

Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

2nd Year 1st Semester Final Examination – 2011 (Session: 2010-2011)

Course Code: CSE 2101

Course Title: Digital logic design

Full Marks: 50

Time: 03:00 hrs

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What is BCD? How many bytes are needed to represent the decimal value 846,569 in BCD? 3
- (b) What is Parity Bit? Describe odd and even parity for error detection with its limitation. 4
- (c) A small process-control computer uses hexadecimal codes to represent its 16-bit memory addresses.
 - i. How many hex digits are required.
 - ii. What is the range of addresses in hex?
 - iii. How many memory locations are there?

2. (a) Simplify the following Boolean function by sing Quine-McClusky method 6

$$F(A,B,C,D) = \sum m(0,2,3,6,7,8,10,12,13)$$
- (b) Why the Gray code used for labeling the cells of K-map. 4

3. (a) Substantiate that four basic gates can either enable or disable the passage of an input signal, A, under control of the logic level at control input B. 5
- (b) Design and describe parity generator and checker by using gate. 5

4. (a) Define the setup time and the hold time requirements of a clocked FF. 2
- (b) Describe parallel data transfer of binary data using D flip-flops. 3
- (c) How a D flip-flop is used to synchronize the input signals and detecting an input sequence? 5

5. (a) Describe a counter with MOD number $< 2^N$, where N is the number of FF. 3.5
- (b) Show how to wire a 74LS293 AS a MOD-40 counter. 3.5
- (c) Depict how reduce frequency of a signal by using FF. 3

6. (a) Design a logic circuit which has three input A,B,C and gives a high output when majority of inputs is high. 5
- (b) Draw logic circuit of a 4:1 multiplexer and explain its working. 5

7. (a) Design full adder using decoder with active low outputs. 4
- (b) Explain following characteristics of logic families: i) Propagation delay; ii) Noise margin; iii) Current parameters; iv) Figure of merit; v) Fan out. 6

Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

2nd Year 1st Semester Final Examination – 2011 (Session: 2010–11)

Course Code: CSE 2103 Course Title: Object Oriented Programming

Full Marks: 50

Time: 03:00 hrs

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What do you mean by Object Oriented Programming and Procedural Programming? Write some feature of Object Oriented Programming. 2+1=3
- (b) Java environment includes large number of development tools and hundreds of classes and methods. What are those? 4
- (c) Describe in details the steps involved in implementing a stand-alone java program. 3

2. (a) Why is Java known as platform neural language? 2
- (b) What are the tasks of main method in a java program? 2
- (c) What is constructor? What is meant by constructor overloading? Explain with an example? 4
- (d) Referring to the code below. What code instantiates an object of class A? 2

```
Class A
{
    int i, j, k;
    public A(int ii) { i=ii};
    public A() { k=1};
}
```

3. (a) What are the purposes of “new” in java? Explain what happens when you use it? 1+2=3
- (b) What is default constructor? How are object variable initialized if a class has only a default constructor? 1+2=3
- (c) Check if the code will compile successfully. If not correct the code. 4

```
Interface NewShape{void draw(); int radius=10;}
Class NewCircle1 implements NewShape
{
    Public void draw() { radius=1; System.out.println ("Radius is :" +radius ); }
}
```

```
Class Interface Var
{
    Public static void main( String[ ] args)
    {
        NewShape nc1 = new NewCircle1();
        Nc1.draw();
    }
}
```

4. (a) What is vector? How is it different from an array? 2
- (b) Write an application of wrapper class. 3
- (c) Write a program in java which will read all occurrences of a particular word. 3

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- (d) Find and correct the errors in each of the following program segment in java.
i. final int ARRAY_SIZE =5; ARRAY_SIZE=10;
ii. int [] b=new int[10]; for(int i=0;i<b.length; i++) { b[i]=1; }
iii. int [] [] a= { {1,2}, {3,4} }; a[1,1]=5;
5. (a) What is an applet? How do applets differ from application program? $1+2=3$
(b) Describe the steps involved in developing and running applet? 3
(c) What are the two GUI component class in java? Which one is better and why? $1+2=3$
(d) Write the functionalities of frame in java GUI. 1
6. (a) What is thread? Explain the advantages of multithread program? 3
(b) Describe the complete life cycle of thread? 3
(c) What is synchronization? When it is used? Write a java program which will synchronize among two threads. 4
7. Write short notes on any four of the following. $4 \times 2.5 = 10$
i. Java Virtual Machine
ii. Exception handling
iii. Packages
iv. Garbage collection
v. Run time polymorphism in java

Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

2nd Year 1st Semester Final Examination – 2011 (Session: 2010-11)

Course Code: CSE 2105

Course Title: Data Structures

Full Marks: 50

Time: 03:00 hrs

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(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What do you mean by data structures? Give examples of some popular data structures along with their applications. 1+2=3
- (b) Choosing the right data structure is as important as choosing the best algorithm for the solution to a particular problem. Explain with a suitable example. 2
- (c) How is the complexity of an algorithm measured? Measure the best case and worst case complexity of the following pseudocode. Here, N is the size of the input, X is a variable and assume that *Module A* takes B units of constant time to execute. 2+3=5
1. Set J:= N
2. Repeat step 3 While J>= 1
3. Repeat steps 4 to 7 for I=J to N
4. set I := I*4
5. If I=X then:
6. PRINT: Found and Exit
7. Else: *Module A*
8. Exit
2. (a) Suppose a text T= ‘IT IS SPRING, NO MATTER FLOWERS BLOOM OR NOT’. Use appropriate string operation so that T takes the form as, 4
- i. ‘IT IS SPRING’
ii. ‘FLOWERS BLOOM IN SPRING’
iii. ‘NO MATTER FLOWERS IS BLOOMING’
iv. ‘garbage’
- (b) A text T and pattern A and B are in memory. Develop an algorithm so that A takes place every occurrences of B and hence find the total number of such changes. 3
- (c) Find the table and corresponding labeled directed graph for a faster pattern matching algorithm where the pattern P=a³ba. Also find the location of the SUBSTRING P in the text T=abaabacbbacbabacbaaababacbab. 3
3. (a) What is linked list? Mention its importance. 1+1=2
- (b) How many addresses are required to delete an element from a one-way list and that from a two-way list? Why? 2
- (c) Given an integer K write a procedure (in pseudocode) to delete the K-th element from a two-way list. 3
- (d) Discuss the advantages (if any) of a two-way list over a one-way list for each of the following operations – 3
- i.) Searching for a given element ITEM in a sorted list.
ii.) Deleting a node whose location is given.
iii.) Traversing a sorted list to process each node.
4. (a) Differentiate between stack and queue. Write down some applications of stack in computers. 1+1=2
- (b) Which solution is faster – recursive or non-recursive? Why? 1+1=2
- (c) Translate the expression Q: (A-B)²+(C+D)-(E²-(F-G/H)) to its corresponding reverse polish notation P using LIFO method. 3
- (d) What is priority queue? How can you implement a priority queue? Give an application of priority queue. 1+1+1=3

5. (a) Define similar and copy trees. What is inorder-successor of a node in a binary search tree (BST)? What traversal should you use to sort the nodes of a BST in ascending order? 1+2=3
- (b) Derive the height of a complete binary tree with n nodes. Write a procedure (in pseudocode) to find out the height of a complete binary tree. 2+2=4
- (c) Build a BST with the following data items taking one at a time. Discuss the complexity of the process for n items where all the items are equal in value.
- 20, 20, 30, 10, 200, 35, 67, 80, 100, 45, 70, 90, 30

6. (a) What is min heap? Discuss how heapsort is efficient over bubble sort. 1+2=3
- (b) Compare the following operations on a max heap and BST w.r.t running time. 3
- (c) i) Searching an element ii) Finding the max element iii) Traversing
 What do you mean by *variable-length coding*? Use Huffman's algorithm to generate *variable length code* for the following data items with the given frequencies. What percentage of storage savings is achieved through this coding scheme over *fixed-length coding* for the given data items. 1+3+2=5

Data Items	A	B	C	D	E	F	G	H	I
Frequency	22	5	5	14	18	35	16	16	20
(in thousands)									

7. (a) What do you mean by collision in hashing? The hash addresses for difference record kept in a table for 11 memory cells as below. Is there any collision? If so use open addressing method for collision resolution and hence find the average numbers of probes for the successful and unsuccessful search. 4

Records:	A	B	C	D	E	F	G
H(K)	4	9	3	4	11	5	3

- (b) What are the main disadvantages of linear probing? How can you minimize it? 3
- (c) What is Chaining? How can you solved collision in question 7(a) ? 3

Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

2nd Year 1st Semester Final Examination – 2011 (Session: 2010-2011)

Course Code: CSE 2107

Course Title: Ordinary Differential Equations

Full Marks: 50

Time: 03:00 hrs

(Answer any Five. Figures in the right margin indicate full marks.)

A piece of white paper with handwritten numbers in black ink. The numbers are '8' at the top right, '1' below it, '2' to the left of '1', and '3' at the bottom left.

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) What do you mean by order and degree of differential equation? Give an example of differential equations of fourth order and second degree. 3
 (b) Form the differential equation of which $c(y+c)^2 = x^3$ is the complete integral. 3
 (c) Define exact differential equation. Solve 4

$$(y \sec^2 x + \sec x \tan x)dx + (\tan x + 2y)dy = 0.$$

2. (a) Define integrating factor. Solve the differential equation $\frac{dy}{dx} - \frac{y}{x} = -\frac{y^2}{x}$. 5
 (b) Solve the initial-value problem $(x^3 + y^2 \sqrt{x^2 + y^2})dx - xy\sqrt{x^2 + y^2}dy = 0$. 5

3. (a) Solve the differential equation $(5x + 2y + 1)dx + (2x + y + 1)dy = 0$ by making a suitable transformation. 5
 (b) Solve the differential equation $(5xy + 4y^2 + 1)dx + (x^2 + 2xy)dy = 0$ by first finding an integrating factor. 5

4. (a) Define orthogonal trajectory. Find the orthogonal trajectories of the curves $cx^2 + y^2 = 1$ 5
 (b) Find a family of oblique trajectories that intersect the family of circles $x^2 + y^2 = c^2$ at an angle 45° . 5

5. (a) What do you mean by auxiliary equation? 5
 Solve the differential equation $\frac{d^4 y}{dx^4} + y = 0$.

(b) Show that $y = x$ is a solution of $x^2 \frac{d^2 y}{dx^2} - 4x \frac{dy}{dx} + 4y = 0$. Find a linearly independent solution by reducing the order. Write the general solution. 5

6. (a) Find the general solution of $x^2 \frac{d^2 y}{dx^2} - 6x \frac{dy}{dx} + 10y = 3x^4 + 6x^3$, given that $y = x^2$ and $y = x^5$ are linearly independent solutions of the corresponding homogeneous equation. 5
 (b) Identify and solve the differential equation $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + 4y = 2x \ln x$. 5

7. (a) Solve $\frac{d^2 y}{dx^2} + 4 \frac{dy}{dx} + 4y = x^3 e^{-3x}$ by using the operator method. 5
 (b) Solve the equation $\frac{d^4 y}{dx^4} + \frac{d^2 y}{dx^2} = 3x^2 + 4 \sin x - 2 \cos x$ by using the method of undetermined coefficients 5

Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

2nd Year 1st Semester Final Examination – 2011 (Session: 2010-11)

Course Code: **CSE 2108**

Course Title: **Economics**

Full Marks: **50**

Time: **03:00 hrs**

(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) Define economics. Distinguish between microeconomics and macroeconomics. 5
- (b) What are the fundamental economic problems? Explain the mechanism through which these problems are solved. 5
2. (a) What are the relationship between the demand and price? In this context explain the demand law. 4
- (b) Why demand curve is downward sloping? Explain the determination of demand law 6
3. (a) Define indifference curve. What are the characteristics of indifference curve? 6
- (b) Explain the consumer's equilibrium through indifference curve analysis. 4
4. (a) What is the production function? Distinguish between short-run and long-run production function. 3
- (b) What are the basic assumptions of the law of variable proportion? Show the stage of production. Where a rational producer will always seek to produce? 7
5. (a) Define Total Fixed Cost (TFC). Total Variable Cost (TVC) and Total Cost (TC). 6
- (b) Why the short run Average Cost (AC) curve is U- shaped? 4
6. (a) What is meant by market in economics? Explain the basic feature of perfect competitive market. 5
- (b) Graphically illustrate the equilibrium of a perfect competitive firm. 5
7. (a) Define Gross Domestic Product (GDP), Net Domestic Product (NDP), Gross National Product (GNP), and Net National Product (NNP). 4
- (b) What are the measures of national income? 6

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Department of Computer Science & Engineering

2nd Year 1st Semester Examination – 2011 (Session 2010-11)

Course Code: CSE 2103 Course Title: Object Oriented Programming Language

Total Time: 03 hours Total Credit: 03 Total Marks: 50

(Answer any five)

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1. a) What do you mean by *Object Oriented Programming* (OOP)? Differentiate between OOP and *structured programming*? 2+2
b) Briefly describe the three principles of OOP. 4
c) What makes Java portable? 2

2. a) What are the differences between *type conversion* and *casting*? What is *automatic type promotion*? What are the differences between the constants 7, '7' and "7"? 3
b) Find the resultant data type for the variable named **result**:
class P2 {
 byte b = 24;
 char a = 'c';
 short s = 786;
 int i = 32565;
 float f = 5.67f;
 double d = 0.987;
 result = (f*b) + (i/c) - (d*s);
 System.out.println("result = " + result);
}
c) Explain output for the following code fragment:
int m = 100;
while(true) {
 if (m<50)
 continue;
 m = m -10;
 System.out.println("m is " + m);
}
d) What will be the output of the following code? 3
byte x= 64, y;
y=(byte)(x<<2);
System.out.println(y); 2

3. a) Describe object *declaration* process in JAVA. How object *declaration* differs from *instantiation*? 2
b) What is constructor? What is the main purpose of using constructor in JAVA? 2
c) How JAVA handles reference? Explain the output for following code: 4

<pre> class c_Anthr { int a; c_Anthr(int a) { this.a = a; } void show(c_Anthr obj) { obj.a = obj.a + 5; System.out.println("The value of a is " + a); } } </pre>	<pre> class c_Prmr { public static void main(String args[]) { c_Anthr Objct = new c_Anthr(5); System.out.println("The value of a is " + Objct.a); Objct.show(Objct); System.out.println("The value of a is " + Objct.a); } } </pre>
--	---

- d) How does Java manage free memory? 2
- 4 a) What is inheritance in JAVA programming? Can a super class object reference a subclass object? Explain. 2
- b) Illustrate the use of *this* and *super* with an example. 2
- c) What is method overriding? 1
- d) Create a class called *c_ThreeDObject* and derive the classes *c_Box*, *c_Cube* from it. The class *c_ThreeDObject* has a method *m_wholesurfacearea()*. Override this method in each of the derived classes to calculate of whole surface area of each type of three dimensional objects. The dimensions of the objects are to be passed through the respective constructors of each derived class. Write a main method to test these classes. 5
5. a) Differentiate between Interface and Abstract Class. 1
- b) What are benefits of thread in programming? Do you think thread always increases programming performance? Justify. 3
- c) What are the purposes of introducing package in JAVA 2
- d) If package P1 is saved in File Name Protection.java and package P2 is saved in File Name Protection2.java then - Find the ERROR and correct those accordingly 4

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Package P1

```
Public class Protection {  
  
    int n = 1;  
    Private int n_pri = 2;  
  
    Public show() {  
        System.out.println(n) ;  
        System.out.println(n_pri);  
  
    }  

```

Package P2

```
Class Protection2 extends Protection {  
  
    Public show2() {  
        System.out.println(n) ;  
        System.out.println(n_pri);  
    }  

```

- 6 a) Discuss *protected* access protection in JAVA. 2
b) What is exception in programming? How exception handling helps JAVA programmer? 2
c) The following attempt at Java code might have been written by a beginner. Identify (but do not correct) as many of the mistakes as you can. Explain how each oddity you identify is either something that would prevent the program from compiling, something that would cause it to stop abruptly reporting failure at runtime, a reason why the program might not do anything sensible or just a stylistic oddity.

```
/* A comment to start with: Exam:2000 */  
public Class mycode.java  
{  
void static public fun main(String [junk])  
begin  
Leaf tr = null;  
for (i=1; i>10; ++i) tr = new Node(i, tr)  
tr.print();  
end;  
}  
6
```

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```
class Leaf
{
    integer value;
    Leaf(int value)
    { this = value; }
    public void print()
    { System.out.println(value); }
}

class Node extends Leaf
{
    Leaf left, right;
    Node(leaf l, Leaf r)
    { left = l, right = r;
    }
    void print()
    { left.print();
        System.out.println("val=" @ value);
        right.print();
    }
}
```

7. Write short note on the followings:
- i) Abstract
 - ii) JVM
 - iii) Applet
 - iv) I/O streams

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Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

2nd Year 1st Semester Final Examination – 2011 (Session: 2010-11)

Course Code: CSE 2105 Course Title: Data Structures

Full Marks: 50

Time: 03:00 hrs

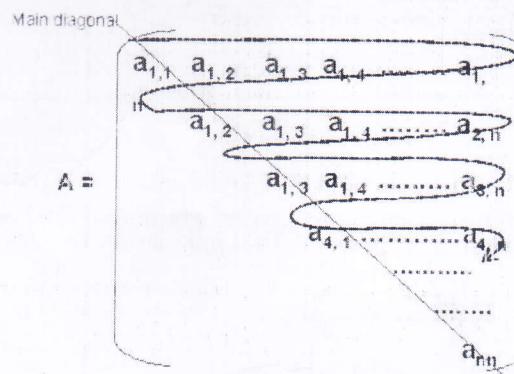
(Answer any Five. Figures in the right margin indicate full marks.)

1. (a) Define Data Structure? Briefly describe Link List and Tree data structure technique. 1+2=3
- (b) Characterize, using the big-Oh notation, the worst-case running time of the following algorithm: 6

Let A be a given array of n integers.

```
for i <- 0 to n-1 do
    for j <- 0 to (i*i)-1 do
        Let A[j mod n] <- j.
    end for
end for
```

- (c) Briefly describe the major operations for data structure. 1
2. (a) What is an array? Mention some advantages of array. 1+1=2
- (b) Why is array accessing faster than that of other data structures? Suppose A is a two-dimensional array having the dimension as 4x5 and is stored in column-major order in memory. Assuming that each element of A occupies 4 bytes, find out the address of the element A[2, 3], where all indices start from 1. 1+2=3
- (c) What is sparse matrix? Suppose, the following n-square upper-triangular matrix is stored in a two-dimensional array A. If A is to be stored in a one-dimensional array B as indicated below, then find out the formula that will give the value of L in terms of J and K such that B[L] = A[J, K] 1+4=5



3. (a) Jobs that require printing, by a network printer, are stored until the printer is ready. Their addresses are placed in a queue to await their turn of printing. Addresses of new jobs are placed at one end of the queue. The job addresses are taken from the other end when the printer is ready. 2

- State two reasons why it would be preferable to store the queue in a linked list rather than an array.
- (b) Let L₁ and L₂ be two one-way linked lists pointed by the pointers H₁ and H₂ respectively. Write pseudocode to append L₁ to L₂. 4

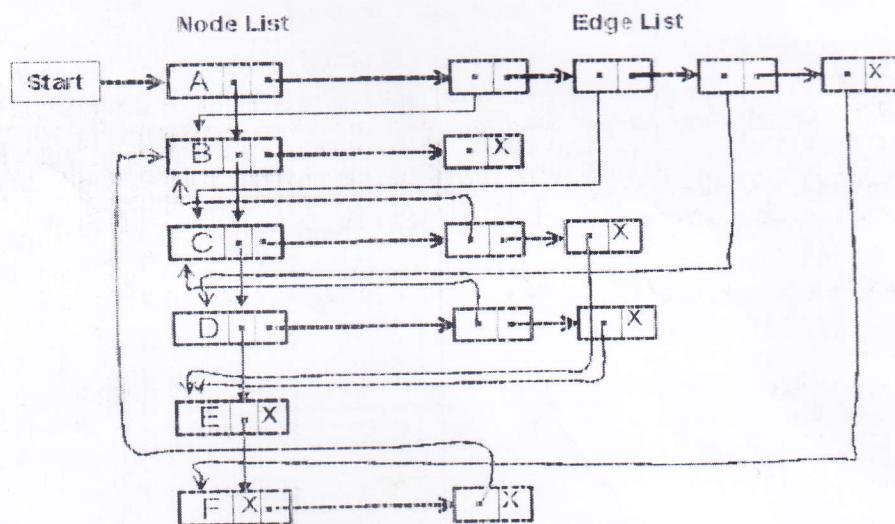
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- (c) What is header list? Why is it used? Draw the schematic diagram of a two-way circular header list that is empty.
4. (a) Differentiate between stack and queue. Write down some applications of stack in computers. 2+
- (b) When a recursive function is called well-defined? Is the following function well-defined? Justify. 1+2+1=4

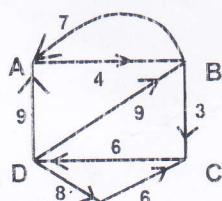
$$f(m, n) = \begin{cases} n+1 & ; \text{when } n = 0 \\ f(m-1, 1) & ; \text{when } m > 0 \text{ but } n = 0 \\ f(m-1, f(m, n-1)) & ; \text{when } m > 0 \text{ and } n > 0 \end{cases}$$

Also, find out the value of $f(3, 4)$.

- (c) State the *Tower's of Hanoi* problem. Graphically show all the steps of the first recursive call to the *Tower's of Hanoi* problem for $n = 4$ disks. 1+2=3
5. (a) Define each of the following. 0.5 x 6 = 3
- (i) complete graph (ii) strongly connected graph (iii) multi-graph
 (iv) simple cycle (v) labeled graph (vi) adjacency matrix of graph
- (b) Given the linked representation of a graph as below, draw the corresponding graph. 3



- (c) Apply Warshall's algorithm on the following graph and find out the shortest path from B to D. 4

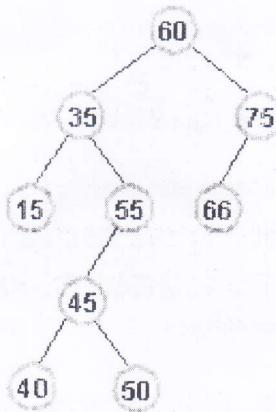


6. (a) What is *binary search tree (BST)*? Find out the average case complexity of *binary search*. Give an example situation binary search would incur the worst case complexity. 1+1+1=4
- (b) What will be the size of the array required to sequentially represent a binary tree T of depth 5? 2

The following is a *BST*. First apply the suitable traversal algorithm to sort the items in ascending order and then build a *max-heap* using the sorted items. Show all the intermediate steps of the heap building operation.

1+3=4

A F



7. (a) What is *2-tree*? Find the total number of nodes in a *2-tree* that has 6 external nodes. 1+1=2

- (b) What do you mean by *variable-length coding*? Use Huffman's algorithm to generate *variable length code* for the following data items with the given frequencies. What percentage of storage savings is achieved through this coding scheme over *fixed-length coding* for the given data items. 1+5+2=8

Data Items	A	B	C	D	E	F	G	H	I
Frequency (in thousands)	22	5	5	14	18	35	16	16	20

Department of Computer Science and Engineering

Begum Rokeya University, Rangpur.

2nd Year 1st Semester Final Examination, 2013. Session: 2010-2011

22

Course Title: Economics

Course Code: CSE 2108

Full Marks: 50

Answer Any Five from the Given Questions

(Note: Numbers in the right margin indicate marks for each question.)

- | | | |
|----|---|---|
| 1. | (a) What is economics? | 2 |
| | (b) Why do you need to study economics? | 3 |
| | (c) What are the basic problems of an economics? Explain. | 5 |
| 2. | (a) What is the law of demand? | 2 |
| | (b) Explain the law of demand through a demand schedule. | 3 |
| | (c) Why do demand curves for most goods slope downwards to the right? | 5 |
| 3. | (a) What is price elasticity of demand? | 2 |
| | (b) Explain cross-elasticity and income-elasticity of demand. | 5 |
| | (c) Suppose that price of commodity X decrease from Tk. 10 per unit to Tk. 8 per unit and quantity demanded of X increases from 50 units to 60 units. Calculate the price elasticity of demand. | 3 |
| 4. | (a) What is indifference curve? | 2 |
| | (b) Distinguish between indifference curve and indifference map. | 3 |
| | (c) Explain the main properties of an indifference curve. | 5 |
| 5. | (a) What is production function? | 2 |
| | (b) Define average and marginal products of labour. | 2 |
| | (c) Suppose a production schedule is given as follows. Complete the table. | 3 |

Labour	Total Production	Marginal Product	Average Product
1	5		
2	11		
3	18		
4	26		
5	35		
6	45		
7	55		
8	64		
9	70		
10	75		

- | | | |
|-----|---|---|
| (d) | Draw MP and AP curves using the schedule obtained in question 5(c). | 3 |
| 6. | (a) Give the definition of perfectly competitive market. | 2 |
| | (b) Explain the characteristics of perfectly competitive market. | 3 |
| | (c) How can a firm get short run equilibrium in a perfectly competitive market? | 5 |
| 7. | (a) Distinguish between normal GDP for the year 2009 and 2010. | 4 |
| | (b) Consider an economy with only 2 goods: chocolate bars and pints of ice cream. | |

Year	Ice cream		Chocolate	
	Price	Quantity	Price	Quantity
2008	3.50	3000	1.00	1500
2009	2.25	3000	1.25	1000
2010	5.00	3500	2.00	1500

- (i) Calculate the normal GDP for year 2009 and 2010.
 (ii) Calculate the real GDP in 2009. (Base Year 2008)
 (iii) Calculate the growth rate in 2009.

3×2=6