

**SECTION – A**

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

1. (a) Define urban and rural settlements. (8)  
(b) What are the basic differences between these settlements? (12)  
(c) What factors and conditions are responsible for having different types of urban and rural settlements? (15)
2. (a) What is the Human Rights to sustainable Human Settlements? Explain. (15)  
(b) What are the Human Rights Issues? (20)
3. (a) Dr. Margaret Mead states that, "A residential community must be far more than a dormitory for assuring health and safety". What does she mean by this statement? Explain elaborately. (20)  
(b) Can you prepare a checklist for designing a housing project according to her proposition? (15)
4. (a) What are factors that need to be considered while selecting a site for a house? (17 1/2)  
(b) What are requirements of residential buildings? (17 1/2)

**SECTION – B**

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

5. (a) Define 'Urbanization' and 'Urban Growth'. Briefly describe the causes of urban population growth. (15)  
(b) "The key factor in urban living is not distance but travel time" – Why Arturo Soria believed in such a way? (5)  
(c) Briefly discuss the three-magnet concept of Sir Ebenezer Howard. (10)  
(d) What are the fundamental principles in designing the city center of vertical city? (5)

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6. (a) Discuss 'Decentralized Development' in context of Bangladesh. (10)  
(b) How industrial revolution brought great changes into the life of people? (5)  
(c) Describe the indirect methods of measuring internal migration. (10)  
(d) "The primary innovation of Radburn was complete separation of pedestrian and vehicular traffic" – Describe it. (10)
7. (a) What are the fundamental elements of Perry's Neighbourhood Unit? Discuss in brief. (20)  
(b) "There exists a trade off between urbanization and environmental degradation" – Explain the statement. (5)  
(c) Discuss the sources of measuring international migration. (10)
8. (a) Write short notes on the following : (Any three) (3×7=21)  
(i) Inhabitants of vertical city  
(ii) Mega city, SMA  
(iii) Obstacles to migration  
(iv) Rank size rule and Primate city concept.
- (b) Compare between – (2×7=14)  
(i) Immigrant and Emigrant  
(ii) Ribbon Development and Linear City Concept
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**SECTION – A**

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

1. (a) Define demand function. (5)
  - (b) What are the main determinants of demand? (10)
  - (c) Why do demand curve slopes downward? (10)
  - (d) What is law of demand? What are the exceptions to the law of demand? (10)
  
  2. (a) Define price elasticity of demand. What are the determinants of price elasticity of demand? (10)
  - (b) How would you measure price elasticity of demand at any point on a straight line demand curve? Explain graphically. (15)
  - (c) From the following demand function, calculate price elasticity of demand when  $P = 3$  and explain what you understand from the result. (10)
- $$Q = 60 - 15P + P^2$$
3. (a) How is price determined in an economy under competition? What will happen to the equilibrium price and quantity due to change in supply? (10)
  - (b) Calculate the equilibrium price and quantity from the following demand and supply functions and show the result in a graph. (15)
- $$Q = 4000 - 400P$$
- $$Q = -500 + 500P$$
- i) If a per unit tax of Tk 0.90 is imposed, how will it effect the equilibrium price and quantity?
  - ii) If government gives a subsidy of Tk 2 per unit, what will happen to the equilibrium price and quantity?
  - (c) Define market demand and market supply. (10)
  
  4. (a) What is an indifference curve? Make a hypothetical indifference schedule and plot the curve. (10)

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**Contd . . . . . Q. No. 4**

(b) What are the assumptions of an indifference curve analysis? Explain the properties of an indifference curve. (15)

(c) From the following budget line and the utility functions, calculate the amount of X and Y that will maximize the satisfaction. What will be the maximum amount of satisfaction? (10)

$$U = 100X^{0.5} Y^{0.5}$$
$$1000 = 30X + 40Y$$

**SECTION – B**

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

5. (a) Define production-possibility frontier (PPF). Explain how resources can be allocated in a society with the help of production-possibility frontier. (20)

(b) Illustrate three important applications of production-possibility frontier. (15)

6. (a) State and prove the application of Euler's theorem in the theory of distribution. (10)

(b) Explain the various internal economics of scale of production. (10)

(c) Define optimisation. How can it be achieved? Why is optimisation necessary with reference to the production of a firm? (15)

7. (a) Describe the classification of market. (10)

(b) Discuss the nature of demand curve under monopoly market. Explain the short-run equilibrium of firm under monopoly market. (15)

(c) Calculate the profit maximising level of output and maximum profit from the following total revenue (TR) and total cost (TC) functions: (10)

$$TR = 48Q - Q^2$$
$$TC = 12 + 16Q + 3Q^2$$

8. (a) Define price consumption curve (PCC) and income consumption curve (ICC). (10)

(b) How would you derive the demand curve of a commodity from the price consumption curve? (10)

(c) Graphically show that the total effect of a price change is equal to the summation of income effect and substitution effect. (15)

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BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 BURP Examinations 2010-2011

Sub : **CHEM 207** (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) Discuss the various mechanisms involved in the formation and depletion of ozone in the atmosphere. What are the consequences of depletion of ozone in the atmosphere? What steps are needed to protect the atmospheric ozone layer? (10)
- (b) Discuss the origin of various inorganic particulates in the atmosphere. (06)
- (c) What is environmental chemistry? Discuss the objective of chemistry of environmental education. (09)
- (d) What are the mechanisms of energy transfer in maintaining the earth's radiation balance? Discuss them. (10)
2. (a) Describe the characteristics of the different environmental segments. (10)
- (b) What is lithosphere? Discuss the bio-chemical effects of the following pollutants: (10)
  - (i) CO (ii) As (iii) Pb
- (c) Discuss the following natural cycles of the environment: (15)
  - (i) Carbon cycle (ii) Phosphorous cycle (iii) Nitrogen cycle.
3. (a) What is hybridization? Discuss the shape of the following molecules: (10)
  - (i) NH<sub>3</sub> (ii) PCl<sub>5</sub> (iii) XeF<sub>4</sub>
- (b) Discuss molecular orbital theory showing different energy level diagram. (10)
- (c) What is Radioactivity? Discuss the properties of radioactive particle. (10)
- (d) What is group displacement law? (05)
4. (a) Write down the postulates and limitations of Bohr's atomic model. (08)
- (b) Discuss the origin of hydrogen spectrum. (10)
- (c) Define the following terms: (12)
  - (i) Modern periodic law
  - (ii) Ionization potential
  - (iii) Electron Affinity
  - (iv) Electronegativity.
- (d) What is transition element? Write down the important characteristics of transition elements. (05)

**CHEM 207**

**SECTION – B**

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

5. (a) What is noise pollution? Discuss the adverse effect of noise pollution. (10)  
(b) Give some suggestions to control industrial noise pollution. (10)  
(c) Write the factors on which disinfection process of water depends. What is potable water? (05)  
(d) Define the following terms (10)  
(i) DO (ii) BOD (iii) COD (iv) Oxygen demanding wastes.
6. (a) Define acids and bases on the basis of (i) Lux-Flood concept (ii) Brönsted concept and (iii) Electronic concept. (09)  
(b) Arrange the following acids in order of decreasing strength. (04)  
 $\text{H}_2\text{SO}_4$ ,  $\text{HClO}_4$ ,  $\text{HClO}$ ,  $\text{H}_2\text{SeO}_4$ ,  $\text{H}_2\text{SO}_3$ ,  $\text{HNO}_3$ ,  $\text{HCl}$   
(c) How photosynthesis and respiration directly influence the pH of environmental water? (10)  
(d) How does the acidity affect ecosystems and also how does it affect fish and other aquatic organisms? (12)
7. (a) Discuss the synthesis and industrial uses of the following polymers: (12)  
(i) PVC (ii) Nylon 6.6 (iii) Teflon (iv) Polyethylene  
(b) "No other organic plastic polymer presents such a direct environmental and human health threat as PVC does throughout its lifecycle, from manufacture to disposal-yet our demand is ever increasing." Explain the statement. (10)  
(c) What are the potential health hazards of Nylon 6.6? (05)  
(d) Discuss the potential adverse health effects of Teflon non-stic pans. (08)
8. (a) What are the sources of oils, aldehydes and polychlorinated biphenyls ( $\text{PCB}_s$ ) in our environmental water? How they pollute our environment? (12)  
(b) What are the detrimental effects of organic pollutants? (04)  
(c) How organic pesticides enter into our aquatic ecosystem? (08)  
(d) Discuss the mode of poisoning action of pesticides. Give the name of different electroanalytical methods for the determination of trace elements in water. Why it is more preferable than chemical methods of analysis? (11)
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L-1/T-1/URP

Date : 12/07/2011

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 BURP Examinations 2009-2010

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

1. (a) Explain with reference to the context any one of the following: (8)
- (i) "You should have returned them to me sooner, for I might have needed them."  
(ii) "But I stayed where I was for I thought it might be a trap."
- (b) Answer any one of the following: (10)
- (i) How did Matilda come to realize that a small thing can ruin or save one?  
(ii) Critically evaluate an individual's awakening from ignorance to enlightenment in the light of "The Bet."
- (c) Answer any three of the following: (12)
- (i) Why was Mrs. Forestier astonished to see Matilda after the years?  
(ii) Why could not the banker sleep throughout the night?  
(iii) "What parents begot such a man?" - Who said this, when and why?  
(iv) "What made Matilda unhappy in her conjugal life?  
(v) Why did the lawyer go away without the money he was going to deserve?
2. Recast and correct any ten of the following sentences: (20)
- (i) It was her who first saw the intruder.  
(ii) Here comes my brother and his friend.  
(iii) Jamil, you and I should be there in time.  
(iv) The man spoke to the lion with a cigar in the corner of his mouth.  
(v) The rain continued without scarcely any break.  
(vi) What did you paint the house white for?  
(vii) He referred back to the matter of yesterday.  
(viii) He had a need and interest in music.  
(ix) The grass become withered, dry and flaky.  
(x) Mr. Philips, together with some friends and neighbours, are planning a celebration.  
(xi) The secretary gave a fulsome account of the minutes.  
(xii) This picture is highly invaluable.
3. (a) Give the meaning of any ten of the following words:  
Tributary, molest, dungeon, hamlet, agile, meticulous, palatable, bleak, conscientious, exorbitant, facile, sporadic. (10)
- (b) Make sentences with any ten of the following words: (10)  
abject, baffle, cataclysm, dingy, emulate, grope, hectic, lustrous, ordeal, mumble, prop, tyro.

Contd ..... P/2

**HUM 125(URP)**

(20)

4. Write a précis of the following passage with a suitable title:

Trees give shade for the benefit of others and while they themselves stand in the sun and endure scorching heat, they produce the fruit by which others profit. The character of good men is like that of trees. What is the use of this perishable body, if no use of it is made for the benefit of mankind? Sandalwood - the more it is rubbed the more scent does it yield. Sugarcane- the more it is peeled and cut into pieces, the more juice does it produce. Gold - the more it is burnt, the more brightly by does it shine. The men who are noble at heart do not lose these qualities even in losing their lives. What does it matter whether men praise them or not? What difference does it make whether riches abide with them or not? What does it signify whether they die at this moment or whether their lives are prolonged? Happen what may, those who tread in the right path will not set foot in any other. Life itself is unprofitable to a man who does not live for others. To live for the mere sake of living one's life is to live the life of dogs and cows. Those who lay down their lives for the sake of a friend, or even for the sake of a stranger, will assuredly dwell for ever in a world of bliss.

**SECTION – B**

There are **FOUR** questions in this Section. Answer any **THREE including Q. No. 5 as compulsory.**

5. Every morning, James Marshall, who lived and built saw mills in Mexican territory known as California, walked along the millrace and studied the wheel of the sawmill he had constructed. He wanted to be able to tell the mill's owner, John Sutter, when the water in the race was deep and swift enough to turn the mill's wheel. On the morning of January 24, 1848, Marshall noticed something unusual in one of the deep pools along the bank, under the clear water lay a yellow lump: a gold-colored, chewed-up piece of rock, sitting on top of a smooth and flat rock. He reached into the cold water and snatched up the strange rock. The he stood by the bank, pondering what his next step should be. Was it really gold? James Marshall knew several tests for gold, but only one such test could be conducted there by the riverbank. Marshall decided to perform this one simple test. He laid the stone on a smooth rock, and then he picked up another rock that he felt would make a good hammer. He hammered at the gold-colored lump. He noticed that it did not break but careful inspection showed that it had changed shape.

He put the lump in his pocket and took it to the mill. There the mill crew conducted another test. They placed the lump on an anvil and beat it with a hammer. When the lump flattened but did not become fragmented, the mill crew knew that the lump was not iron pyrite, also known as fools, gold.

Three more tests were used in order to ascertain the exact composition of that gold lump. The mill cook threw it into a kettle of lye, where it was boiled for a day. The prolonged boiling did not change the lump's color: it remained the color of gold. John Sutter, the mill's owner, was shown the lump on January 28, 1848, five days before his land become part of the United States. He performed two different tests on the gold-colored lump.

After the first test, John Sutter observed that nitric acid did not damage the lump's appearance. Then he placed the lump on a scale. Its weight showed that it was much denser than silver.

**HUM 125(URP)**

**Contd ... Q. No. 5**

John Sutter and James Marshall were then sure that had in their possession a gold nugget. They decided to keep the find a secret, and they told the mill crew to keep quiet about the news. However, one mill hand wrote to his friends about his own efforts at gold mining. A storeowner overheard another mill hand bragging about a piece of gold he kept in a small buckskin bag. When a deliveryman got a look at a handful of gold dust, shown to him by a small boy at the mill, the arrival of a California Gold Rush was almost unavoidable. Its occurrence was made a certainty with the publication of a San Francisco news head line reading "Gold Mine Found." Over ninety percent of the people in San Francisco took off in the direction of Sutter's Mill.

Questions:

**(30)**

- (a) Who is James Marshall? What does he do in Sutter's Mill?
  - (b) Which was the first test conducted by the river bank? Why do you think only that test was possible?
  - (c) What do you know about fools' gold? How did the mill crew understand that the lump was not fool's gold?
  - (d) Narrate the tests performed by John Sutter.
  - (e) Why did Sutter and Marshall decide to keep the gold discovery issue a secret? How did this secret expose?
  - (f) Give the meanings of the following words as used in the passage:  
pondering, fragmented, ascertain, prolonged, possession, certainty
6. (a) Suppose you are the Regional Planner working in a real estate company named Janata Housing. You have purchased construction materials from BD steel Mills Ltd. But you just found out that the purchased materials are substandard. Now write a letter of complain to the Director of BD Steel Mills Ltd. **(10)**
- (b) Write phonetic transcription of the following words: (any five) **(10)**  
deal, measure, jam, clock, father, son
7. (a) Write a composition on any one of the following: **(10)**  
(i) Addiction to Face book (ii) Session Jam (iii) Cox's Bazar Sea Beach
- (b) Write adialogue between you and your friend about the effects of smoking. **(10)**
8. (a) Transform the following sentences as directed: (any five) **(10)**  
(i) Life is tough when you are an orphan. (Simple)  
(ii) As the did not call me, I forgot to pick up his things. (Simple)  
(iii) He was too angry to talk. (Compound)  
(iv) Truth does not exist, only interpretations exist. (Compound)  
(v) He is disappointed and planning to leave his job. (Complex)  
(vi) His friends betrayed him. He decided not to see them any more. (Complex)
- (b) Write short notes on any two of the following: **(10)**  
(i) 'Recommendation' of a report (ii) Diphthongs (iii) Components of a composition.
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**SECTION – A**There are **FOUR** questions in this Section. Answer any **THREE**.

Symbols have their usual meanings.

1. (a) Consider the function

(10½)

$$f(x) = \begin{cases} 2x+5, & \text{if } -3 \leq x < 0 \\ -3, & \text{if } x = 0 \\ -5x^2, & \text{if } x \geq 0 \end{cases}$$

(i) Graph the function, (ii) Find the Domain and Range of  $f(x)$ . (iii) Locate the intercepts.(b) Graph the function  $f(x) = -2\sin(x - \pi/2) + 2$  using the techniques of shifting, stretching, and/or reflecting. Start with the graph of the basic function  $y = \sin x$  and show all stages with explanation. Show the final graph in  $[-2\pi, 2\pi]$ .

(8)

(c) Determine whether  $f(x) = 2x^2 - 4x - 3$ ,  $x > 1$  is one-to-one. If so, find its inverse and check your answer. Also sketch the graph of  $f$  and  $f^{-1}$ .

(5)

2. (a) Analyze the graph of the function:
- $R(x) = \frac{x^2 + x - 12}{x^2 - x - 6}$
- .

(10½)

(b) Consider the function  $f(x) = (x - 1)^2(x - 3)(x + 1)$ .

(8)

(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) Find the power function that the graph 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) Transform the equation  $x^2 + y^2 = z^2 \tan^2 \alpha$  to (i) cylindrical (ii) spherical polar co-ordinates.

(5)

3. (a) Use transformation to graph the function
- $f(x) = 3 - e^{x-3}$
- . Determine the domain, range and the horizontal asymptote of the function. Also find its inverse with its graph.

(10½)

(b) Graph the function  $y = 3 \sec(\frac{1}{4}x) + 1$ . Be sure to label key points and show at least two cycles.

(8)

(c) Find the exact value of  $\sec(\tan^{-1}(\frac{1}{2}))$ .

(5)

4. (a) A cylindrical tin can, closed at the both ends, of a given capacity, has to be constructed. Show that the amount of the tin required will be a minimum when the height is equal to the diameter.

(13½)

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### MATH 101(URP)

(b) Find values of  $x_1$  and  $x_2$  that minimize

$$z = 3x_1 - 5x_2 \quad (10)$$

subject to

$$2x_1 - x_2 \leq -2$$

$$4x_1 - x_2 \geq 0$$

$$x_2 \leq 3$$

$$x_1 \geq 0, x_2 \geq 0.$$

### SECTION - B

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

5. (a) Show that  $(AB)C = A(BC)$ , where  $A$ ,  $B$  and  $C$  are  $m \times n$ ,  $n \times p$ ,  $p \times r$  matrices respectively. (8)

(b) If  $A$  is  $n$ -square and non-singular matrix, then prove that  $A(\text{adj.}A) = |A| I$ .

Verify the above relation for the matrix

(15½)

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ 4 & 3 & 3 \end{bmatrix}$$

6. (a) Define symmetric and skew-symmetric matrices. (10)

If  $A = \begin{bmatrix} 3 & 2 & 1 \\ 0 & 2 & 4 \end{bmatrix}$  then show that  $AA^T$  is a symmetric matrix.

(b) Find the inverse of the matrix  $A$ , where  $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 4 & 5 & 5 \end{bmatrix}$

by elementary row operations and hence verify your result. (13½)

7. (a) Investigate for what values of  $\lambda$  and  $\mu$  the following system of linear equations

$$x + 2y + z = 8$$

$$2x + y + 3z = 13$$

$$3x + 4y - \lambda z = \mu$$

have (i) no solution (ii) a unique solution and (iii) infinitely many solutions. (12½)

(b) Find all non-trivial solutions of the following system of linear equations: (11)

$$x_1 - x_2 - x_3 + 2x_4 = 0$$

$$x_1 + 3x_2 - x_3 - 6x_4 = 0$$

$$2x_1 + x_3 - 3x_4 = 0$$

8. (a) Find the rank of the matrix  $A = \begin{bmatrix} 1 & 2 & -1 & 3 \\ 4 & -6 & 4 & -2 \\ 3 & -1 & 1 & 2 \\ 1 & 2 & 0 & 1 \end{bmatrix}$  by reducing it to canonical form. (12½)

(b) For the matrix  $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$  (11)

find non-singular matrices  $P$  and  $Q$  such that  $PAQ$  is in the normal form.

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