L-1/T-1/ARCH **Date : 04/09/2018**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B.Arch. Examinations 2017-2018

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

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 **Q. No. 1** and any **TWO** from the rest.

1. Write short notes on any two of the following: **(10×2=20)**
   (a) Catal Hüyük
   (b) Nabta Playa
   (c) Great Bath of Mohenjo Daro.

2. (a) Describe the evolution of 'Mastaba' with necessary sketches. **(15)**
   (b) Why 'Bent Pyramid' is significant in the development of the true pyramid. **(10)**

3. (a) What were the contextual characteristics that the large cities of 'Indus-Ghaggar-Hakra' region adopted to live with flood. **(15)**
   (b) Describe the salient features of the 'Ziggurat at Ur' with illustrations. **(10)**

4. (a) Elucidate the characteristics of the huts and town centers located at Banpo, China, during 4500 BCE. (Use sketches). **(15)**
   (b) With necessary drawings, describe the 'Temple of Uruk'. **(10)**

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 the following - **(10×2=20)**
   (a) Manikarnika ghat, Varanasi
   (b) Temple of Solomon
   (c) Wangchen plan

6. (a) Describe the different parts of an Egyptian cult temple using an appropriate example. **(15)**
   (b) Briefly describe the salient features of the city of Babylon with illustrations. **(10)**

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7. (a) Compare between the Mycenaean palace at Pylos and Minoan palace at Knossos. **(15)**

   (b) Describe the attributes of 'Treasury of Atreus' with sketches. **(10)**

8. (a) With illustrations, describe the "Palace complex at Persepolis." **(15)**

   (b) 'Height and verticality emphasized the ruler's authority during the warring states period in China'- Elaborate with example. **(10)**

L-1/T-1/ARCH **Date : 15/09/2018**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B.Arch. Examinations 2017-2018

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

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 **Q. No. 1** and any **TWO** from the rest.

1. Write short notes on the following: **(3×10=30)**
   (a) Varity in Unity
   (b) Balance and Harmony
   (c) Hierarchy and Unity

2. Explain Tactile texture and visual texture. Give example of different type of textures depending on physical properties. Describe the effect and use of texture in the field of Art and Architecture. **(6+6+8=20)**

3. Illustrate with sketches, the inherent character of these forms. **(10+10=20)**
   (a) Cube and Rectangle
   (b) Sphere and Cylinder

4. (a) Investigate 'Line' as an element of visual art. Describe with sketches the use of line in the realm of Art and Architecture. **(20)**

SECTION-B

There are **FOUR** questions in this section. Answer **Q. No. 8** and any **TWO** from the rest.

5. What are the types of Additive form? Describe them with necessary sketches. **(20)**

6. How 'L-shaped plane' and 'U-shaped plane' as vertical space defining elements define spaces? **(20)**

7. Discuss 'Point' and 'Line' as primary elements in Architecture with examples and sketches. **(20)**

8. Write short notes on the following: **(15×2=30)**
   (a) Material proportion
   (b) Platonic solid

L-1/T-1/ARCH **Date: 19/09/2018**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

B.Arch. Examinations 2017-2018

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

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) A function $f(x)$ is defined in the way: $f(x)=\begin{cases} x^2, & 0<x<1 \\ x, & 1\le x<2 \\ \frac{1}{4}x^2, & 2\le x<3 \end{cases}$. Discuss the continuity and differentiability of $f(x)$ at $x=2$. Also sketch the graph of $f(x)$. **(12)**

   (b) Differentiate n times of the function $y=e^{a\sin^{-1}x}$ for $x=0$. **(11 1/3)**

2. (a) State and prove Euler's theorem on homogeneous function. If $u=\tan^{-1}\frac{x^2+y^2}{x-y}$, then show that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=\sin 2u$. **(12)**

   (b) Write the conditions of a function having maximum or minimum values. Show that the maximum triangle which can be inscribed in a circle is equilateral. **(11 1/3)**

3. Integrate the following:

   (i) $\int(3x-2)\sqrt{x^2-x+1}\,dx$ **(12)**

   (ii) $\int\frac{dx}{a\sin x+b\cos x}$ **(11 1/3)**

4. (a) Evaluate $\lim_{n\to\infty}\left[\frac{1}{\sqrt{n^2-1^2}}+\frac{1}{\sqrt{n^2-2^2}}+\frac{1}{\sqrt{n^2-3^2}}+.....+\frac{1}{\sqrt{2n-1}}\right]$. **(12)**

   (b) Find the area of a loop of curve $x(x^2+y^2)=a(x^2-y^2)$ and that bounced by its asymptote. **(11 1/3)**

Contd P/2

MATH 111/ARCH

SECTION – B

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

5. (a) Suppose that a box has its faces parallel to the coordinate planes and the points (4,2, -2) and (-6, 1, 1) are endpoints of a diagonal. Sketch the box and give the coordinates of the remaining six corners. **(10 1/3)**

(b) Prove that the straight lines whose direction cosines are given by the relations **(13)**

$al+bm+cn=0$ and $ul^2+vm^2+wn^2=0$ are perpendicular if

$a^2(v+w)+b^2(w+u)+c^2(u+v)=0$ and parallel if $\frac{a^2}{u}+\frac{b^2}{v}+\frac{c^2}{w}=0.$

6. (a) Find the equation of the plane through the points (1,-2,2), (-3,1,-2) and perpendicular to the plane 2x + y – z + 6 = 0. **(11)**

(b) Show that the lines $\frac{x-5}{4}=\frac{y-7}{4}=\frac{z+3}{-5}$ and $\frac{x-8}{7}=\frac{y-4}{1}=\frac{z-5}{3}$ are coplanar, find their common point and the equation of the plane in which they lie. **(12 1/3)**

7. (a) Find an equation for the line of intersection of the palnes 2x – 4y + 4z = 6 and 6x + 2y – 3z = 4. **(10)**

(b) Find the length of the shortest distance between the lines **(13 1/3)**

$\frac{x-3}{1}=\frac{y-5}{-2}=\frac{z-7}{1}$ and $\frac{x+1}{7}=\frac{y+1}{-6}=\frac{z+1}{1}$. Find also its equation and the point where it intersect the lines.

8. (a) Find the equation of the sphere which passes through the circle **(11 1/3)**

$x^2+y^2+z^2=5, x+2y+3z=3$ and touches the plane $4x+3y=15$.

(b) Find the point of intersection of the line $\frac{x-\alpha}{l}=\frac{y-\beta}{m}=\frac{z-\gamma}{n}=r$ with the conicoid $ax^2+by^2+cz^2=1$ and find the condition that the line will touch the conicoid. **(12)**

L-1/T-1/ARCH **Date : 25/09/2018**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B.Arch. Examinations 2017-2018

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

Full Marks: 210 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) Explain the terms absolute humidity, relative humidity and dew point. **(9)**

   (b) What is hygrometer? Describe (i) wet and dry bulb hygrometer and (iii) Hair hygrometer. **(17)**

   (c) The temperature of air of a class room is $25^\circ C$ contains $0.015\ gm$ of water vapor per liter. Calculate the relative humidity. Given, the saturated vapor pressure of water at $25^\circ C$ is $2\ cm\ of\ mercury$ and the mass of one liter of steam at $100^\circ C$ and $76\ cm\ of\ mercury$ pressure is $0.7\ gm$. **(9)**

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

   (b) Derive an expression of thermal conductivity for a good conductor using Searle's method with a suitable diagram. **(17)**

   (c) A block is made of two different materials of thickness $1\ cm$ and $2\ cm$, respectively. The thermal conductivities of first and second layers are 0.03 and 0.04 SI units, respectively. If the temperatures of two outer layers are $373\ K$ and $273K$, calculate the temperature gradient of the first layer. **(9)**

3. (a) Define the terms black body, Fery's black body and emissive power. **(9)**

   (b) State and prove Stefan-Boltzmann law of radiation. **(17)**

   (c) Derive Newton's law of cooling from Stefan-Boltzmann law of radiation. **(9)**

4. (a) What do you mean by diffraction of light? Distinguish between the Fraunhofer and Fresnel diffraction. **(7)**

   (b) Describe Fraunhofer diffraction due to double-slit and deduce the position of maxima and minima. **(20)**

   (c) In double-slit Fraunhofer diffraction pattern the screen is placed $170\ cm$ apart from the slits. The width of each slit is $0.08\ mm$ and they are $0.4\ mm$ apart. Calculate the wavelength of light if the fringe width is $0.25\ cm$. Also find the missing order. **(8)**

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SECTION-B

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

5. (a) What are the coherent sources of light? State the essential conditions for observing the phenomenon of interference of light. **(7)**

(b) Discuss the formation of interference fringes in wedge-shaped thin film. Find the expression for the fringe width in case of normal incidence. **(20)**

(c) Interference fringes are produced by monochromatic light falling normally on a wedge-shaped film whose refractive index is 1.4. The angle of the wedge is 20″ and the distance between two successive fringes is 0.25 cm. Calculate the wavelength of light. **(8)**

6. (a) Define illumination at a point on a surface and explain the laws of illumination. What is the difference between the brightness of a surface and the intensity of illumination on the surface? **(10)**

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

(c) The reflected light is found to be completely plane polarized when sunlight falls on the surface of water at an angle of incidence of 53°. Find the angle of refraction and the refractive index of water. **(10)**

7. (a) Briefly describe forced and damped oscillations. What are Lissajous' figures? **(10)**

(b) Derive an expression for the total energy of a particle executing simple harmonic motion. **(16)**

(c) The equation of a progressive wave is given by $y = 10 \sin(0.5x - 200t)$, where x and y are in cm and t is in seconds. Calculate the amplitude, frequency and velocity of the wave. **(9)**

8. (a) What do you mean by beat? Explain the architectural acoustics of a room. **(10)**

(b) Discuss analytically the interference of sound waves, and obtain the conditions for maximum and minimum intensities. **(15)**

(c) The volume of a room is 980 m^3. The wall area of the room is 150 m^2, the floor area is 90 m^2 and the ceiling area is 95 m^2. Given that the average sound absorption coefficient, for the walls is 0.03; for the ceiling is 0.80, and for the floor is 0.06. Calculate the average sound absorption coefficient and the reverberation time. **(10)**
