

Department of Information and Communication Engineering

Noakhali Science and Technology University

Term Final Examination, 2019

Year: 2, Term: II, Session: 2017-2018

Course Code: ICE-2201

Course Title: Programming with Java

Time: 4 Hours

Marks: 70

Answer any seven of the following questions.

Marks

- 1 (a) Why java language is called platform independent programming language? 2
(b) Define package and interface. Differentiate between Java and C++ programming language. 3
(c) What do you mean by java buzzword. Describe about the following features of Java language: Portable, Secured, Robust, Multithreaded and Distributed. 5
- 2 (a) Differentiate between StringBuffer and StringBuilder Class. 2
(b) Why string objects are immutable in java? Explain with an example. 3
(c) How many methods are available in java for comparing one string to another string? Explain equals() method with example. 4
(d) What is the functionality of toString() method in java? 1
- 3 (a) Define stream. Write the InputStream Hierarchy in java. 3
(b) Write a java program to read all characters from a file named test.txt using FileInputStream class. 3
(c) What is Serialization in Java? Explain java serialization with a program. 4
- 4 (a) Define Exception Handling and describe about the different types of Java Exceptions. 3
(b) What are the advantages of using exception handling in java? Explain the problem without exception handling and give the solution. 5
(c) Write the syntax for nested try block. 2
- 5 (a) Define applet in Java. What are the differences between an applet and a standalone Java application? 3
(b) Show Applet architecture. 2
(c) What are the required steps for converting an application to an applet? Write them with an example in proper sequence. 3
(d) Write the process for invoking an Applet and explain the following code with output. 2

```
<html>
<title>The Hello, World Applet</title>
<hr> <applet code = "HelloWorldApplet.class" width = "320" height = "120">
    If your browser was Java-enabled, a "Hello, World"
    message would appear here.
</applet>
<hr>
</html>
```

- 6 (a) What is socket programming? 1
(b) Explain the procedure of Java socket programming with java program where client sends a text and server receives and prints it. 4
(c) Describe about the constructors of java URL class. 3

- (d) Write a java program to print fibonacci series without using recursion.
7. (a) Write the list of methods and a little trick which makes thread communication. 1
 (b) Write the rules for abstract class and method declaration. 3
 (c) What is virtual method? What properties are necessary to use a virtual method? Explain. 3
 (d) "Using the object of the subclass you can access the members of a super class". How 3
8. (a) What is JDBC? 1
 (b) What is a JDBC driver? How many JDBC drivers are available? 2
 (c) Illustrate JDBC architecture with proper figure 3
 (d) If you have different types of databases, then how you can connect JDBC to non-conventional databases? 4
9. (a) What is the functionality of Java InetAddress class? 2
 (b) Write a java program to get ip address of www.nstu.edu.bd website. 3
 (c) Define DatagramSocket and DatagramPacket in java. Explain the functionality of Commonly used Constructors of DatagramSocket class. 3
 (d) Draw the Java AWT Hierarchy. 2

Time: 4 Hours Total Marks: 70
 [Answer any seven of the following questions. Figures in the right margin indicate full marks]

- | | | Marks |
|----|--|-------|
| 1. | (a) What do you understand by the term "Physical topology of a network"? Make a comparative analysis of different network topologies. | 5 |
| | (b) What are the criteria necessary for an effective and efficient network? | 3 |
| | (c) Why protocols are necessary in Data Communication? | 2 |
| 2. | (a) Briefly describe the seven layers of the OSI protocol hierarchy. | 5 |
| | (b) What is "Logical Connection" between layers? Show the logical connections between the layers of TCP/IP protocol suite. | 3 |
| | (c) "Without Protocol Layering, data communication is impossible", - do you agree with this statement? Explain your answer. | 2 |
| 3. | (a) What is composite signal? Illustrate how distortion can affect composite signal. | 3 |
| | (b) What are three important characteristics of a periodic signal? Write down the differences between periodic and aperiodic composite signals. | 3 |
| | (c) A nonperiodic composite signal has a bandwidth of 200 kHz, with a middle frequency of 140 kHz and peak amplitude of 20 V. The two extreme frequencies have an amplitude of 0. Draw the frequency domain of the signal. | 2 |
| | (d) The loss in a cable is usually defined in decibels per kilometer (dB/km). If the signal at the beginning of a cable with -0.3 dB/km has a power of 2 mW, what is the power of the signal at 5 km? | 2 |
| 4. | (a) Why data rate limits over a channel? What are the formulas to calculate theoretical maximum bit rate for noiseless and noisy channel. | 2+2 |
| | (b) Distinguish between baseband transmission and broadband transmission. | 3 |
| | (c) Write your understanding about Throughput, Latency and Jitter of a network? | 3 |
| 5. | (a) Draw digital signal encoding format for the following latter codes for binary input 01001100011
(i) NRZ-L (ii) NRZ-I (iii) Bipolar-AMI (iv) Pseudoternary (v) Manchester (vi) Differential Manchester | 4 |
| | (b) Describe the pulse code modulation technique with figure. | 3 |
| | (c) Define Transmission time. What is the transmission time of a packet sent by a station if the length of the packet is 1 million bytes and the bandwidth of the channel is 200 kbps? | 3 |
| 6. | (a) Describe the propagation methods used for unguided media. | 3 |
| | (b) What is digital to analog conversion? What are the types of digital to analog conversion? Explain FSK with proper diagram. | 4 |
| | (c) You need to send data 3 bits at a time at a bit rate of 3 Mbps. The carrier frequency is 10 MHz. Calculate the number of levels, the baud rate and the bandwidth. Draw the figure of | 3 |

the allocation of frequencies and bandwidth.

7. (a) Explain the concept of a constellation diagram. Show the constellation diagrams for an ASK (OOK), BPSK and QPSK signals. 2+2
- (b) What do you mean by Amplitude Modulation? Explain Amplitude Modulation with diagram and show AM band allocation. 1+3
- (c) Write short note on: (i) QAM (ii) FSK. 2
8. (a) Discuss the comparison among radio wave, microwave and infrared by means of advantages, disadvantages and application. 4
- (b) What are the differences between STP and UTP cables? 3
- (c) What do you mean by fiber optic cable? Explain the advantages and disadvantages of optical fiber. 3
9. (a) Categorize multiplexing. Describe the goals of multiplexing and demultiplexing. 4
- (b) Define spread spectrum and its goal. Discuss the two spread spectrum technique. 4
- (c) Five channels, each with a 100-kHz bandwidth, are to be multiplexed together. What is the minimum bandwidth of the link if there is a need for a guard band of 10 kHz between the channels to prevent interference? 2

Department of Information and Communication Engineering
Noakhali Science and Technology University
Term Final Examination, 2019

Year: 2, Term: 2, Session: 2017-2018

Course Code: ICE 2209

Course Title: Electromagnetic Fields and Waves

Time: 3 Hours

Marks: 70

- | | Marks |
|--|-------|
| 1. (a) What do you mean by vector magnetic potential? | 2 |
| (b) Explain the boundary conditions for magnetostatic fields. | 4 |
| (c) Prove that electric field intensity at any point P is a vector sum of electric intensities due to each charge acting alone. | 4 |
| 2. (a) Prove that the emf induced in the close circuit equals the negative time -rate of change of the magnetic flux linking a circuit applies to a stationary circuit as well as a moving one. | 5 |
| (b) Explain the fundamental equations of electromagnetic fields theory. | 5 |
| 3. (a) Electromagnetic radiation from the sun travels to the earth with an intensity of 1500 W/m^2 . If we are considering a single electromagnetic wave, find the value of peak electric and magnetic fields. | 4 |
| (b) Define phase velocity, group velocity, TEM waves. | 4 |
| (c) What do you mean by intrinsic impedance of a medium? | 2 |
| 4. (a) Explain the four functional parameter (attenuation constant, phase constant, intrinsic impedance, phase velocity) for the case of low loss dielectrics. | 6 |
| (b) Find the electric field intensity and potential due to an infinite line of charge. | 4 |
| 5. (a) Drive the nonhomogeneous wave equation for vector potential A. | 4 |
| (b) State and explain faraday's law of electromagnetic induction. | 3 |
| (c) Define wavenumber. How is wavenumber related to wavelength? | 3 |
| 6. (a) The electric field intensity of a linearly polarized uniform plane wave propagating in the +Z direction in the seawater is $\vec{E} = \vec{a}_x 100 \cos(10^7 \pi t) \text{ V/m}$ at $z = 0$. The constitutive parameters of seawater are $\epsilon_r = 72$, $\mu_r = 1$ and $\sigma = 4 \text{ (S/m)}$ | 5 |
| (a) Determine the attenuation constant (α), phase constant (β), intrinsic impedance (η), phase velocity (v_p), wavelength (λ) and skin depth (δ) | |
| (b) What is the value of the intrinsic impedance of good conductor? | 3 |
| (c) What is meant by loss tangent of a medium? | 2 |
| 7. (a) Discuss briefly about self-inductance and mutual inductance. | 5 |
| (b) Show that the total magnetic energy associated with two mutually couple circuit can be written as $W_m = \frac{1}{2} L_1 I_1^2 + \frac{1}{2} L_2 I_2^2 + M I_1 I_2 \text{ (J)}$, where the symbols have their usual meaning. | 5 |

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8. (a) Prove that the total displacement or electric flux through any closed surface surrounding the charge is equal to the amount of charge enclosed. 6
- (b) Show that the magnetic field of a circular current carrying loop $\vec{B} = \frac{\mu M}{2\pi r^3}$ 4
- Where symbols have their usual meanings.
9. (a) State and explain stoke's theorem. 4
- (b) What are the properties of uniform plane waves? 3
- (c) Find out the relationship between phase velocity (u_p) and group velocity (u_g). 3

$$F_m = q(E + v \times B)$$

Department of Information and Communication Engineering
Noakhali Science and Technology University
Term Final Examination, 2019
Year: 2, Term: II, Session: 2017-2018

Course Code: ICE-2207

Course Title: Database Management Systems

Time: 4 Hours

Marks: 70

Answer any seven of the following nine questions.

Marks

1. (a) In which perspective do you think that the DBMS is important? 2
(b) You may know file processing system. If so, define it. 2
(c) Do you find any disadvantages of file processing system? Discuss against your answer. 3
(d) Define database schema and database instance. 3
2. (a) How can you classify the database user? Show your debate for distinct categories of database user. 2+3
(b) Suppose you are given the following requirements for a simple database for the NSTU Premiere League (NPL): 5
- The NPL has many teams
 - Each team has a team name, a department name, a coach, a captain, and a set of players
 - Each player belongs to only one team
 - each player has a player name, a position (such as cover, square leg or wicket keeper), a skill level (bowler, batsman, allrounder etc.), and a set of injury records
 - A team captain is also a player
 - A game is played between two teams (referred to as team_A and team_B) and has a date (such as July 11th, 2016) and a score.

Now, Construct a clean and concise ER diagram for the NPL database.

3. (a) Describe about various Data types in SQL. 2
(b) What do you mean by integrity constraints? 2
(c) Consider the following tables: 6
- Employee (Emp_no, Name, Emp_city)
Company (Emp_no, Company_name, Salary)
- i. Write a SQL query to display Employee name and company name.
ii. Write a SQL query to display employee name, employee city, company name and salary of all the employees whose salary > 10000
iii. Write a query to display all the employees working in 'XYZ' company.
4. (a) What is transaction? Explain the ACID properties of a transaction. 1+2
(b) What is CLAUSE? What is the difference between a HAVING CLAUSE and a 1+2



- WHERE CLAUSE?
- (c) How you can drop an attribute from an existing relation? Explain with example. 4
5. (a) Define Data Models and list the types of Data Model 2
- (b) Explain the difference between a weak and strong entity set with example 2
- (c) How can we represent entity sets with composite attributes? Explain with an example 2
- (d) Explain generalization and specialization with example. 4
6. (a) What do you mean by redundancy? How this can be avoided? 2
- (b) Draw an E - R Diagram for Banking System. 5
- (c) Explain the partial and total participation constraints with example. 3
7. (a) Explain the converting procedure of Non-Binary Relationships to Binary Form. 3
- (b) Explain Closure of Set of Functional dependency and Closure of Attribute sets 2
- (c) Consider the universal relation $R = \{A, B, C, D, E\}$. $F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$. Is the above decomposition a lossless join or not? 3
- (d) What is transitive dependency? 2
8. (a) What is the need of the normalization? Explain the first three steps involed in the normalization. 2
- (b) Consider the universal relation $R = (A, B, C, D)$ and the set of functional Dependencies $F = \{AB \rightarrow C, AB \rightarrow D, C \rightarrow A, D \rightarrow B\}$. 4
- i) Is R in 3NF, why? If it is not, decompose it into 3NF.
- ii) Is R in BCNF, why? If it is not, decompose it into BCNF
- (c) What is lossy and lossless decomposition? Explain with example 4
9. (a) Between SAN and NAS, explain which one is comparatively better. 2
- (b) Is there any algorithm to optimize Disk-Block Access? If yes, explain the algorithm. 3
- (c) Define RAID and describe its all level from 0 to 6. 5

Alter Drop table A

Department of Information and Communication Engineering
Noakhali Science and Technology University

Term Final Examination-2019, Year-2, Term-II
B.Sc. (Eng.), Session: 2017-2018, October'19

Course Code: Math-2211

Course Title: Laplace, Fourier series and Complex Variables

Total Marks: 70

Time: 4 hours

(Answer any Seven of the following questions. The right hand margin indicates full marks)

1(a)	Define Laplace Transform and inverse Laplace Transform.	2
(b)	State and prove the change of scale property.	5
(c)	If $\mathcal{L}\{F(t)\} = f(s)$, then $\mathcal{L}\{F'(t)\} = s^2 f(s) - sF(0) - F'(0)$.	3
2(a)	Define continuous function. Prove that the function $f(z) = z ^2$ is continuous everywhere but not where differentiable except at the origin.	4
(b)	State Laurent's theorem. How Laurent's series converted to a Taylor's series. Expand $f(z) = 1/\{(z+1)(z+3)\}$ in a Laurent's series for the region $1 < z < 3$.	6
3(a)	State and prove the Cauchy-Riemann equations.	5
(b)	Define harmonic function. Determine the following function u is harmonic or not. If possible, find the conjugate harmonic function v and also find $f(z)$ in terms of z , $u = e^{-2xy} \sin(x^2 - y^2)$.	5
4(a)	State and prove the Cauchy theorem. Evaluate $\oint_C \bar{z}^2 dz$ around the circle $ z-1 =1$.	6
(b)	Define Contour integration. Use the complex variables technique to find the value of the integral $\int_0^{2\pi} \frac{d\theta}{5-4\sin\theta}$.	4
5(a)	Define periodic function, odd function, even function and Fourier series.	2
(b)	Find the Fourier cosine series.	4
(c)	State and prove Parseval's formula for Fourier series.	4
6(a)	Define Laplace Transform (L. T). Find the L. T of the following functions: (i) $F(t) = t^n$ and (ii) $F(t) = t^2 e^t \sin 4t$.	6
(b)	Solve the DE by using the L. T $y'' - y' - 2y = t^2$, $y(0) = 1$, $y'(0) = 3$.	4
7(a)	State and prove the Convolution theorem. Evaluate $L^{-1}\{1/s^2(s^2+4)\}$ by use of the Convolution theorem.	6
(b)	Define inverse Laplace Transform. Evaluate $L^{-1}\left\{\frac{5}{s-3} - \frac{2s}{s^2+25} + \frac{3}{s^2+4} + \frac{1}{s^4}\right\}$.	4
8	Evaluate the following by using the method of contour integration $i) \int_0^{2\pi} \frac{d\theta}{5+3\sin\theta}$	10

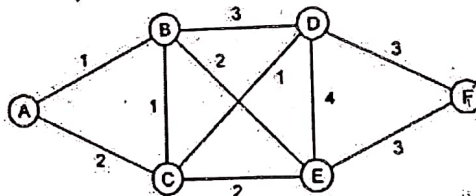
$$ii) \int_0^{2\pi} \frac{\sin 2\theta d\theta}{5 + 4\cos\theta}$$

9(a)	Find the Fourier Complex transformation of $F(x) = \begin{cases} 1 - x^2, & x < 1 \\ 0, & x > 1 \end{cases}$	5
(b)	Use the Fourier transform to solve $\frac{\partial U}{\partial t} = \frac{\partial^2 U}{\partial x^2}$, $x > 0$, $t > 0$ subject to the conditions $U(0, t) = 0$, $U(x, 0) = \begin{cases} 1, & 0 < x < 1 \\ 0, & x > 1 \end{cases}$ and $U(x, t)$ is bounded.	5

Answer any seven of the following questions.

Marks

1. (a) Define algorithm. What are the properties of an algorithm, explain. 4
- (b) What is asymptotic notation? Write down the types of asymptotic notation and explain. 6
2. (a) What is "Order of Growth" of an algorithm? 3
- (b) Define space complexity. Write the Merge sort algorithm and analyze the algorithm for deriving different notations of time and space complexity. 5
- (c) What do you understand by "Optimal Algorithm"? 2
3. (a) What is recurrence relation? Write and explain the recurrence relation of binary search. 3
- (b) Define amortized analysis. In which types of algorithms, amortize analysis is preferable? What is the difference between average case and amortized analysis? 3
- (c) Write an algorithm of your choice and do its worst case and amortized analysis. 4
4. (a) Suppose that, you have given an array of 20 integer numbers. You have to make a heap from this. Write two algorithms for this. One, that creates heap in $O(n \log n)$ time, and the other, that creates heap in linear time. Analyze the algorithms to prove that they actually take those times mentioned. 2+2+3
- (b) Explain the two heuristics that is applied on disjoint set data structure. Why those heuristics are necessary? 3
5. (a) Apply Dijkstra's algorithm to find the shortest route from the node A to rest of the nodes (Explain step by step). 4

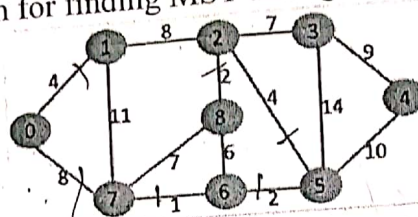


- (b) What is knapsack problem? Is it dynamic or greedy? Whichever option you choose, justify your answer for following 4 items where total weight is 7 and find out what would be the items for which you'd get max profit. 6

Items	weights	Benefits
1	1	1
2	3	4
3	4	5
4	5	7

6. (a) Explain the Divide and Conquer paradigm. 4
- (b) Write Quick sort algorithm and do its worst case and average case analysis. 6
7. (a) What is matrix chain multiplication problem? Write down the algorithm. 5
- (b) Apply the longest common sequence algorithm for $X = \langle GCGCAATG \rangle$ and $Y = \langle GGCCTAGCG \rangle$. Place X as row and Y as column. 5
8. (a) Why kruskal's algorithm is used for? Write down the work flow for solving a graph by kruskal's algorithm. 3

- (b) Solve the following graph for finding MST through prim's algorithm.



- (c) What is matrix? How many ways are there to represent matrix? Explain with examples.

9. (a) Input size of an algorithm depends on the problem instance- explain this.
(b) Write and explain the Depth-first search graph traversal algorithm.