29-B

Begum Rokeya University, Rangpur

Department of Computer Science and Engineering

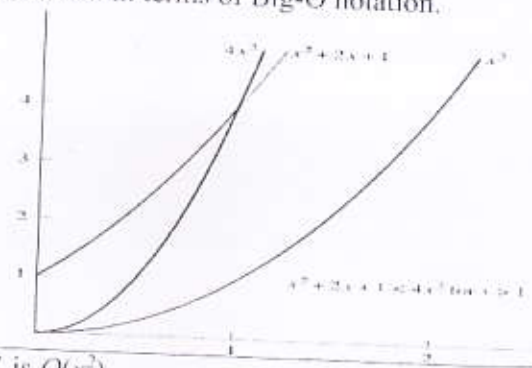
B.Sc. (Engg.) 1st year 2nd Semester Final Examination, 2018. (Session: 2017-18)

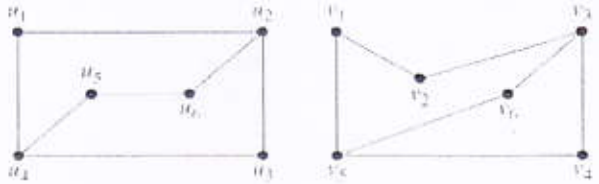
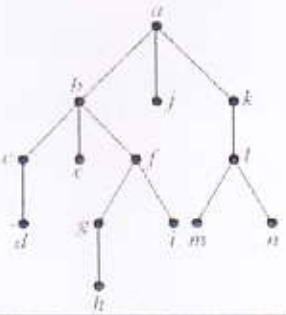
Course Code: **CSE 1201** Time: **3.00 hours**

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 a bit string? Find the bitwise **OR**, bitwise **AND**, and bitwise **XOR** of the bit strings 0110110110 and 110011101	3
	b)	Let p and q be the propositions. Swimming at the St. Martin shore is allowed and sharks have been spotted near the shore, respectively. Express each of these compound propositions as an English sentence. i) $\neg q$ ii) $\neg p \vee q$	2
	c)	Show that p -> q and $\neg p \vee q$ are logically equivalent.	3
	d)	Determine the truth value of each of these statements if the domain consists of all integers. i) $\forall n$ (n+1 > n) ii) $\exists n$ (2n = 3n) iii) $\exists n$ ($n = -n$) iv) $\forall n$ ($3n \leq 4n$)	2
2.	a)	Let m be a positive integer. If $a \equiv b \pmod m$ and $c \equiv d \pmod m$, then prove that $a + c \equiv b + d \pmod m$.	3
	b)	How does theorem $(a + b)$ **mod** $m = ((a$ **mod** $m) + (b$ **mod** $m))$ **mod** m helps in programming contest.	3
	c)	Describe the following function in terms of Big-O notation. 	2
	d)	Show that $f(x)=x^2+2x+1$ is $O(x^2)$	2
3.	a)	Prove that if $n = ab$, where a and b are positive integers, then $a \leq \sqrt{n}$ or $b \leq \sqrt{n}$	3
	b)	Explain *proof by contradictions* with an example.	2
	c)	Briefly explain the basic counting principles: i) the product rule ii) the sum rule with proper examples.	4
	d)	Find the prime factorization of 7007.	1
4.	a)	How does binomial equation from monomial equation. Write down the expression of $(x+y)^4$ using binomial theorem.	3
	b)	State the generalized pigeonhole principle. Each user on a computer system has a password, which is six to eight characters long, where each character is an uppercase letter or a digit. Each password must contain at least one digit. How many possible passwords are there?	4
	c)	Consider the following five relations on the set $A = \{1, 2, 3, 4\}$: R1 = {(1, 1), (1, 2), (2, 3), (1, 3), (4, 4)} R2 = {(1, 1)(1, 2), (2, 1), (2, 2), (3, 3), (4, 4)} R3 = {(1, 3), (2, 1)} Determine which of the relations are reflexive, symmetric, with explanation.	3

5.	a)	When two vertices u, v is called adjacent? Prove that an undirected graph has an even number of vertices of odd degree.	
	b)	Draw a pseudograph with the given adjacency matrix with respect to the ordering of vertices a, b, c, d. $\begin{bmatrix} 0 & 3 & 0 & 2 \\ 3 & 0 & 1 & 1 \\ 0 & 1 & 1 & 2 \\ 2 & 1 & 2 & 0 \end{bmatrix}$	3
	c)	Write down properties of graph invariant. Determine whether the graphs G and H displayed in below are isomorphic justify your answer. 	4
6.	a)	Determine the given graph is planar or not. If planar then re draw it. 	2
	b)	Discuss THE FOUR COLOR THEOREM in short. What is the chromatic number of K_n. Explain?	4
	c)	Explain how decision is taken by using a decision tree. Generate a decision tree that orders the elements of the list a, b, c.	4
7.	a)	Answer these following questions about the rooted tree illustrated. i) Which vertices are internal? ii) Which vertices are children of f? iii) Which vertices are siblings of g? iv) Is the rooted tree a full m-ary tree for any positive integer m? 	3
	b)	Which of these graphs are trees?(Graphs are named G1, G2, G3 in sequence) 	2

	e)	In which order an inorder and postorder traversal visit the vertices of the given ordered rooted tree. 	3
	e)	Draw a spanning tree of the following graph. 	2

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Course Code: **CSE 1202** 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)	Consider you have a series like the following 1+3+5+ … + 99 Write a "C" program code that can sum up the series.	4
	b)	Explain the basic structure of C with appropriate example.	3
	c)	Explain the importance of comments and describe the two types of comments used in C programming.	3
2.	a)	What is variable and what is meant by the value of a variable? What are the rules for naming of a variable?	3
	b)	When dealing with very small or very large numbers, what steps would you take to improve the accuracy of the calculations.	3

	c)	What is the output of the following segment when executed, explain it?
		int m = -14, n = 3;
		printf("%d\n", m/n*10);
		n = -n;
		printf("%dn", m/n*10);
			4

3.	a)	Explain the syntax of **do … while** structure. Write a C program to find the factorial of a number using **while** loop, where the number *n* is entered by the user.	5

	b)	Consider the following code snippet
		
		#include <stdio.h>
		
		int main()
		
		{
		
		int a = 9;
		
		a = a >> 2
		
		printf("%d\n", a);
		
		}
		
		What should be the output for this code snippet?
			3

	c)	What is the difference between "a" and "a"	2
4.	a)	Define unary and ternary operator with suitable example.	3
	b)	When does C perform automatic type conversions in expression? Mention the general rules that a C compiler follows during automatic type conversion.	4
	c)	Discuss how initial values can be assigned to a multidimensional array.	3
5.	a)	What are the points are to be noted while calling a function?	2

	b)	Write the prototype of a function named *search* that takes an integer value and an integer type array as arguments and returns the array index where the value is first found.	
	c)	What do mean by the following terms: Scope, Visibility and Lifetime of a variable?	3
	d)	State the problems we are likely to encounter when we pass global variables as parameters to functions.	2
6.	a)	Explain how the structure variable passed as a parameter to a function with example.	3
	b)	Write a C program to concatenate two strings without using built-in function strcat.	3
	c)	List string manipulation library function and explain each of them with example.	4
7.	a)	State the meaning of the following declaration: double (*f)()	2

	b)	What is the output of the following code?
		int m[2];
		int *p = m;
		m[0] = 100;
		m[1] = 200;
		printf("%d%d",++p*, *p);
			3

	c)	Write a C program to swap two numbers using call by pointers method.	3
	c)	What are the advantages and disadvantages of pointer data type?	2

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Year: First | Semester: Second
Course Code: MAT 1221 | Course Title: Differential & Integral Calculus
Time: Three hours | Marks: 50

(Answer any five of the following questions)

1.a) Define limit (epsilon delta definition). Draw the graph of the following function. i) $y = e^x$ ii) $y = 3^x$ iii) $y = 3^{-x}$ — 5

b) Evaluate the following limit — 5
i) $\lim_{x\to\infty}\left(\sqrt{x^6+5}-x^3\right)$ ii) $\lim_{x\to\infty}\left(\sqrt{x^6+5x^3}-x^3\right)$ iii) $\lim_{x\to-\infty} e^{-x}$

2.a) Define continuity at an interval. A function f(x) is defined as follows, — 5
$f(x) = -3+2x$ when $-3/2 \le x < 0$
$= 3-2x$ when $0 \le x < 3/2$
$= -3+2x$ when $x \ge 3/2$
Determine the continuity of the function $f(x)$ at $x = 0$ and x=3/2.

b) What do you mean by differential coefficient? Find from the first principle the differential coefficient of x^2+3x+1 *and* e^x — 5

3.a) State and prove the Leibnitz theorem — 5

b) Find y_3 if $y = e^{\frac{1}{x}}$. Show that $(1-x^2)y_{n+2} - xy_{n+1}(2n+1) - (n^2+a^2)y_n = 0$ when $y = e^{a\sin^{-1}x}$ — 5

4.a) State and prove the Mean value theorem. — 5

b) Find the value of c in the mean value theorem if i) $f(x) = x^2, a = 1, b = 2.$ ii) $f(x) = \sqrt{x}, a = 4, b = 9.$ — 5

5.a) What do you mean by maxima and minima of a function? Write down the Necessary and sufficient condition. Examine for maxima and minima of x^5. — 5

b) Find the maximum and minimum values of u. Where $u = \frac{4}{x}+\frac{36}{y}$ *and* $x+y=2$. — 5

6. Integrate any four (4) of the following — 10
i) $\int sin3xcos2xdx$ ii) $\int \frac{dx}{x\sqrt{(x^2-a^2)}}$ iii) $\int \sin^{-1}\frac{2x}{1+x^2}dx$ iv) $\int x^3e^x dx$ v) $\int \frac{dx}{x^2+x+1}$
vi) $\int \frac{1}{\sqrt{x}}\cos\sqrt{x}\,dx$ vii) $\int \sqrt{1+\sin x}\,dx$

7.a) If f is continuous on [a.b] and F is any anti derivative of f on [a.b], then prove that $\int_a^b f(x)dx = F(b) - F(a)$ — 5

b) Find the area of the surface that is generated by revolving the portion of the curve $y = x^3$ between x = 0 and x = 1 about the x-axis. — 5

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Course Code: **EEE 1223** Time: **3.00 hours**

Course Title: **Basic Electronics** 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]

[N.B. ***Answer any Five (5) Questions, Number of each question is indicated to the right***]

1.	(a)	Explain the energy band diagram of metal, insulator and semiconductor.	3
	(b)	Give the mechanism of hole current flow in a semiconductor. Why number of electrons and holes are equal in intrinsic semiconductor?	2+2=4
	(c)	Why silicon is preferred over germanium as semiconductor devices?	3
2.	(a)	Explain the different biasing of the pn junction and draw the characteristic curve.	4
	(b)	Give the name of different semiconductor diodes with their symbols.	3
	(c)	An ac voltage of peak value 15 V is connected in series with a silicon diode and load resistance of 680Ω. If the forward resistance of the diode is 22Ω, calculate (i) peak current through diode, (ii) peak output voltage.	3
3.	(a)	What is zener diode? Explain how and how zener diode used as a voltage regulator?	1+2=3
	(b)	With a neat sketch, explain the working of a full wave rectifier and calculate its efficiency.	3+4=7
4.	(a)	What is BJT? Explain the different types of transistor.	1+2= 3
	(b)	How you draw the dc load line on the output characteristics of a transistor? What is its importance?	3+1=4
	(c)	Establish the relation between α and β of a BJT.	3
5.	(a)	Draw the forward and reverse bias characteristics of a p-n junction diode and explain them qualitatively.	6
	(b)	Describe the potential divider biasing method for transistor. How stabilization of operating point is achieved by this method.	3+1=4
6.	(a)	Does thermal runway take place in FET? Why?	2
	(b)	Draw the symbols of different types of JFET and MOSFET.	2
	(c)	Explain the construction and working principle of depletion mode type MOSFET.	3+3=6
7.	(a)	What is Op-Amp? Write down the idealized characteristics of an Op-Amp.	1+2=3
	(b)	Drive expressions for voltage gain for inverting and non-inverting Op-Amp.	3
	(c)	Explain Op-Amp as (i) summing amplifier and (ii) integrator amplifier.	4

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1st Year 2nd Semester Final Examination' 2018 (Session: 2017-18)

Course Title: Economics; Course Code: ECO 1225

Time: 3.00 Hours | Full Marks: 50

Answer Any Five from the Given Questions

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

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1. (a) What is Economics and why do we study Economics? 3
   (b) Describe a command economy and a laisess-faire economy. Do any economic systems in the world reflect the purest forms of command or laissez faire economies? Explain. 4
   (c) Dr. Faruq is a dentist who performs two basic procedures: filling cavities and whitening teeth. Faruq charges tk.4000 per cavity filled a process that takes him 15 minutes per tooth and requires no help or materials. For tooth whitening, a process requiring 30 minutes, Faruq charges tk. 12000 bet of materials. Again, no help is required. Is anything puzzling about Falk's pricing pattern? Explain your answer. 3

2. (a) Define the law of demand. Why do demand curves for most goods slope downwards to the right? 3
   (b) What is meant by demand function? Suppose a demand function is given as D =20-2p and supply function is given as S = -30 + 2p. Will there be a realistic equilibrium output? 4
   (c) Derive a demand curve from the demand function Q = 50-10p. 3

3. (a) What are the types of elasticity and how are they calculated? 5
   (b) Show the relationship between elasticity and total revenue of a firm. 5

4. (a) Formally describe budget constraint. 3
   (b) How can we allocate income among goods and services to maximum utility? 4
   (c) Diminishing marginal utility results in the downward sloping demand curve. Explain. 3

5. (a) Show relationship among total, marginal, and average product graphically. 4
   (b) Briefly describe production function with two variable factors of production 3
   (c) Describe the process of choosing technology. 3

6. (a) What is the meaning of inflation? Explain the various degrees of inflation. 4
   (b) Discuss the circular flow of Economics. 4
   (c) What is the effect of fiscal policy in the Keynesian model? 2

7. (a) Explain the multiplier intuitively. Why is that an in planned investment of tk. 100 raises equilibrium output by more than tk. 100? Why is the effect on equilibrium output finite? How do we know that the multiplier is 1/MPS? 10