
   (b) Describe the Assyrian Palace at Khorsabad. **(17)**

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 (02) of the following topics (with illustration): **(10×2=20)**
   (a) Agora
   (b) Parthenon
   (c) Roman Forum

6. (a) Describe characteristics of Aegean Architecture. **(10)**
   (b) Describe the Doric order with illustration. **(15)**

7. (a) Name the principal types of public building built by the Romans. **(7)**
   (b) Describe 'Pantheon' with illustrations. **(18)**

8. (a) Write down the basic features of Basilica of Trazan. **(7)**
   (b) Describe and illustrate Roman Colosseum. **(18)**

L-1/T-1/ARCH **Date : 27/06/2011**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2010-2011

Sub : **PHY 115** (Physics of Architects)

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) Define Simple Harmonic Motion. Establish the differential equation of Simple Harmonic Motion and solve it to obtain expression for the displacement of a particle executing Simple Harmonic Motion. **(15)**

   (b) Show that the average values of kinetic energy and potential energy of a particle executing Simple Harmonic motion over a complete cycle are same and is equal to $\frac{1}{4} m\omega^2 a^2$, where the symbols have their usual meanings. **(10)**

   (c) The simple harmonic motion of a body of mass 10 kg is represented by $x = 15 \sin (15t - \frac{\pi}{4})$, where x is measured in meters, t in seconds and the phase angle in radians. Calculate time period, maximum velocity, maximum acceleration, average kinetic energy. At what time velocity is maximum? **(10)**

2. (a) What is Interference of sound? What are the conditions for interference of sound waves? **(8)**

   (b) What are beats? Discuss analytically the formation of beats and show that the number of beats per second is equal to the difference in frequency of the two beats. **(20)**

   (c) Calculate the velocity of sound in a gas in which two waves of lengths 1.04 meter and 1.05 meter produces 13 beats in 4.2 sec. **(7)**

3. (a) State and explain Doppler's effect in sound. Derive an expression for the apparent frequency when both the source of sound and the observer are in motion. Consider two possible cases of motion of the source and the observer. **(20)**

   (b) Discuss the applications of Doppler's effect of sound. **(7)**

   (c) Two trains travelling in opposite directions at 105 km/hr each, crossing each other while one of them is whistling. If the frequency is 805 Hz, find the apparent pitch as heard by an observer in the other train : **(8)**

   (i) Before the trains cross each other.

   (ii) After the trains have crossed each other.

   Velocity of sound in air = 340 m/sec.

Contd P/2

PHY 115

4. (a) State and prove Stefan-Boltzmann's law of radiation. Show that Newton's law of cooling follows from Stefan-Boltzmann's law. **(20)**

   (b) Define solar constant. Describe a method for experimental determination of solar constant. **(10)**

   (c) Use Stefan's law to calculate the rate at which energy is reaching the top of the earth's atmosphere. Assume, the temperature of sun is 5800 K, radius of sun is 7×10^8 m, distance of the earth's atmosphere from sun is 1.5×10^{11} m and Stefan's constant $\sigma = 5.67 \times 10^{-8}$ SI unit. **(5)**

SECTION – B

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

5. (a) Define relative humidity. Discuss the importance of determining relative humidity. Show that relative humidity $= \frac{f}{F} \times 100\%$, where the symbols have their usual meaning. **(14)**

   (b) Describe a wet and dry bulb hygrometer. How would you determine the relative humidity by this apparatus? **(14)**

   (c) A hot day in Chittagong causes greater discomfort than an equal hot day in Dhaka. Why? The dew point on a certain day was 12°C while actual temperature was 16°C. If the saturated aqueous vapour pressure at 12°C and 16°C be 1.064 cm and 1.364 cm of mercury respectively, find the relative humidity. **(7)**

6. (a) Define and explain the coefficient of thermal conductivity. Discuss heat flow through a compound wall. **(15)**

   (b) Describe Lees and Chorlton's method of determining the thermal conductivity of a bad conductor. Develop the formula you would use. **(15)**

   (c) Heat is conducted through a slab of two slices of different materials of thermal conductivities 0.3 and 0.45 respectively. The thickness of each slice is 2 cm. If the temperature of the two outer surfaces are 100°C and 0°C, find the temperature of the interface. **(5)**

7. (a) What do you mean by 'interference of light'? Discuss interference of light analytically and obtain the conditions for maximum and minimum intensities. **(20)**

   (b) Consider a point P such that path difference, $S_2P - S_1P = \frac{\lambda}{3}$. Find the ratio of the intensity at the point P to that of maximum. **(8)**

   (c) Explain the Lambert's law. **(7)**

8. (a) What is diffraction of light? Derive an expression for the intensity distribution due to Fraunhofer diffraction by single slit. **(15)**

   (b) State and prove Brewster's law. **(10)**

   (c) Explain the Malus' law. How will you orient the polarizer and the analyzer so that a beam of natural light is reduced to 0.5 of its original intensity? **(10)**

L-1/T-1/ARCH **Date : 19/07/2011**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Arch. Examinations 2010-2011

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

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**.

Symbols have their usual meaning.

1. (a) A function $f(x)$ is defined as follows: **(14)**

$$f(x)=\begin{cases} -x & , \ -2 \le x \le 0 \\ x & , \ 0 < x < 1 \\ 3-x & , \ 1 \le x \le 2 \end{cases}$$

Discuss the continuity and differentiability of $f(x)$ at x = 0 and x = 1. Also sketch the graph of $f(x)$.

(b) If $y=\frac{1}{x^2+a^2}$, find y_n. **(9⅓)**

2. (a) If $v=\left(x^2+y^2+z^2\right)^{-\frac{1}{2}}$, show that $x\frac{\partial v}{\partial x}+y\frac{\partial v}{\partial y}+z\frac{\partial v}{\partial z}=-v$. **(8⅓)**

(b) Suppose $f(x)=x^3-3x^2+1$. Use first and second derivatives of $f(x)$ to determine the intervals on which $f(x)$ is increasing, decreasing, concave up, concave down. Locate all inflection points and confirm that your conclusions are consistent with the graph. **(15)**

3. Evaluate the following:

(a) $\int\frac{2x+3}{\sqrt{5x^2+x+1}}dx$ **(7)**

(b) $\int\frac{1}{(3x+7)\sqrt{10x+9}}dx$ **(7)**

(c) $\int\frac{x\sin^{-1}x}{\sqrt{1-x^2}}dx$ **(9⅓)**

4. (a) Prove that $\int_0^{\pi}\frac{xdx}{a^2\cos^2x+b^2\sin^2x}=\frac{\pi^2}{2ab}$. **(10)**

(b) Find the area common to the two curves $y^2=x$ and $x^2+y^2=4x$. **(13⅓)**

Contd P/2

MATH 111

SECTION – B

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

5. (a) A line makes angles $\alpha, \beta, \gamma, \delta$ with the four diagonals of a cube. **(12⅓)**

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

(b) The direction cosines of two lines are connected by the relations: **(11)**

$l - 5m + 3n = 0$ and $7l^2 + 5m^2 - 3n^2 = 0$.

Find them. Also find the angle between the lines.

6. (a) Find the equation of the plane through the intersection of the planes $x + 3y + 6 = 0$ and $3x - y - 4z = 0$, whose perpendicular distance from the origin is unity. **(11)**

(b) A variable plane at a constant distance p from the origin meets the axes in A, B, C. Through A, B, C planes are drawn parallel to the coordinate planes. Show that the locus of their point of intersection is: **(12⅓)**

$x^{-2} + y^{-2} + z^{-2} = p^{-2}$.

7. (a) Show that the lines $\frac{x+1}{-3} = \frac{y-3}{2} = z + 2$ and $x = \frac{y-7}{-3} = \frac{z+7}{2}$ intersect. Find the coordinates of the point of intersection and the equation to the plane containing them. **(11)**

(b) Find the shortest distance between the lines **(12⅓)**

$\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$ and $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$.

Find also its equation and the points where it intersects the lines.

8. (a) Find the equation of a sphere for which the circle **(11)**

$x^2 + y^2 + z^2 + 2x - 3y + z + 1 = 0, x - y + 3z = 4$ is a great circle.

(b) If $2r$ is the distance between two parallel tangent planes to the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$, prove that a line through the origin perpendicular to the planes lies on the cone $x^2(a^2 - r^2) + y^2(b^2 - r^2) + z^2(c^2 - r^2) = 0$. **(12⅓)**

L-1/T-1/ARCH **Date : 19/07/2011**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. ARCH. Examinations 2010-2011

Sub : **ARCH 597** (Educational Facilities Planning and Design)

Full Marks: 140 Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

The questions are of equal value.

1. Briefly describe the historical overview of planning school facilities from Helenistic Period to Post-Civil War Period.

2. Discuss in short the educational organizations in Bangladesh.

3. Write short notes on:
   (a) Open Plan School Design.
   (b) Vocational Training in Bangladesh.

4. Discuss the general lighting system of a classroom in the context of Bangladesh.

SECTION – B

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

The figures in the margin indicate full marks.

5. What is the aim of the development of 'Modular Coordination'? Discuss the types of dimension practiced in school design. **(20)**

6. Write in short the historical development of education in Bangladesh during 19th and 20th centuries. **(25)**

7. How can a Secondary School be economized through design solution? **(25)**

8. What are the Elements of flexibility in School design? Describe the Criteria for flexible School design. **(25)**
