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Begum Rokeya University, Rangpur

Department of Computer Science and Engineering

B.Sc. (Engg.) 1st year 2nd Semester Final Examination, 2017. (Session: 2016-17)

Course Code: **CSE 1201**	Time: **3.00 hours**
Course Title: **Discrete Mathematics**	Total Marks: **50**

[N B: *Answer any five (5) questions and figures in the right margin indicate full marks*]

[*All parts of each question must be answered sequentially*]

1. a) What is proposition? Which of these sentences are propositions and Why?   1+2
    i) Miami is the capital of Florida.
    ii) 5+6=10.
    iii) 3+11=x.
    iv) Answer this question.
    b) Is the function $f(x)=x^2$ from the set of integer to the set of integers one-to-one or onto?   2+2
    c) Show that the premises "A student in this class has not read the book," and "Everyone in this   3
    class passed the first exam" imply the conclusion "Someone who passed the first exam has
    not read the book."

2. a) Write a source code (in C language) to implement the given statement.   3

    $$\forall x \forall y ((x > 0) \wedge (y < 0) \rightarrow (xy < 0))$$

    b) What do you mean by a is congruent to b. Suppose you searching an element from a list   4
    using linear searching method. The time complexity of this searching is O(n). Now how can
    you use hashing function to reduce time complexity O(n) to O(1). Briefly describe.
    c) What is the value of k after the following code1 and code2 have been executed. To compute   3
    value of the k, which rule (between sum rule and product rule) is used for code1 and code2
    and why?

```
k := 0
for i₁ := 1 to n₁
    for i₂ := 1 to n₂
        .
        .
        .
    for iₘ := 1 to nₘ
        k := k + 1

        Code 1
```

```
k := 0
for i₁ := 1 to n₁
    k := k + 1
for i₂ := 1 to n₂
    k := k + 1
    .
    .
for iₘ := 1 to nₘ
    k := k + 1

    Code 2
```

3. a) In a live show, you are asked to select one of the three cars. Among three cars one car work   3
    properly and other two cars do not work properly. After you select a car, the show-host
    shows one not working car of the other two cars (Which he knows is not the working car).
    Now luckily, he gives you an opportunity to switch your selection. Should you switch or
    not? In this case, can you take decision based on emotion or probability? Explain.

    b) Using mathematical induction, prove that if n is an integer greater than 1, then n can be   3
    written as the product of primes.
    c) In how many ways can a photographer at a wedding arrange six people in a row, including   4
    the bride and groom, if

i) the bride must be next to the groom.
ii) the bride is not next to the groom.
iii) the bride is positioned somewhere to the left of the groom.

4. a) What is running time analysis? Step by step compute the worst-case running time of the given snap-code.   3

```
x=x+1 ;
for(i=1; i<=n; i++)
  {
    m=m+2;
    if(length()==0)
        return false;
    else
        for(j=1; j<=length(); j++)
        p=p+2;
  }
for(k=1; k<=n; k++)
        n=n+1;
```

  b) Define zero-one matrices with example.   2
  c) When a relation is called symmetric relation?   2
  d) Define binomial expression. Find out the coefficients of expression $(x+y)^4$ using conditional reasoning instead of multiplying the four terms.   3

5. a) What do you mean by endpoints in a Graph? Construct the call graph for a set of seven telephone numbers 555-0011, 555-1221, 555-1333, 555-8888, 555-2222, 555-0091, and 555-1200. Consider there were two calls from 555-0011 to 555-8888 and two calls from 555-8888 to 555-0011, three calls from 555-2222 to 555-0091, two calls from 555-1221 to each of the other numbers, and one call from 555-1333 to each of 555-0011, 555-1221, and 555-1200.   1+2

  b) Suppose that a group has four employees: Alvarez, Berkowitz, Chen, and Davis and suppose that four jobs need to be done to complete Project 1: requirements, architecture, implementation, and testing. Every employees trained to specific job like following graph.   3
To complete a project we have to assign jobs to the employees so that every job has an employee assigned it and no employee is assigned more than job.
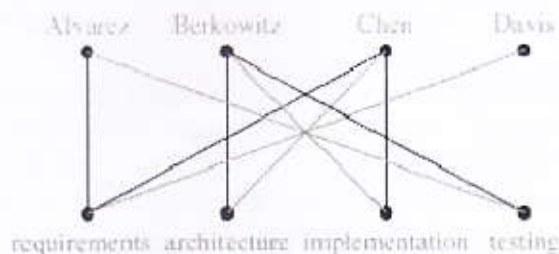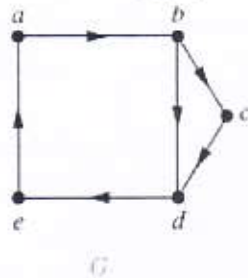

How solve this problem in terms of graph theory and how draw a simple graph of above graph model that follow above consideration.

  c) What is Isomorphism of a graph? Determine the given pair of graphs is isomorphic or not and justify your answer.   4
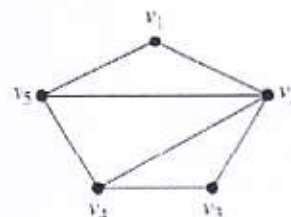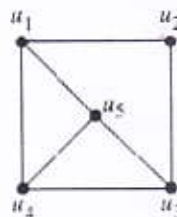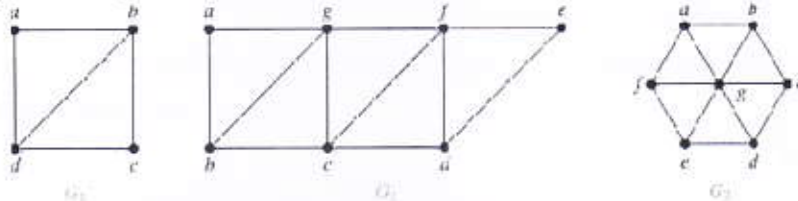
a) Define path of a graphs. Is following graph G strongly connected or not? Explain.   1+2

b) Write down the differences between Euler paths and circuits. Which graphs shown below   1+2
have an Euler path? Why?

c) Discuss the main idea of graph coloring. Draw the dual graph the dual graph for the map   2+2
shown in below. After that find, the number of colors needed to color the map so that no two
neighboring regions have the similar color.
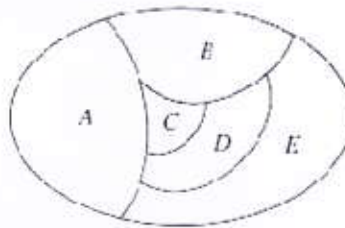
7. a) In which order does a postorder traversal visit the vertices of the ordered rooted tree T shown   2
in the Figure? Illustrate your answer.
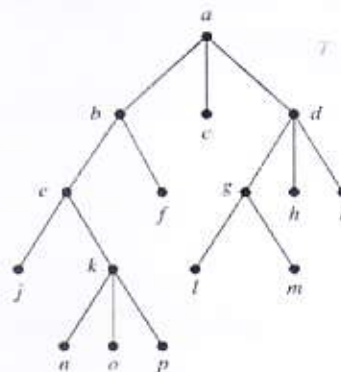
b) Define desiccation tree. Suppose there are seven coins with the same weight and two fake   4
coins that weight less than the others do. Construct a decision tree for finding these fake
coins with explanation.

c) Draw a spanning tree of the following graph G. (Label all the vertices yourself).   2

G
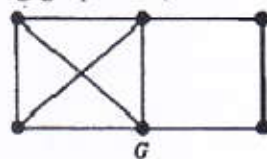
d) Recursively define the tree traversal algorithms on an ordered rooted tree.   2

Course Code: **CSE 1203** Time: **3.00 hours**

Course Title: **Structured Programming Language** Total Marks: **50**

[N B: *Answer any five (5) questions and figures in the right margin indicate full marks*]

[*All parts of each question must be answered sequentially*]

1. a) What is the deference between a local and global variable in C? (Consider variable scope, storage and initialisation.) 2

    b) Write a complete definition of the function prototype **void reverse(char *s)** that reverses a given string s. 3

    c) Briefly discuss the major differences between C and C++ with examples. 4

    d) Compare C **struct** and C++ **struct**. 1

2. a) What will be printed by the following code? 2

```
void main()
{
    unsigned int x;
    int b;
    x=18;
    for (b=0; x!=0; x>>1)
        if (!(x & 01))
            b++;
    printf("%d\n", b);
}
```

    b) What is variable and what is meant by the "value" of a variable? 2

    c) How can you avoid using *goto* in C, Explain? 3

    d) Write a C program that extracts and prints the right-most digit of the integral portion of a float. 3

3. a) What will the following C code fragments print 4

```
main()
{
    char string [ ]= "HELLO WORLD";
    char *m;
    p=a;
    printf("%d%d%d%d",sizeof(string), sizeof(m), strlen(string), strlen(m));
}
```

    b) Mention the general rules that a C compiler follows during automatic type conversion. 3

    c) When a "switch" statement is preferable over an "if" statement? In a switch statement, what will happen if a break statement is omitted? 3

4. a) Define *static* and *register* variables. 2

    b) Write a C language program to count number of lines and words in a file. 4

    c) A subset of a set is a set that contains all or some of the elements of that set. For example if the set is {3, 5, 7} then some of its subsets are { } the empty set, {3, 7}, {5, 7}, {5} and {3, 5, 7}- the original set. If the original set has *n* elements then it will contain 2^n subsets. Write a C program that prints all the subsets of the following given set A={2,3,5,7,9} (Hint: Represent the set into the following array, int A[]={2,3,5,7,9}) 4

5. a) What does the name of the array signify? Illustrate the initialization of single and multidimensional array with example 4

   b) What is the output of the following code segments: 3

   ```
   int m[2];
   *(m+1) =100;
   *m = *(m+1);
   printf("%d", m[0]);
   ```

   c) How does a structure differ from array? Explain with appropriate example. 3

6. a) Write a C function named **compute()** that returns the result of the sum $\sum_{i=1}^{100}\sum_{j=1}^{i}j$ and also write the value that will be returned by **compute()**. 4

   b) What is the C Preprocessor? Explain with examples. 2

   c) What is difference between i++ and ++i? 1

   d) What will be the value of the variable **count** after the 4 nested loops executed in the following code segment: 3

   ```
   count= -5;
   for (i= 1; i<= 1500; i<<= 1)
       for(j=100; j >0; j --)
           for(k= 0; k< 100; k += 2)
               for(m= 400; m ; m /= 2)
                   count++;
   ```

7. a) Write a C program to calculate P (n, r) = n!/(n-r)! 2

   b) Write a pointer version of **void strcpy(char *s, char *t)**. 2

   c) Write short notes on the following library functions: i) memset() ii) malloc() iii) qsort() 6

Department of Computer Science and Engineering
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BSc(Engg.) 1st Year 2nd Semester Final Examination -2017 (Session: 2016-17)

Course Code: MAT 1221;   Course Title: **Differential and Integral Calculus**

Time: 3:00 Hours   Full Marks: 50

[Note: Answer any five from following questions]

1. (a) Define inverse function with example. Find the domain and range of the following function: 6
   $y = \sqrt{1+x}$.

   (b) Find out the value of $\lim_{x \to 0} \frac{1}{x} \cdot e^{\frac{1}{x}}$ 4

2.
   (a) Find $\frac{dy}{dx}$ of (i) $y = \tan^{-1} \sqrt{\frac{x-a}{b-x}}$ (ii) $y = \sqrt{\frac{(x-1)\,(x-2)}{(x-3)\,(x-4)}}$ 6

   (b) If $y = \sin(m \sin^{-1} x)$, then prove that $(1 - x^2)y_{n+2} - (2n+1)xy_{n+1} + (m^2 - n^2)y_n = 0$ 4

3. (a) Define maxima and minima of $1 + 2\sin x + 3\cos^2 x$ $(0 \le x \le \frac{\pi}{2}$ 4

   (b) State mean value theorem and geometrical interpretation of Rolle's theorem.   6

4. (a) Define homogeneous function of two variables . State and prove Euler's theorem for   6
   homogeneous function of two variables.

   (b) If $u = (x^2 + y^2 + z^2)^{-\frac{1}{2}}$ then prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0$ 4

5. (a) State and prove the first fundamental theorem of calculus.   5

   (b) If $I_n = \int_0^{\frac{\pi}{4}} \tan^n x \, dx$ then show that $I_n + I_{n+2} = \frac{1}{n-1}$. Hence find the value of I_5.   5

6. (a) Evaluate the following integral (any two):   5

   (i) $\int \frac{(\tan x)^{\frac{3}{2}}}{\cos^2 x} dx$ (ii) $\int \frac{x\,dx}{\sqrt{x}+1}$ (iii) $\int \frac{dx}{3+2\sin x}$

   (b) Evaluate the following definite integral (any one):   5

   (i) $\int_0^{\frac{\pi}{2}} \frac{\cos x \, dx}{\sin x + \cos x}$ (ii) $\int_0^1 \frac{dx}{e^x + e^{-x}}$

7. (a) Find the area above X-axis included between a parabola $y^2 = ax$ and a circle $x^2 + y^2 = 2ax$.   5

   (b) Find the area of the following quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ between the major and minor   5
   axis.

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B.Sc.(Engg.) 1st Year 2nd Semester Final Examination -2017 (Session: 2016-17)
Course Code: **EEE 1223**;   Course Title: **Basic Electronics**

Time: 3:00 Hours   Full Marks: 50

[Note: Answer any five from following questions]

1. (a) Define insulator, conductor and semiconductor with examples.   2

    (b) Define intrinsic and extrinsic semiconductor.   2

    (c) Why silicon is preferred over germanium as semiconductor device   3

    (d) Describe the concept of *'hole current'* in terms of energy bands.   3

2. (a) Explain the working principle of p-n diode.   2

    (b) Define biasing. Explain the different biasing of p-n diode. Draw the load line of diode.   5

    (c) Define break down voltage, peak inverse voltage and zener voltage.   3

3. (a) Explain the working principle of a full wave rectifier and derive an expression for its efficiency.   6

    (b) An ac voltage of peak value 22 V is connected in series with a silicon diode and load resistance of   4
        470Ω. If the forward resistance of the diode is 22Ω, calculate (i) peak current through diode
        (ii) peak output voltage.

4. (a) Explain the operation of transistor when it acts as an amplifier.   3

    (b) What are the different configurations of transistor? Write their merits and demerits.   4

    (c) Define α, β and γ and establish a relation among them.   3

5. (a) What are the different characteristics of transistor?   1

    (b) Draw and explain the characteristics of common emitter transistor configuration.   5

    (c) Define operating point of transistor. How can you determine the operating point of transistor?   4

6. (a) Write merits of FET over BJT.   2

    (b) What are the different types of FET?   2

    (c) Define the transfer characteristics of JFET in terms of *Shockley's equation*.   6

7. (a) What do you mean by IC? What is an operational amplifier?   2

    (b) Write the ideal characteristics of an operational amplifier.   2

    (c) Explain the working of an Op-Amp as (i) integrator (ii) differentiator and (iii) comparator.   6

Begum Rokeya University, Rangpur

Department of Computer Science and Engineering

1st Year 2nd Semester B.Sc. (Engg.) Examination-2017

Course No. : ECO 1225 Course Title: Economics

Full Marks: 50

Time: 03 hours

N.B.: Instruction for Candidates:

i) The figures in the right margin indicate full marks.

ii) Answer any **FIVE** questions from the followings.

iii) All part of a question must be answered sequentially.

1. a) What are the demand schedule and demand curve, and how are they related? 3
   b) If demand is elastic how will an increase in price change total revenue? 2
   c) What is meant by demand function? Suppose a demand function is given as 5
   D = 20 - 2P and a supply function is given as S = -30 + 2P. Will there be a realistic equilibrium output?

2. a) Draw the supply- and demand diagram for an importing country. 3
   b) The supply function of a certain commodity is: $Q = a + bp2 + R2$ (a<0, b>0); Find the 4
   price elasticity of supply.
   c) What is consumer surplus and producer surplus before trade is allowed? What is 3
   consumer surplus and producer surplus with free trade? What is the change in total surplus.

3. a) Define production function. Marginal cost and variable cost. 3
   b) What is equal product curve? Show difference between short-run and long run 4
   production function.
   c) Given the average cost function AC = $Q2 - 4Q + 214$. Find the MC function and TC 3
   function. Is the given function more appropriate as a long run or a short-run function? Why?

4. a) What is meant by input-output analysis? 2
   b) Write down the assumption of input-output analysis. 2
   c) Given the input matrix and final-demand vector: 6
   $$A = \begin{bmatrix} 0.1 & 0.5 \\ 0.6 & 0 \end{bmatrix} \text{ and } d = \begin{bmatrix} 1000 \\ 2000 \end{bmatrix}$$
   Find the solution of output levels by Creamer's rule.

5. a) Graphically explain Philips curve and Business cycle. 4
   b) Explain the circular flow model in a two sector economy in detail and relate it with 4
   three approaches in calculating national income.
   c) Distinguish between fiscal policy and monetary policy. 2

6. a) What is the meaning of inflation? Explain the various degrees of inflation. 4
   b) Define GNP and NNP. Explain factor income method of estimating national income. 4
   c) Distinguish between Nominal GNP and real GNP. 2

7. a) Define Capital Budgeting and Government tax. 4
   b) What are the differences between Direct tax and Indirect tax? 2
   c) Explain why need for planning in Bangladesh? 4