BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA
L-1/T-1   B. Sc. Engineering Examinations 2011-2012
Sub : **CHEM 123** (Basic Environmental Chemistry)
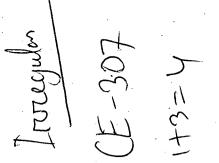Full Marks : 210   Time : 3 Hours
The figures in the margin indicate full marks.
USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

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

1. (a) What is environmental chemistry? Discuss the objective of environmental education.   **(2+5)**

   (b) Show the important characteristics (such as height above the earth's surface, temperature range and major chemical species) of the four major atmospheric regions in the form of table.   **(10)**

   (c) Discuss the temperature and pressure of the major atmospheric regions and explain their change with the help of a graph.   **(9)**

   (d) Discuss the following natural cycles of the environment: **(9)**

   (i) Hydrological cycle   (ii) Nitrogen cycle   (iii) Carbon cycle.

2. (a) What are the chemical species and particulates present in the atmosphere? Discuss their effects in the atmosphere.   **(10)**

   (b) Discuss the mechanism in maintaining the earth's radiation balance.   **(8)**

   (c) Write down the various chemical and photo-chemical reactions taking place in the atmosphere and discuss their consequence.   **(12)**

   (d) Write short note on "Green house effect".   **(5)**

3. (a) What is Lewis concept of acids and bases? Illustrate your answer with examples. Mention the limitations of Lewis concept.   **(7)**

   (b) Discuss the classification of Lewis acids and bases. Illustrate your answer with examples.   **(10)**

   (c) What are the characteristics of Hard and Soft Acids and Bases (HSAB)? State HSAB principle.   **(7+2)**

   (d) Discuss three important applications of the HSAB principle.   **(9)**

4. (a) Discuss the Molecular Orbital theory (MOT). How it is different from valence bond theory?   **(10+5)**

   (b) Discuss the shapes of the following molecules.   **(12)**

   (i) NH_3 (ii) PCl_5 (iii) XeF_4 (iv) $BaCl_2$

   (c) Draw the Molecular Orbital Diagram of the given molecules and calculate their bond order. (i) F_2 (ii) N_2 **(8)**

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CHEM 123 (BURP)

SECTION – B

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

5. (a) How the following organic compounds pollute our environment? **(18)**

   (i) Carbohydrate and proteins (ii) Oils (iii) Polychlorinated biphenyls (iv) Aromatic hydrocarbons

   (b) What are the detrimental effects of the organic pollutants? **(5)**

   (c) What are the potential health hazards of nylon 6,6 polymer? Mention the harmful effects of polyethylene carrier bag. **(6+6=12)**

6. (a) Write the chemical equations involved in the biodegradation of urea and urea-aldehyde organic fertilizers. Why the question arises to synthesize organic fertilizer to save our environment? **(11)**

   (b) Discuss the following natural detoxification process of organic pesticides, which are responsible for our congenial environment: **(12)**

   (i) Photochemical degradation (ii) Hydrolysis (iii) Oxidation (iv) Dehalogenation

   (c) How do the raw fruits become ripe when treated with organic chemicals? **(5)**

   (d) How does formalin enter into our body? **(7)**

7. (a) Teflon non-stick fry pan-a potential health hazards. Explain the statement. **(8)**

   (b) How soap can be synthesized in the laboratory? Mention the environmental impact of soaps and detergents. **(12)**

   (c) Discuss the environmental impacts of melamines which are used in our everyday life. **(7)**

   (d) The PVC polymer is a direct environmental and human health threat throughout its life cycle from manufacture to use and disposal. Explain the statement. **(8)**

8. (a) Write down the postulates of Bohr theory. Deduce the energy equation for an electron in an orbit. **(5+10)**

   (b) What is Sommerfield modification? Explain the significances of quantum numbers. **(4+8)**

   (c) Define the following terms **(8)**

   (i) Ionization potential (ii) Electron affinity and (iii) Electronegativity.

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   BURP Examinations 2011-2012

Sub : **HUM 125** (English)

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, including questions No. 1 as compulsory

1. (a) Explain with reference to the context any one of the following: **(8)**

    (i) "You have lost reason and taken wrong path, you have taken lies for truth, and hidiousness for beauty."

    (ii) "How singular is life and how full of changes! How shall a thing will ruin or save one!"

   (b) Answer any one of the following.   **(10)**

    (i) How does 'Cibces's Garden' become a story about the struggle between Good and Evil?

    (ii) What ultimate truth does the story of 'The Bet' try to establish for you?

   (c) Answer any three of the following questions.   **(12)**

    (i) What did the Loisel couple decide to do when the necklace was lost?

    (ii) What are the things that always tortured and angered Mrs. Matilda Loisel?

    (iii) Describe in brief the terms and conditions of the bet agreed upon between the banker and the lawyer?

    (iv) How did the lawyer spent the last two years of his confinement?

    (v) What did Odysseys do with the dear he found on his way back to the ship?
    Odysseus   deer

2. Recast and correct any ten of the following sentences.   **(20)**

    (i) The matter was to be discussed between the electricians, the plumbers and the carpenters.

    (ii) Now we have less staff members than we had before.

    (iii) We heard a sound somewhere in the distant woods.

    (iv) Walt Whitman occupies a most unique place in literature.

    (v) The militia is discussing the battle among itself.

    (vi) Abraham Lincoln was one of the great man in American history.

    (vii) He played good in every game.

    (viii) He is something better today.

    (ix) Illiteracy is when a man cannot read or write.

    (x) He didn't speak but once.

    (xi) He had a need and interest in athletics.

    (xii) He is as tall as, if not taller, than his brother.

HUM 125 (URP)

3. (a) Give the meaning of any ten of the of the following words. **(10)**

Adroit, bellow, cataclysm, cogent, creed, diffidence, eloquence, grouchy, hilarious, loathe, morsel, reproach.

(b) Make sentences with any ten of the following words. **(10)**

Wayward, transcend, straddle, prank, recluse, prolific, oblivion, meddle, indictment, holocaust, grumble, extol.

4. (a) Write a precis of the following passage with a suitable title. **(20)**

Nature seems to have taken particular care to disseminate her blessings among the different regions of the word with an eye to this mutual intercourse and traffic among mankind, that the natives of the several parts of the globe might have a kind of dependence upon one another, and be united together by their common interest. Almost every degree produces something peculiar to it. The food often grows in one country, and the same in another. The fruits of Portugal are corrected by the products of Barbados, and the infusion of a china plant is sweetened by the pith of an Indian cave. The Philippine islands give a flavour to the European bowls. The single dress of a woman of quality is often the product of a hundred climates. The muff and the fan come together from the different ends of the earth. The scarf is sent from the torrid zone, and the tippet from beneath the pole. The brocade petticoat rises out of the mines of Peru, and the diamond necklace out of the bowels of Indostan.

SECTION – B

There are **FOUR** questions in this Section. Answer question No. 5 and other **TWO** from the rest.

5. Read the following passage carefully and answer the questions that follow: **(30)**

A world without poverty. Whenever I mention this to people who have not experienced the power of micro-credit first hand, I see a half smile often masking their obvious cynicism or doubts. Even supporters of micro-credit sometimes view this as an 'impossible dream' which we use to motivate ourselves and our workers. To me a world of poverty means that every person would have the ability to take care of his or her own basic needs. In such a world nobody would die of hunger or suffer from malnutrition. This is a goal world leaders have been calling for decades, but have never set out any way of achieving it.

Social structures in a poverty-free world would, of course, be quite different those that exist in a poverty-ridden world. But nobody would be at the mercy of any one else, and that is what would make all the difference between a world without poverty and one ridden with it. One-fifth of the world's inhabitants who today live a life of extreme poverty would become income earners and income spenders.

HUM 125 (URP)

Contd ... Q. No. 5

They would generate extra demand in the market to make the world economy grow. They would bring their creativity and innovations into the market place to increase the world's productive capacity.

But even in a poverty free world there would always remain differences in life style between people at the bottom of society and those at the top income levels. Yet the difference would be the difference between the middle-class and luxury class, just as an trains in Europe today you have only first-class and second-class carriages, whereas in the nineteenth century there were third-class and even fourth-class carriages-sometime with no windows and just hay strewn on the floor. A poverty-free world would not be perfect, but it would be the best approximation of the ideal.

We have created a slavery free world, a Polio-free world, apartheid free world. Creating a poverty free world be greater than all these accomplishments while at the same time reinforcing them. This would be a world that we could all be proud to live in.

Questions:

(i) Why even the supporters of micro-credit, do you think, sometimes view its power as an "impossible dream"?

(ii) What according to you, in the writer's imagination, are the changes that micro credit can put forward?

(iii) 'A poverty free world would not be perfect but it would be the best approximation of the ideal'. Discuss.

(iv) Do you consider the power of micro-credit to be Utopian or realistic? Give reasons in favour of your choice.

(v) Why would the writer feel "proud to live in' a poverty free world?

(vi) Give the meanings of the following words as used in the passage:

cynicism, innovations, apartheid, accomplishments, reinforcing.

6. (a) Suppose you are the Technical Officer of URP Department, BUET. You have purchased some technical equipment from Unique Business System. After receiving the delivery of the equipment you find out that some pieces of equipment are substandard. Now write a letter of complaint to the Managing Director of Unique Business System claiming their proper replacement. **(10)**

(b) Write phonetic transcription of the following words: (Any five) **(10)**

angel, school, right, thunder, exam, tough.

HUM 125 (URP)

7. (a) Write a dialogue between two students of URP department about their views on 'Wetland conservation and proper land management system? **(10)**

    (b) Write a short essay on any one of the following topics: **(10)**

    (i) Culture: Pride of every nation

    (ii) Dhaka City without High rise Buildings

    (iii) Depression : A global Crisis.

8. (a) Transform the following sentences as directed: (Any five) **(10)**

    (i) We achieved victory in December, 1971 (make it complex). ·

    (ii) I offended him by doing this (... compound)

    (iii) His mistake was evident, but his sincerity was also obvious. (... Complex)

    (iv) His work being unsatisfactory he was dismissed (... compound)

    (v) His enterprises failed and this added to his worries. (... Simple)

    (vi) You must avoid fat to lose weight. (... Compound)

    (b) Write short notes on any <u>two</u> of the following: **(10)**

    (i) Diphthongs

    (ii) Communication process.

    (iii) Front matter of a formal report.

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   Burp. Examinations 2011-2012

Sub : **HUM 171** (Micro Economics)

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 do you understand by the concept of production function?   **(5)**

   (b) Explain the various forms of productivity.   **(15)**

   (c) State and prove the application of Eular's theorem in the theory of distribution of production.   **(10)**

   (d) Distinguish between the concepts of short-run and long-run.   **(5)**

2. (a) Discuss the various internal and external economics of scale of production.   **(15)**

   (b) Distinguish between the concepts of fixed cost and variable cost.   **(5)**

   (c) Explain short-run total cost curves and short-run per unit cost curves. Present hypothetical average on graph and show that short-run cost curves are U-shaped. *and marginal cost schedules, plot these schedules)*   **(15)**

3. (a) Discuss the assumptions of perfect competition.   **(7)**

   (b) Explain the short-run equilibrium of a firm under perfectly competitive market.   **(10)**

   (c) When does a firm under perfect competition close down its production? Explain graphically.   **(8)**

   (d) Calculate the profit maximizing level of output and maximum profit from the following total revenue (TR) and total cost (TC) functions.   **(10)**

   $$TR = 5900Q - 10Q^2$$
   $$TC = 2Q^3 - 4Q^2 + 140Q + 845$$

4. (a) Define normal good, inferior good and giffen good.   **(5)**

   (b) Derive the Marshallian and Hicksian demand curves for an inferior good.   **(15)**

   (c) "The Marshallian demand curve for a giffen good does not follow the law of demand" - Explain.   **(15)**

HUM 171(BURP)

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

5. (a) Explain the basic economic problems that an economy has to face. How can these problems be solved? **(10)**

(b) Given the demand and supply equations: **(12⅓)**

$$Q = \frac{256}{P} \qquad and \qquad Q = P^{\frac{1}{2}}$$

Find out the equilibrium price and quantity and then show them graphically.

(c) Write the determinants which affect the changes in demand of an individual. Show the changes graphically. **(13)**

6. (a) Explain the price elasticity of demand, income elasticity of demand and cross elasticity of demand with examples. **(15)**

(b) Applying the knowledge of price elasticity of demand show that "the more inelastic the demand, the more tax burden on a consumer". **(10)**

(c) What do you mean by paradox of bumper harvest? What policies can be addressed to avoid the losses of farmers result from the bumper harvest? **(10)**

7. (a) What is indifference curve? Mention the characteristics of an indifference curve. **(7)**

(b) What are the exceptional cases of indifference curve? **(8)**

(c) Explain the "law of diminishing marginal utility" and "law of equi-marginal utility". **(20)**

8. Write short notes on (any four) **(35)**

(a) Minimum wage determination (Price floor)

(b) Movement along the demand curve and the supply curve.

(c) Relationship between 'total utility' and 'marginal utility'.

(d) Determinants of supply.

(e) Twin themes of Economics - 'scarcity' and 'efficiency'.

(f) Consumers equilibrium.

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   BURP Examinations 2011-2012

Sub : **PLAN 111** (Human Settlements Development)

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 do you understand by the term "human settlements"? What are the main components of a human settlement? **(2+2=4)**

    (b) Write down the main three factors responsible for the form of cities. How they are interrelated? Describe the evolution of cities. **(7+15=22)**

    (c) Describe the basic characteristics of ancient cities. Write down the brief description of the sacred area of 'Ur'. **(3+6=9)**

2. (a) Write about the rural settlement patterns observed in Bangladesh. Describe any two of them. **(2+4=6)**

    (b) Describe the structural and administrative pattern of medieval towns in brief. **(4+4=8)**

    (c) Describe the area used as colony of workers which was developed during building of the Illahun pyramid. **(8)**

    (d) Differentiate between the administrative power structure of medieval towns and neo-classic cities. **(13)**

3. (a) Describe the findings of R.D. Banerjee, M.S. Vats and K.N. about the excavation of Mohenjo-daro. **(12)**

    (b) What are the main changes evident in the latter stages of medieval towns? **(8)**

    (c) How the appearance of gunpowder brought change in the defense system of cities? **(15)**

4. Write down short notes on (any five)   **(5×7=35)**

    (a) Hippodamus and greek city planning

    (b) Market place of greek cities

    (c) Baroque city

    (d) Babylon during Nebuchadnezzar

    (e) Janapads of Bengal

    (f) The ancient town of Mainamati

    (g) Evolution of Dhaka city

PLAN 111

SECTION – B

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

5. (a) Define urbanization with reference to its demographic, behavioral and structural meanings. **(6)**

(b) What is meant by Level of Urbanization? Calculate Level of Urbanization and Annual average growth rate of urban population for the following years and interpret the results. **(20)**

Year	Total Population	Total Urban Population
1961	50,840,235	264,0726
1974	71,479,071	6,273,602
1981	87,120,119	13,535,963
1991	111,455,185	22,455,174
2001	123,851,120	28,605,200
2011	161,083,840	45,103,465

(c) Describe the 'Superblocks' of Radburn Concept with appropriate diagram. **(9)**

6. (a) What are the fundamental aspects of Howard's Garden City Planning? Discuss with necessary illustration. **(15)**

(b) What are the strategies of rural-urban migration? Discuss briefly. **(12)**

(c) Explain 'Rank Size Rule' and 'Primate City' concept with examples. **(4)**

(d) How can the size of a 'Neighborhood Unit' be determined? **(4)**

7. (a) How did Le Corbusier classify streets and the railway system in his concept of 'Vertical City'? **(10)**

(b) Discuss the different determinants of migration. **(15)**

(c) What are the consequences of urbanization in the context of Bangladesh? **(10)**

8. Write short notes on (any five) **(5×7=35)**

     (a) Satellite Town Concept,

     (b) Urban Area,

     (c) Utopian thoughts,

     (d) Green belt,

     (e) Suburb,

     (f) Indirect measurement of internal migration,

     (g) Central Business District (CBD).

L-1/T-1/URP   **Date : 05/01/2013**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1   BURP Examinations 2011-2012

Sub : **MATH 101** (Mathematics - I)

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**.

Symbols used have their usual meanings.

1. (a) Consider the function   **(10⅓)**

$$f(x) = \begin{cases} x+3 & if & -2 \le x < 2 \\ 5 & if & x = 2 \\ x^2+2 & if & x > 2 \end{cases}$$

(i) Find the Domain of the function (ii) Locate the intercepts (iii) Graph the function (iv) Based on the graph, find the range.

(b) Graph the function   **(8)**

$$f(x) = -\frac{1}{2}\sqrt[3]{1-3x} + 2$$

using the techniques of shifting, stretching, and/or reflecting. Start with the graph of the basic function and show all stages with explanation.

(c) Use transformation to graph the function $f(x) = 3 + \log_2(x+2)$. Determine the domain, range and the vertical asymptote of the function.   **(5)**

2. (a) Analyze the graph of function   **(10⅓)**

$$R(x) = \frac{2x^2 - 5x + 2}{x^2 - 4}.$$

(b) Consider the function   **(8)**

$$f(x) = -x^3 - x^2 + 12x.$$

(i)   Find the x and y-intercepts of the polynomial function f.

(ii) Determine whether the graph of f crosses or touches the x-axis at each x-intercept.

(iii) End behavior: find the power function that the graph of f resembles for large values of $|x|$.

(iv) Determine the maximum number of turning points on the graph of f.

(v)   Determine the behavior of the graph of f near each x-intercept.

(vi) Put all the information together to obtain the graph of f. (You may need to locate additional points on the graph).

(c) Solve: $\log_{16} x + \log_4 x + \log_2 x = 7$.   **(5)**

MATH 101

3. (a) Use the rational zeros theorem to find all the complex zeros of the polynomial function $\qquad$ **(10⅓)**

$$f(x) = 3x^4 + 5x^3 + 25x^2 + 45x - 18.$$

Use the zeros, factor $f(x)$ over the real numbers.

(b) For the given function $f(x) = \dfrac{3}{x-1}$ and $g(x) = \dfrac{2}{x}$, find (i) $g \circ f$ (ii) $g \circ g$; with

their domains. **(8)**

(c) Prove that $\tanh^{-1} x = \dfrac{1}{2} \ln\left(\dfrac{1+x}{1-x}\right)$, hence find $\dfrac{d}{dx} \tanh^{-1} x$. **(5)**

4. (a) The polynomial function **(10⅓)**

$$f(x) = 2x^4 - 3x^3 - 4x^2 - 8$$

has exactly one positive zero. Approximate the zero correct to two decimal places.

(b) A window is in the form of a rectangle surmounted by a semicircle. If the total perimeter be 25 feet, find the dimensions so that the greatest possible amount of light may be admitted. **(13)**

SECTION – B

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

5. (a) Define symmetric and skew-symmetric matrices. Prove that every square matrix can be expressed in one and only one way as a sum of a symmetric and a skew-symmetric matrix. **(15)**

$$\text{Express } A = \begin{pmatrix} 3 & 4 & 1 \\ 0 & 3 & -7 \\ 1 & 2 & 3 \end{pmatrix}$$

as a sum of a symmetric and a skew-symmetric matrix.

(b) If $A = \begin{pmatrix} 3 & 2 & 1 \\ 0 & 2 & 4 \end{pmatrix}$ then show that AA^{T} is a symmetric matrix. **(8⅓)**

6. (a) Find the inverse of the matrix A, where **(12⅓)**

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{pmatrix}$$

and hence verify your result.

MATH 101
Contd. Q. No. 6

(b) Find the rank of the matrix **(11)**

$$A = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \\ 3 & 0 & 5 & -10 \\ 5 & 3 & 2 & 1 \end{pmatrix}$$

by reducing it to canonical form.

7. (a) Test whether the following equations are consistent: **(11)**

$$5x + 3y + 7z = 4$$
$$3x + 26y + 2z = 9$$
$$7x + 2y + 10z = 5$$

If consistent, find the solution.

(b) Determine for what values of λ and μ the following system of linear equations **(12⅓)**

$$x + y + z = 6$$
$$x + 2y + 3z = 10$$
$$x + 2y + \lambda z = \mu$$

have (i) no solution, (ii) a unique solution and (iii) infinitely many solutions.

8. (a) Find two non-singular matrices P and Q such that PAQ is in the normal form, where **(15⅓)**

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & -1 & -1 \\ 3 & 1 & 1 \end{pmatrix}$$

(b) Find all eigenvalues and the corresponding eigenvectors of the matrix **(8)**

$$A = \begin{pmatrix} 1 & 2 & -1 \\ 0 & -2 & 0 \\ 0 & -5 & 2 \end{pmatrix}.$$