26-28

Department of Computer Science and Engineering
Begum Rokeya University, Rangpur
2^{nd} Year 1^{st} Semester Final Examination - 2015 (Session: 2013-14)
Full Marks: 50 CSE 2101: Discrete Mathematics Time: 3 Hours

[Answer any **five** questions of the following. Each question carries a total of 10 marks]

1. (a) What is a bit string? Find the bitwise **OR**, bitwise **AND**, and bitwise **XOR** of the bit strings 0110110110 and 11 0001 1101. (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 $p \rightarrow q$ 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) Prove that if $n = ab$, where a and b are positive integers, then $a \leq \sqrt{n}$ or $b \leq \sqrt{n}$ (3)

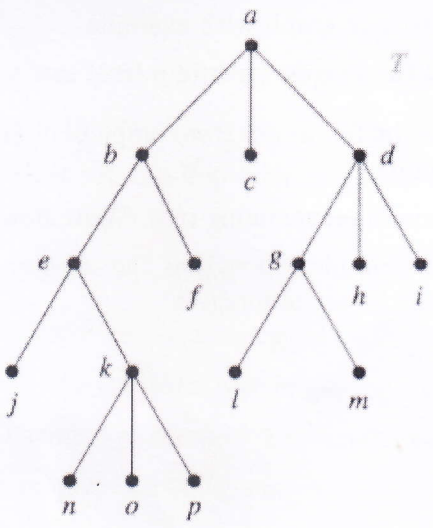
   (b) Explain *proof by contradictions* with an example. (2)

   (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)

3. (a) Prove that if n is a composite integer, then n has a prime divisor less than or equal to $\sqrt{n}$. (2)

   (b) In which order does a postorder traversal visit the vertices of the ordered rooted tree T shown in the Figure ? Illustrate your answer. (3)



   (c) Recursively define the tree traversal algorithms on a ordered rooted tree. (2)

   (d) Use Modular exponentiation algorithm to find 7^{644} **mod** 645 (3)

4. (a) Compute each of these double sum: (3)

$$i)\sum_{i=0}^{2}\sum_{j=0}^{3} i^2 j^3 \quad ii)\sum_{i=0}^{3}\sum_{j=0}^{2}(3i+2j)$$

(b) A sequence of 10 bits is randomly generated. What is the probability that at least one of these bits is 0? (1)

(c) Give definition of the followings: i) arithmetic progression ii) geometric progression iii) fibonacci sequence iv) floor and ceiling functions (4)

(d) Briefly describe an algorithm to find a spanning tree for a connected graph. (2)

5. (a) Prove that a tree with n vertices has $n-1$ edges. (2)

(b) Describe the extended Euclidean algorithm using pseudocode. Use the extended Euclidean algorithm to express $gcd(144, 89)$ as a linear combination of 144 and 89. (5)

(c) In how many ways can a photographer at a wedding arrange six people in a row, including the bride and groom, if (3)

a) the bride must be next to the groom?

b) the bride is not next to the groom?

c) the bride is positioned somewhere to the left of the groom?

6. (a) Define set and symmetric difference of sets. (2)

(b) Discuss operation on nonempty set. (4)

(c) Briefly discuss bipartite graph with example. (3)

(d) How can you find the longest path in a tree? (1)

7. (a) What do you mean by full m-ary tree,complete m-ary tree and balanced m-ary tree? Explain with example. (3)

(b) Define tree and minimum spanning tree. Write down the differences between them. (3)

(c) Define poset with example. Show that the 'greater than or equal' relation ($\geq$) is a partial ordering on the set of integers. (4)

Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

Semester Final Examination-2015 | 2nd year 1st Semester | Session: 2013-2014

Course Title: Digital Logic Design | Course Code: CSE 2102

Time: 3.0Hours | Full Marks: 50

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

1.	(a)	What are the different ways to represent the numerical values?	2
	(b)	What do you mean by digital and analog systems? Write the advantages of digital techniques.	2+2=4
	(c)	Explain different methods used to represent negative numbers in binary system.	2
	(d)	Convert: (i) decimal to binary 277.35; and (ii) binary to decimal 100110.101	2
2.	(a)	What are the different fundamental logic gates? Explain their function with symbol and truth table.	1+3=4
	(b)	Write the Boolean theorems.	3
	(c)	Show how a two-input NAND gate can be constructed from two-input NOR gate.	2
	(d)	Convert the given gray code number to equivalent binary: 1001001011110010.	1
3.	(a)	What do you mean by SOP and POS?	2
	(b)	What are Minterms and Maxterms?	2
	(c)	Simplify $x= A\overline{B}C+\overline{A}BD+\overline{C}\,\overline{D}$ and draw the final logic diagram.	2
	(d)	Simplify the following Boolean function using K-map $F(w,x,y,z) = \sum(1,3,7,11,15)$.	4
4.	(a)	Define the following terms related to filp-flops: set-up time, hold time, propagation delay and show their position in a wave.	3
	(b)	Explain working of master-slave JK flip-flop with necessary logic diagram and state diagram.	4
	(c)	Describe potential timing problem in FF circuits.	3
5.	(a)	Distinguish between combinational logic and sequential logic.	2
	(b)	Explain the working procedure of a full adder with proper logic circuit and signals.	3
	(c)	What do you mean by MOD number of counter? Explain the working of a MOD-16 synchronous counter with proper circuit diagram.	1+4=5
6.	(a)	Define decoder and encoder. Write their applications.	1+1=2
	(b)	Write the working of 1-of-8 line decoder.	4
	(c)	Design a BCD to decimal decoder.	4
7.	(a)	What are multiplexer and demultiplexer? Write their major applications.	1+1=2
	(b)	Explain the working function of 1-line-to-8-line demultiplexer.	6
	(c)	What are the difference between decoder and demultiplexer?	2

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Begum Rokeya University, Rangpur

Semester Final Examination-2015 2nd year 1st Semester Session: 2013-2014

Course Title: Introduction to Business Course Code: BUS 2123

Time: 3.0Hours Full Marks: 50

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

1.	(a)	"Management is indispensible in every sphere of life"- elaborate.	3
	(b)	Do you agree that a manager can be successful without having necessary skills? How such skills can be acquired?	4
	(c)	Show the management process with the help of diagram.	3
2.	(a)	What are the major industrial activities that identify by Henri Fayol?	3
	(b)	Why Henry Fayol is called the father's of modern management?	4
	(c)	What are the principles of scientific management?	3
3.	(a)	Define the theory "Z".	3
	(b)	Describe the ten managerial roles that are essence for any industry.	3.5
	(c)	Show the diagram of business environment.	3.5
4.	(a)	Explain the motivation process with the help of diagram.	3
	(b)	Elaborate with critical appreciation Maslow's Hierarchy of Need theory.	4
	(c)	Describe the non financial technique of motivation.	3
5.	(a)	Distinguish between centralization and decentralization.	2
	(b)	Discuss the Likert's four styles of managerial leadership.	3
	(c)	What are the situational theories of leadership?	5
6.	(a)	How can you distinguish between single use plan and standing plan?	2
	(b)	Describe the "SWOT" analysis.	4
	(c)	Discuss the Portfolio Matrix.	4
7.	(a)	Define time management.	2
	(b)	Why time is so much important in our life?	3
	(c)	Describe the time management grid.	5

Begum Rokeya University, Rangpur.

Department of Computer Science and Engineering

B.Sc. (Engg.) 2nd Year 1st Semester Final Examination-2015 (Session: 2013-14)

Course Title: Object Oriented Programming Language; Course Code: CSE 2104

Total Marks: **50** Time: **3.00 hours**

Answer any five from the given questions.

[Note: Numbers on right margin indicate the marks for each question. Answer the question sequentially]

1.	**a)**	What are the benefits of object oriented programming over procedural programming? Write down the features of OOP.	**3**
	b)	What gives Java its 'write once and run anywhere' nature?	**2**
	c)	What are class, object and method? Why main method is static?	**3**
	d)	What is byte code? Discuss the scope and lifetime of a variable.	**2**
2.	**a)**	What is *Constructor* in java? Why *constructor* does not have return type in java? Explain it with proper example.	**3**
	b)	Why do we need Static members and how to access them? Explain it with clear example.	**2**
	c)	Explain the access specifiers (Visibility Controls) supported by Java with an example code.	**3**
	d)	When you will use type casting explicitly and implicitly?	**2**
3.	**a)**	Define polymorphism and explain how dynamic binding is implemented in Java with an example code.	**3**
	b)	Difference between the *super* and *this* keyword.	**2**
	c)	Define a package, and give the list of steps used to create a package in Java. Explain with a sample code.	**3**
	d)	With example describe when do autoboxing happens in java?	**2**
4.	**a)**	What is the difference between static and non static methods?	**2**
	b)	Which class is the *super* class of all classes in Java? List at least five methods of this class.	**2**
	c)	What is the difference between *Shallow* and *deep* copying? What is an *inner class*? List the needs of inner classes.	**3**
	d)	State the features of an interface.	**3**
5.	**a)**	What are a Java Exception and its types? Define *try*, *catch* and *throw* in an Exception block.	**3**
	b)	What is the importance of finally block? How does finally block differ from finalize() method?	**3**
	c)	What is the difference between *throw* and *throws* clauses? Explain with a code	**2**
	d)	Why Runtime Exceptions are Not Checked?	**2**
6.	**a)**	Discuss parameter passing by value and by reference in JAVA with suitable examples.	**2**
	b)	What are wrapper classes? Why should we need a wrapper class?	**3**
	c)	What is polymorphism? Write a java program that uses polymorphism. Give self explanatory comments in your program.	**3**
	d)	Explain the detail about generic classes and methods with suitable example	**2**
7.	**a)**	What do you mean by multithreading? Explain why support for concurrency is necessary for any programming language that is used to build a Graphical User Interface (GUI).	**1+3**
	b)	Describe the algorithm used in Thread scheduling.	**3**
	c)	Describe synchronization in respect to multithreading. What are the different levels of locking used in the synchronization keyword?	**3**

Begum Rokeya University, Rangpur.

Department of Computer Science and Engineering

B.Sc. (Engg.) 2nd Year 1st Semester Final Examination-2015 (Session: 2013-14)

Course Title: Ordinary Differential Equation; Course Code: MAT 2121

Time: **3.00 hours** Total Marks: **50**

Answer any five from the given questions.

[Note: Numbers on right margin indicate the marks for each question. Answer the question sequentially]

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1. a) Define ODE. Give some examples. Find the differential equation arising from the relation $x(t) = A\cos 2t + B$. **4**

b) Define general solution of a differential equation. Show that $f(x) = 2e^{3x} - 5e^{4x}$ be the solution of the equation $\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 12y = 0$. **4**

c) Solve $(2xy + 1)dx + (x^2 + 4y)dy = 0$. **2**

2. a) What is exact differential equation? Solve $(3x^2 + 4xy)dx + (2x^2 + 2y)dy = 0$. **4**

b) Show that the transformation $y = \vartheta x$ reduces a first order homogeneous equation into a separable equation. **4**

c) Solve $2r(s^2 + 1)dr + (r^4 + 1)ds = 0$. **2**

3. a) Define first order linear ODE. Find the solution of $\frac{dr}{d\theta} + r\tan\theta = \cos\theta$. **5**

b) What do you mean by particular solution of a differential equation? Solve the IVR $(x + y)dx - xdy = 0, y(0) = 3$. **5**

4. a) Define orthogonal and oblique trajectories. Find the orthogonal trajectories of the family curve $cx^2 + y^2 = 1$. **5**

b) Find a family of oblique trajectories that intersect the family of circles $x^2 + y^2 = c^2$ at angle $45°$. **5**

5. a) Find the general solution of the equation $\frac{d^3y}{dx^3} - 5\frac{d^2y}{dx^2} + 7\frac{dy}{dx} - 3y = 0$ **5**

b) What is the initial value problem? Find the particular solution of the IVP $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 8y = 0$, $y(0) = 1, y'(0) = 6$. **5**

6. a) Define integrating factor. Solve the differential equation $(5xy + 4y^2 + 1)dx + (x^2 + 2xy)dy = 0$ by first finding an integrating factor. **5**

b) Solve $(D^3 - D^2 + 4D - 4)y = 68\,e^x \sin x$ by using operator method. **5**

7. Define singular point and regular singular point. Use the method of the Frobenius to find the solution of the differential equation $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + (x^2 - 1)y = 0$. **2+8**

Begum Rokeya University, Rangpur

Department of Computer Science & Engineering

B.Sc. (Engg.) 2nd Year 1st Semester Final Examination-2015 (Session: 2013-14)

Course title: Basic Statistics & Probability; Course code: STA 2125

Time: 3.00 (Hours) **Full marks: 50**

[Answer any five of the following questions. All questions carry equal marks]

1. **a)** Define Statistics. Distinguish between descriptive statistics and inferential statistics. Explain and illustrate the function and importance of different modern Statistical techniques in Computer Science & Engineering. **5**

   b) Give a brief description of various graphs and diagrams for representing statistical data. The following data represent the marks obtained by 20 students of CSE dept. in a Statistics test. **5**

   34 17 32 5 24 35 16 34 25 22 26 13 8 14 21 23 19 25 28 9

   Use a steam and leaf plot to display the data and then comment.

2. **a)** Define a frequency distribution. What is the purpose of constructing a frequency distribution? Compare and contrast various levels of measurement. **5**

   b) The following is a frequency distribution of the final examination scores of 200 students obtained in a three-week course in Statistics. **5**

Scores	Number of students
0-19	24
20-39	55
40-59	76
60-79	32
80-99	13
Total	200

   Draw a histogram, a frequency polygon and an ogive. Calculate the mean, median, mode and the standard deviation.

3. **a)** What do you mean by measures of central tendency and measures of location? Write down the different measures of central tendency. Following are the 5 days closing price of two stocks (in taka) **Stock A:** 180,179,182,178,181 **Stock B:** 27, 30,24,33,21 **5**

   Which stock should be purchased and why?

   b) Six samples of sizes 150, 155, 140, 148, 135 and 160 were taken from the students of Begum Rokeya University, Rangpur, giving the mean heights 131.06, 143.26, 152.40, 155.45, 134.11 and 146.30 cm, respectively. Estimate the mean height of the students. **5**

4. **a)** What is dispersion? What do you mean by absolute and relative measures of dispersion? Explain the necessity of studying dispersion with a suitable example. Among the different measures of dispersion, which one is the best and why? **5**

   b) The number of students admitted in CSE Department of two private universities in different years are as follows: **5**

University-I	155, 165, 170, 190, 220, 250, 250
University-II	300, 355, 360, 360, 360, 400, 400

   Are the variations in admission of students in different years in two universities same?

5. a) How do you distinguish correlation analysis from regression analysis? Give examples of their practical utility. What do you mean by regression model? Distinguish between a Stochastic model and deterministic model. 5

b) The police Head Quarter of Bangladesh is considering increasing the number of police officers in an effort to reduce cyber crime in Rangpur Division. The chief of Police gathered the following sample information: 5

Districts	Police Officers	Number of Crimes
Rangpur Sadar	15	17
Bogra	17	13
Gaibandha	25	5
Kurigram	27	7
Nilphamari	17	7
Dinajpur	12	21
lalmonirhat	11	19
panchagarh	22	6

i) If we want to estimate crimes on the basis of the number of police, which variable is the dependent variable and which is the independent variable?
ii) Draw a scatter diagram.
iii) Determine the coefficient of correlation and interpret.
iv) Determine the coefficient of determination and interpret.

6. What do you mean by coefficient of correlation? What does the correlation coefficient measure? Show that coefficient of correlation in independent of origin and scale of measures. Find the coefficient of correlation of the following data: 10

X:	5	10	15	25	30	35	40	45
Y:	5	32	44	32	39	49	55	60

7. Define probability. Write down the types of probability. Distinguish between probability and possibility. State and prove Bayes Theorem. 10