Khulna University of Engineering and Technology

Department of Architecture

B.Arch 1st Year 1st Term Regular Examination, 2018

Math-1125 Mathematics

Full Marks : 210 Time : 3 Hours

N.B i) Answer any three questions from each section in separate script.

ii) Figures in the right margin indicate full marks.

Section A

1 (a)	Find the cylindrical and spherical polar coordinates for the point (-6,-2,1).	11
1 (b)	Define direction cosines. If l, m, n are the direction cosines of a straight line, then prove that $l^2 + m^2 + n^2 = 1$.	13
1 (c)	Show that the straight line joining the point (1, 2, 3) and (3, -2, 5) is divided internally by the point (9/5, 2/5, 19/5) in the ratio 2 : 3.	11
2 (a)	Find direction cosines of the two lines which are connected by the two relations $2l + 2m - n = 0$ and $lm + mn + nl = 0$. Also show that the lines are perpendicular to each other.	12
2 (b)	Find the equation of the plane passes through the origin and perpendicular to the line joining the points (3, -2, -3) and (-3, -7, 1).	11
2 (c)	If the coordinates of A and B are (6, 2, -3) and (-2, -1, 3) respectively and "O" is the origin, then find the angle between OA and OB. Also find the angle between OA and the x-axis.	12
3 (a)	Find the coordinates of the point where the line, $\frac{x-2}{-1} = \frac{y+3}{1} = \frac{z-1}{6}$ cuts the plane, $2x + y + z - 7 = 0$.	12
3 (b)	Find the equation of a plane passing through the line of intersection of the planes $x - 2y + 3z + 4 = 0$ and $2x - 3y + 4z - 1 = 0$ and is perpendicular to the plane $3x - y + 2z - 1 = 0$.	12
3 (c)	Find the perpendicular distance of the point (-2, 3, 4) from the straight line through the point (-1, 3, 2) whose direction ratios are 12, 3, -4.	11
4 (a)	Find the length and equation of the shortest distance between two skew-lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$.	13
4 (b)	Find the centre and radius of the sphere $x^2 + y^2 + z^2 + 2x - 4y + 8z + 10 = 0$. Also find the tangent plane of this sphere at (0,1,-1)	12
4 (c)	Find the equation of the sphere whose centre at the origin and it touches the plane $2x + 3y - z + 14 = 0$.	10

Section B

5 (a) Define limit of a function. A function $f(x)$ is defined as $f(x) = \frac{x^2-9}{x-3}$. Does $f(3)$ exist ? Discuss about the limit of this function at $x = 3$. 10

5 (b) A function $f(x)$ is given by 13

$$f(x) = \begin{cases} 2x-1 & when\ x \geq 3 \\ 5 & when\ -2 \leq x < 3 \\ 1-2x & when\ x < -2 \end{cases}$$

Discuss the continuity and differentiability of $f(x)$ at $x = -2$.

5 (c) Differentiate : 12

(i) $\tan^{-1}(\frac{\sqrt{1+x^2}-1}{x})$ w.r.to $\tan^{-1} x$ (ii) $\log_{10} x$ w. r. to x^5.

6 (a) State Leibnitz's Theorem. If $y = \sin(m\cos^{-1} x)$ then show that 13
$(1-x^2)y_{n+2} - (2n+1)xy_{n+1} + (m^2-n^2)y_n = 0$.

6 (b) Define maximum of a function. Show that $x^3 + 9x^2 + 30x + 2$ is neither a maximum nor a minimum . 12

6 (c) If $u = \log_e(x^3 + y^3 + z^3 - 3xyz)$, then find the value of $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$. 10

7. Integrate any three of the followings **35**

(a) $\int \frac{(2x+5)}{\sqrt{(x^2-2x+2)}}\,dx$

(b) $\int \frac{2\sin x + 3\cos x}{7\sin x - 2\cos x}\,dx$

(c) $\int x\sin^2 x\,dx$

(d) $\int \frac{dx}{(x-1)\sqrt{(x^2+1)}}$

8. (a) Evaluate any two of the followings 22

(i) $\int_0^{\pi/2} \frac{\sqrt{\cot x}}{1+\sqrt{\cot x}}\,dx$

(ii) $\int_0^{\pi} \frac{dx}{\cos x + 2\sin x + 3}$

(iii) $\int_0^{\log 2} \frac{e^x}{1+e^x}\,dx$

8 (b) Show that the area between the parabola $y^2 = 4x$ and the straight line $y = 2x - 4$ is 9 . 13

Khulna University of Engineering and Technology

Department of Architecture

B.Arch 1st Year 1st Term Regular Examination, 2018

Course no: Phy 1125 Course title: Physics

Full Marks: 210 Time: 3 Hours

N.B i) Answer any three questions from each section in separate script.

ii) Figures in the right margin indicate full marks.

Section-A

Question-01

a) Establish the differential equation of simple harmonic motion and solve it to obtain an expression for the displacement. 13

b) Show that the energy of a plane progressive wave is given by $E = 2\pi^2 \rho\gamma^2 \alpha^2$, where the terms have their usual meanings. 12

c) A source of sound has amplitude of 0.24cm and a frequency if 525Hz. If the velocity of sound in air is 332 m/s and the density of air is 0.00129gm/cm^3. What is the rate of flow of energy per square cm? 10

Question-02

a) Show that there is no transfer of energy across any section of the medium in case of a stationary wave. 10

b) What is Doppler's effect in sound? Obtain an expression for the apparent frequency of a note when the source and listener are, (i) Moving towards each other. (ii) Moving away from each other. 15

c) The two trains travelling in opposite directions at 100 km/hr each. Cross each other while one of them is whistling. If the frequency of the note is 700 Hz, find the apparent pitch as heard by an observer in the other train: (i) before the trains cross each other and (ii) after the trains have crossed each other, velocity of sound in air=332 m/s 10

Question-03

a) What is weber-Fetchner law? Discuss the different factors on which loudness depends. 12

b) What are the acoustic requirements for a good auditorium? Obtain an expression for intensity of a plane wave in terms of acoustic pressure. 13

c) Calculate the (i) acoustic intensity, (ii) acoustic pressure of a plane, acoustic wave in air of intensity level of 80db reference to 10^{-12} watt/m^2. 10

Question-04

a) Discuss how sound of a syllable grows and decays in a hall. What is absorption co-efficient? 15

b) Mention at least ten applications of ultrasonic waves? 10

c) If a concert hall of size 80X60X30 cu.ft has plastered surface of absorption co-efficient 0.1 and a capacity of an audience of 130a adults (each having an absorption of 4.6ft^2 own). Find the reverberation time of the hall. 10

Section-B

Question-05

a) Draw all possible diagrams that indicate the reduction of spherical aberration using stops. 13

b) What is chromatic aberration? Let a polychromatic beam of light incident on a convex lens of focal length f_1. In this beam let two light eave of colour red and violet have focussed on two different points in the principal axis. If the focal distance for red and violet coloured light are f_r and f_v respectively then, (i) draw the corresponding ray diagram that represents chromatic aberration. (ii) Show that this type if aberration can be minimized by introducing a convex lens of focal length f_2 putting $\frac{f_1 + f_2}{2}$ distance apart. 15

c) The two thin lenses of focal length f_1 and f_2 separated by a distance 'd' have an equivalent focal length 60 cm. The combination satisfies the conditions per no chromatic aberration and minimum spherical aberration. Find the values of f_1, f_2 and d. 10

Question-06

a) What is polarization of light? Discuss Brewster's law and hence show that the reflected and refracted rays are 90^0 apart. 13

b) Show that, if unpolarised light of intensity I_0 is incident on a polarizer, the intensity of light transmitted through the polarizer is $\frac{I_0}{2}$. 12

c) Find the specific rotation of a given sample of sugar solution if the plane of polarization is turned through 26.4^0.The length of the tube containing 20% sugar solution is 20cm. 10

Question-07

a) What is Nichol prism? Explain with figure that how Nichol prism can be used as both polarizer and analyser. 12

b) What is primary colour and secondary colour? Draw a colour triangle to explain that how the white colour is formed 10

c) What is additive colour mixture? How has this technique enhanced the colour of points and ink? 13

Question-08

a) What is photometry? Define the following terms: (i) Solid angle (ii) Luminous power and (ii) Illuminance. 12

b) What are meant by Radiant and luminous intensity? State and explain the Lambert's law of light 13

c) An electric lamp hangs h feet above the centre of a circular table of diameter d. Determine the ratio between the illumination at the centre of the table to that at its edge. 10

Khulna University of Engineering and Technology

Department of Architecture

B.Arch 1st Year 1st Term Regular Examination, 2018

Course no: Hum- 1125 Course title: Communicative English

Full Marks: 210 Time: 3 Hours

N.B i) Answer any three questions from each section in separate script.

ii) Figures in the right margin indicate full marks.

Section-A

1. a) Make sentence with the following structures using the words given in brackets. 14

(i) Subject+ Linking verb+ Adjective complement (seem as verb).

(ii) Subject+ Intransitive verb+ Adv. Of time (play as verb).

(iii) Subject+ Transitive verb+ Object (write as verb).

(iv) Subject+ Verb+ that+ Subject+ Verb+ Object (say and follow as verb).

(v) What+ Subject+ Verb+ Adv. Of manner+ Verb+ Adv. complement (say and is as verb)

(vi) Since+ Subject+ Verb+ Adv. Of manner, Subject+ Verb+ Adv. of place (study and succeed as verb)

(vii) Subject+ Verb+ Adv. of manner, but+ Verb+ Adv. of Place (work and succeed as verb)

b) Change the following words as asked in brackets and make sentence with the changed forms. 12

Require (into noun), Success (into adj.), Aware (into noun), Acquit (into noun), Length (into adj.), Rich (into verb).

c) Make new words with the following prefixes and suffixes and use the new words in sentence. 09

Anti....., Be....., In....., ...ism, ...ing, ...tude

2. a) Make Wh- question with each of thr underlined word/ words of the following sentences. 14

(i) Their plan will probably meet with little success.
(ii) Mim hates leaving home.
(iii) She has been living in this house for ten years.
(iv) His honesty is not in question.
(v) The train is running at a speed of 40 Kph.
(vi) The water is only waist-deep.
(vii) His parents live some distance away.

b) Make use of the following words in sentence as asked in brackets. 12

Love (as adj.), Tea (as adj.), Cloud (as verb), Access (as verb), Date (as verb), Table (as verb)

c) Write two antonyms for each of the following words and make sentence with the antonyms. 09

(i) Barrier (ii) Benefit (iii) Honesty

3. a) Transform the following sentences as asked in brackets. 14

(i) That he works intellectually is progressive. (into simple)
(ii) The policy of tax discourages tobecco at all level of society. (into complex)
(iii) When he was at school he loved mathematics. (into simple)
(iv) Give him this note in case of your seeing him. (into complex)
(v) I'm sorry but I can't stay any longer. (into simple)
(vi) He is as hard as Masum. (into comparative)
(vii) He behaves rudely. (into negative)

b) Make use of the following modals in sentence as asked in brackets. 12

(i) Can. (To allow somebody for a program)
(ii) Might (To express uncertainty)
(iii) Shall (To offer some one for something)
(iv) Could (To express past ability)
(v) Would rather (To express preference)
(vi) Had better (To suggest some one for something)

c) Fill in the gaps of the following sentences with suitable words. 09

(i) I'd ..... everybody ..... only two people came.

(ii) We have made great ..... in controlling .....

(iii) His achievement is a great ..... to his .....

4. a) Correct the following sentences. 14

(i) Police is liable to control law and order.

(ii) He drank slowly the milk.

(iii) That is he liable to family is fine.

(iv) He hopes he will not pass.

(v) See the word in the dictionary.

(vi) He loves to play cricket.

(vii) He will buy a pencil, pen sharpener and others.

b) Express the following notions or functions in sentence. 12

(i) Wish (ii) Command (iii) Hatred (iv) Honesty (v) Certainty (vi) Sympathy

c) Define gerund, present participle and infinitive with two examples following each of the definitions. 09

Section-B

5. a) Read the passage and answer the questions that follow. 15

A person once went to a Shadhu and asked two questions: (1) why do people say God is everywhere? I see him nowhere, therefore, show me where he is. (2) Why is man punished for crime, since he is not a free agent, but made to do as God wishes? The Shadhu took up a lump of earth and flung it at the head of the questioner. The man went to the judge and complained against the Shadhu for having inflicted a

severe pain in his head. The judge had the Shadhu arrested and brought up for trial. As the accused stood in the dock, the judge said, "why", instead of answering the complaint's questions, did you throw a lump of earth at him? The Shadhu replied, "The blow he received with the lamp was an answer to his questions. He has told you that there is a pain in his head. Let him show me the pain, and I show him God. And why does he complain against me, for what I did was, according to him, an act of God." The judge was pleased with the Shadhu's defence and dismissed the case. The complainant left the court a sadder but a wiser man.

Questions: (i) What were the questions the Shadhu was asked?

(ii) What did the Shadhu do on hearing the questions?

(iii) How did the Shadhu explain that his action contained the answers to the questions?

b) Make a precis of the above passage (Q-5a) with a suitable title. 20

6. a) Write a contrast paragraph between Bangladesh and India. 15

   b) Amplify the idea contained in of the following statement. 20

   Of soup and love first is the best.

7. a) Write a sports report on a world cup football match you have enjoyed recently. 15

   b) Write a letter to the editor of a newspaper commenting on bad effects of deforestation. 20

8. a) Write a free composition on any one of the following: 35

   (i) Global Warming: Bangladesh is a victim

   (ii) Patriotism

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B.Arch 1st Year 1st Term Regular Examination, 2018

Arch 1131- Architecture of Ancient Civilization.

Full Marks: 210 Time: 3 Hours

N.B i) Answer any three questions from each section in separate script.

ii) Figures in the right margin indicate full marks.

Section A

1. a. What are the building materials of ancient Egyptian architecture? 10
   b. Analyze and discuss the temple of Abu Simbel with illustrations. 25

2. a. Draw typical temple of ancient Egyptian architecture. 10
   b. Illustrate your understanding with drawing about the temple of Ammon at Karnak. 25

3. a. Interpret your understanding about the context of Mesopotamian architecture highlighting geological, climatic and religious aspects. 15
   b. Discuss the Ziggurat at Tchoga-Zanibil, Elam with necessary drawings. 20

4. a. Elucidate character of Persian Architecture. 10
   b. Elaborate your understanding on Apadana and Throne Hall with necessary drawings. 25

Section B

1. Write short notes on : 7x5 = 35
   i. Hellenic and Hellenistic Period
   ii. Ionic Order
   iii. Doric Order
   iv. Theatre and Amphitheatre
   v. Corinthian Order

2. a. Discuss the Temple of Hera and Temple of Hephaestus with illustrations. 15
   b. Critically interpret Geographical, Geological and climatic aspects of Greece. 20

3. a. Evaluate and discuss Agora with drawings. 15
   b. Interpret your understanding on Parthenon with drawings. 20

4. a. Discuss and Evaluate Roman Forum. 15
   b. Interpret in your own words about Pantheon, Rome with illustrations. 20

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B.Arch 1st Year 1st Term Regular Examination, 2018

Course no: Arch 1133 Course title: Design Theory

Full Marks: 210 Time: 3 Hours

N.B i) Answer any three questions from each section in separate script.

ii) Figures in the right margin indicate full marks.

Section-A

1. a. How orientation of a line affects its role in a visual construction? 05

   b. Which is the most powerful element for creating enclosure of space? Discuss with examples. 15

   c. How linear elements have been used in architecture according to their visual expression and functionality? Discuss with examples. 15

2. a. State seven visual properties of architectural form with examples. 15

   b. Compare regular forms with irregular forms. 05

   c. Discuss surface articulation in brief. 15

3. a. Explain additive transformation with example of an architect's work. 10

   b. Discuss linear form in brief. 10

   c. Identify the reasons behind formal collisions of geometry. Give examples. 15

4. a. Evaluate the role of depressed base plane in defining a volume of space. 15

   b. How U-shaped plane define a field of space? State with examples. 15

   c. Outline the various types of openings at corners. 05

Section-B

5. a. Explain the term "Ergonomics". Discuss Visual scale and Human scale with examples. 15

   b. Briefly interpret the following proportioning systems with examples- 15
      i. Golden Section
      ii. Modulor

   c. Distinguish between proportion and scale. 05

6.	a. Define Order.	05
	b. Make your understanding clear about Hierarchy. Analyze the ways in which visual emphasis can be achieved in the arrangement of forms and spaces.	15
	c. What is Axis? Outline the terminating elements of an axis.	15
7.	a. In how many ways interlocking spaces can be generated? Discuss with examples.	15
	b. Explain centralized organization. Give an example from Bangladesh.	15
	c. Discuss linear organization with examples.	05
8.	a. Outline the elements of circulation.	05
	b. Discuss path-space relationship.	15
	c. Evaluate and interpret various types of approaches towards a building with examples.	15