

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-I

(Problem Solving Using C)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Discuss the features of an algorithm. When an algorithm is said to be efficient? Write an algorithm for generating the series of even natural numbers
2. Write a program to generate a Fibonacci series upto 10 terms. Explain the syntax of the program step by step.
3. Discuss various types of looping statements in C programming language with examples.
4. What are operators in C programming language? Explain operators with the help of examples.
5. Explain String handling functions in C. Write a C program to reverse a string entered from the keyboard and print it.
6. Differentiate between constant and variables in C language. Give examples to explain the concept. Give the rules for naming the variables in C.
7. Explain Type conversion in C with an example. Discuss the difference between Type conversion and Type casting in C with an example.
8. What is Function? Explain different types of functions with examples. Discuss about Global and Local variables.
9. What are pointers in C? Differentiate between arrays and pointers with examples.
10. Write short notes on any **Two** of the following:—
 - (a) Data types in C.
 - (b) Recursion.
 - (c) Formatted Input Output function
 - (d) Union in C.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-II

(Computer Organization)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Convert the following :—
 - (i) $(10001000111001)_2 = ()_{10}$
 - (ii) $(45C21D)_{16} = ()_8$
 - (iii) $(9673)_{10} = ()_8$
 - (iv) $(776645)_8 = ()_{16}$
2. Draw half adder and full adder circuits and give their truth tables.
3. Simplify the following using Karnaugh's map in terms of SOP and draw the circuit for the output expression: $F(A, B, C, D) = \sum(0, 1, 2, 3, 6, 8, 9, 10, 12, 14, 15)$
4. Simplify the expressions and draw the circuit diagram for the expressions given below:
 - (i) $AB'C' + (BC) + A'B'C + A'B$
 - (ii) $A'B'C + ACD + AB'D + (AB + CD)$
5. Draw a circuit diagram of 8×1 multiplexer. What is the use of a multiplexer?
6. Describe JK flip-flop and T flip-flop with their circuit diagram.
7. Discuss memory hierarchy in computers. What is the role of cache in computers?
8. Discuss some of the arithmetic and Logic instructions with their complete description.
9. Compare and contrast between Arithmetic Logic Unit and Control Unit.
10. Write short notes on any **two** of the following:—
 - (a) Counters
 - (b) Fundamental gates
 - (c) Assembly language
 - (d) Device drivers.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER–III

(Discrete Mathematics)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. (a) Define converse, inverse and contra positive of an implication with examples.
 (b) Show that $r \wedge (\sim r \vee \sim s)$ is neither a tautology nor a contradiction.
2. Prove that $\sqrt{2}$ is Irrational by giving a proof by contradiction.
3. Construct a truth table for each of the Boolean Expressions
 (a) $xy = x'.y'$ (b) $x(x + y')$
4. (a) If $A = \{1, 2, 3, 4\}$ and $B = \{2, 4, 5, 6\}$ then find
 (i) $(A \cap B) \times (A - B)$ (ii) $A \times (A - B)$ (iii) $(A \Delta B) \times (A \cap B)$
 (b) If $A = \{x \mid x \in N \text{ and } x < 3\}$, where N is a set of natural number.
 $B = \{x \mid x^2 - 16 = 0 \text{ and } x < 0\}$. Find $B \times A$.
5. Let $f : z$ be a function defined by $f(x) = 2x + 3$
 Let $g : z$ be a function defined by $g(x) = 3x + 2$
 Find (a) fog (b) gof
6. If ${}^n P_5 = 20 \times {}^n P_3$ find the value of n.
7. (a) Prove that ${}^n C_r + {}^n C_{r-1} = n + 1 C_r$.
 (b) In how many ways can 4 students be selected out of 12 students if (i) two particular students are not included at all, (ii) two particular students are included.
8. (a) Find the term Independent of x in the expansion $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$.
 (b) Expand $(x^2 - 4)^3$.
9. Three balls are drawn at random from a bag containing 6 blue and 4 red balls. What is the chance that two balls are blue and one ball is red ?
10. Find the remainder when $(10)^{907}$ is divided by 13.

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EXAMINATION PROGRAMME-2021
MCA, Part-I

Date	Papers	Time	Examination Centre
06.05.2022	Paper-I	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
07.05.2022	Paper-II	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
09.05.2022	Paper-III	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
11.05.2022	Paper-IV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
13.05.2022	Paper-V	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
17.05.2022	Paper-VI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
19.05.2022	Paper-VII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
23.05.2022	Paper-VIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
25.05.2022	Paper-I (Practical)	11.30 AM to 1.30 PM	Nalanda Open University School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
26.05.2022	Paper-VI (Practical)	11.30 AM to 1.30 PM	
27.05.2022	Paper-VIII (Practical)	11.30 AM to 1.30 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-IV
(Communication Skills)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer all Questions.

1. Read the following passage and answer the questions given below :—
Gandhiji always loved his people Muslims as much as Hindus. Even when Pakistan was formed, he spoke for the Muslims of India who were so few in comparison to Hindus. Many Hindus thought that he favoured the Muslims too much. Nathuram Godse held misguided ideas of his kind. At a prayer meeting at Birla House in New Delhi, Godse shot Gandhiji on 30th January 1948. The great soul died with 'Hey Ram' on his lips. He was murdered, yet he was calm and peaceful even in death. It seemed as if he were sleeping.
 - (a) Who murdered Gandhiji? 5
 - (b) Where and when was he assassinated ? 5
 - (c) The great soul died with_____ 5
 - (d) Did Gandhiji love his people Muslims as much as Hindus? 5
2. Define Communication and highlight its importance. 10
3. Define the role of Communication in business. 10
4. Explain the characteristics and benefits of group discussion. 10
5. Point out the difference between Bio-data/Resume/C.V. How to prepare them? 10
6. Point Out the barriers of communication. How to overcome them? 10
7. What is the role of media used in communication?. 10

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-V

(Systems Analysis and Design)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define System. Explain all the elements of a system?
2. Describe Analysis and Design phase of System Development Life Cycle (SDLC).
3. Draw Data Flow Diagram and develop SRS for Railway Reservation System.
4. Define Information. What are the various approaches of development of an Information system? Explain in detail.
5. Define SRS. Describe the characteristics of a SRS and the rules for specifying Software Requirements.
6. Why documentation is important in Software development? Explain at least two types of documentation reports prepared during software development.
7. What is Cost-Benefit analysis? Describe various types of costs and benefits involved during software development.
8. What is the difference between a Form and a Report? Discuss the characteristics of a Form. Design an examination form for Nalanda Open University.
9. What is the role of database in software development? Discuss the advantages and disadvantages of Database design.
10. Write short notes on any **two** of the following:—
 - (i) Feasibility Study
 - (ii) Structure charts
 - (iii) Project life cycle
 - (iv) Coupling.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-VI
(Operating System Concepts and Networking Management)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define Operating System. Explain the functions of an Operating system.
2. What is Process Control Block (PCB)? What type of information is kept in a PCB? Explain.
3. Compare and contrast between UNIX Operating System and Windows Operating System.
4. What is Virtual memory? Explain in brief the need of Virtual memory in a computer system.
5. Define Networking. Explain various types of topologies used for networking.
6. Describe various types of transmission channels used for networking. What are the factors considered while choosing a transmission medium?
7. Compare and contrast between OSI model and TCP/IP model of Networking.
8. What is the use of networking devices? List and explain the significance of any five networking devices.
9. Write at least 10 command in LINUX with their complete syntax and their use.
10. Write the short notes on any **two** of the following:—
 - (a) Structure of UNIX operating system
 - (b) Domain Name System (DNS)
 - (c) Types of Operating System
 - (d) Transmission modes.

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EXAMINATION PROGRAMME-2021
MCA, Part-I

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06.05.2022	Paper-I	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
07.05.2022	Paper-II	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
09.05.2022	Paper-III	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
11.05.2022	Paper-IV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
13.05.2022	Paper-V	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
17.05.2022	Paper-VI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
19.05.2022	Paper-VII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
23.05.2022	Paper-VIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
25.05.2022	Paper-I (Practical)	11.30 AM to 1.30 PM	Nalanda Open University School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
26.05.2022	Paper-VI (Practical)	11.30 AM to 1.30 PM	
27.05.2022	Paper-VIII (Practical)	11.30 AM to 1.30 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER–VII

(Object Oriented Analysis and Design)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Explain Object Oriented Analysis process in detail with the help of an example.
2. Discuss different types of inheritance with examples. What is abstraction?
3. What is Polymorphism? Differentiate between operator overriding and operator overloading.
4. Explain the terms Aggregation, Composition, Generalization and Specialization. Give examples for each.
5. Draw a DFD for the 'University Examination System'. Assumptions can be made wherever necessary. Draw the DFD's up to second level.
6. Define Inheritance. Explain different types of Inheritance with examples.
7. Draw a use-case diagram of your own choice and explain all its components. How are constraints defined and implemented?
8. What is concurrency? How is it identified? What are the issues, mechanisms and methods to manage concurrency?
9. List and describe the elements of a State Diagram. Give an example of state diagram.
10. Write short notes on any **Two** of the following: —
 - (a) Encapsulation
 - (b) Object
 - (c) Testing in OOAD
 - (d) Coupling and cohesion.



-:REVISED:-

Annual PRACTICAL EXAMINATION PROGRAMME-2021

MCA, Part-I

**Venue : Nalanda Open University, School of Computer Education & IT,
12th Floor, Biscomaun Tower, Patna-800001**

Enrollment No.	Date	Papers	Time
All New & Old Students	25.05.2022	Paper–I (Practical)	11.30 AM to 1.30 PM
All New & Old Students	27.05.2022	Paper–VI (Practical)	11.30 AM to 1.30 PM
All New & Old Students	30.05.2022	Paper–VIII (Practical)	11.30 AM to 1.30 PM

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER–VIII
(Data and File Structures)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define algorithm. What are the properties of algorithm? Discuss the steps used to plan an algorithm. Give an example of an algorithm.
2. Write a C program for Insertion and deletion of an element in a linear array.
3. What is a SPARSE matrix? Write a program for addition of two sparse matrices.
4. What is Linked List? Explain different types of Linked list and the basic operations supported by linked list with examples.
5. Explain Push and Pop operations on stack with the help of an example. What are the application areas of stack data structure? Describe them with examples.
6. Define an AVL tree. What are the properties of an AVL tree? Draw an AVL tree for the following series: –
12, 6, 8, 18, 3, 12, 9, 25, 36, 7.
7. Explain the concept of sorting in data structure. Discuss at least two sorting algorithms with examples.
8. Compare and contrast between Binary Tree and Binary Search Tree. Give examples of each.
9. Explain In-order and Pre-order traversal algorithms with the help of an example.
10. What is probing? How it is different from hashing? Explain different types of probing with examples.



-:REVISED:-
Annual PRACTICAL EXAMINATION PROGRAMME-2021
MCA, Part-I
Venue : Nalanda Open University, School of Computer Education & IT,
12th Floor, Biscomaun Tower, Patna-800001

Enrollment No.	Date	Papers	Time
All New & Old Students	25.05.2022	Paper–I (Practical)	11.30 AM to 1.30 PM
All New & Old Students	27.05.2022	Paper–VI (Practical)	11.30 AM to 1.30 PM
All New & Old Students	30.05.2022	Paper–VIII (Practical)	11.30 AM to 1.30 PM

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-I
Problem Solving using C (Computer Practical)
Annual Examination, 2021

Time : 2 Hours.

Full Marks : 20

Answer any two questions. All questions carry equal marks.

1. Write a program in C language to display the greatest of three numbers entered from the keyboard.
 2. Write a program to generate the following pattern below:
1
2 2
3 3 3
4 4 4 4
 3. Write a program in C language to compute the average of 10 consecutive Natural numbers.
-

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-I
Problem Solving using C (Computer Practical)
Annual Examination, 2021

Time : 2 Hours.

Full Marks : 20

Answer any two questions. All questions carry equal marks.

1. Write a program in C language to print the multiplication table of the number entered from the keyboard.
2. Write a program to generate the following pattern below:
4 4 4 4
3 3 3
2 2
1
3. Write a program in C language to print the sum of the squares of 10 even numbers.

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-VI

Operating System concepts and Networking Management (Computer practical)
Annual Examination, 2021

Time : 2 Hours.

Full Marks : 20

Answer all the questions. All questions carry equal marks.

1. Write a shell program to find the sum and average of first "n" odd numbers.
2. List and execute the following UNIX commands:
 - (a) To display the content of a file.
 - (b) To display the top 10 lines of the file.
 - (c) To count no. of words in a given text file.
 - (d) To search the pattern "abc" in the text file.
 - (e) To list the content of the directory with all information.

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-VI

Operating System concepts and Networking Management (Computer practical)
Annual Examination, 2021

Time : 2 Hours.

Full Marks : 20

Answer all the questions. All questions carry equal marks.

1. Write a shell program to find the sum and average of first "n" natural numbers.
2. List and execute the following UNIX commands:
 - (a) To create a file.
 - (b) To stop any process using PID.
 - (c) To count no. of lines in a given text file.
 - (d) To create a file in a sub-directory with name abc.txt.
 - (e) To change the read and write permission of the file.

SET-I

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER–VIII
Data and File Structure (Computer practical)
Annual Examination, 2021

Time : 2 Hours.

Full Marks : 20

Answer all the questions. All questions carry equal marks.

1. Write a program in 'C' language for implementation of deletion in Linked List.
2. Write a program in 'C' language to implement binary tree.

SET-II

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER–VIII
Data and File Structure (Computer practical)
Annual Examination, 2021

Time : 2 Hours.

Full Marks : 20

Answer all the questions. All questions carry equal marks.

1. Write a program in 'C' language for the implementation deletion from a queue.
2. Write a program in 'C' language for the multiplication of two matrices using arrays.

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER-IX

(Internet Concepts and Web Design)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Explain the concept of IP Addressing with examples. Also discuss the class of IP Addressing.
2. What is Domain Name System? Explain Address Resolution mechanism and Record caching in detail.
3. Explain File Transfer Protocol (FTP) and its uses in Internet with reference to File types, Data Structure and Transmission modes used to transfer a file by FTP.
4. Define Video-conferencing. Discuss the hardware, software and internet connections requirements for Video-conferencing. Compare CU-SeeMe and Microsoft NetMeeting.
5. Define Web Page. Describe various categories of web page available on World Wide Web.
6. Explain the phases of Website development in detail.
7. Discuss various HTML attributes with examples.
8. What is an image? What are the various file formats in which images can be stored? Explain.
9. Describe different types of control structure used in JavaScript with examples of each
10. Write short notes on any two of the following: —
 - (i) MODEM
 - (ii) Internet
 - (iii) Search Engines
 - (iv) Block-level element in HTML.



EXAMINATION PROGRAMME-2021
MCA, Part-II

Date	Papers	Time	Examination Centre
26.07.2022	Paper-IX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
28.07.2022	Paper-X	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
30.07.2022	Paper-XI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
01.08.2022	Paper-XII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
03.08.2022	Paper-XIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
05.08.2022	Paper-XIV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.08.2022	Paper-XV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
08.08.2022	Paper-XVI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
17.08.2022	Paper-IX (Practical)	11.30 AM to 1.30 PM	Nalanda Open University School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
18.08.2022	Paper-XIII (Practical)	11.30 AM to 1.30 PM	
20.08.2022	Paper-XIV (Practical)	11.30 AM to 1.30 PM	
22.08.2022	Paper-XV (Practical)	11.30 AM to 1.30 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER-X
(Computer Graphics and Multimedia)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define Computer graphics. Discuss various applications of Computer Graphics.
2. Describe various output devices used for Computer graphics.
3. Compare and contrast between CPU and GPU. Explain graphic pipeline with a diagram.
4. Explain Digital Differential Analyzer (DDA) algorithm. Give an example of DDA algorithm.
5. Explain Bresenham's circle generation algorithms with the help of an example.
6. What do you mean by composite transformation in 3D transformation? Explain with the help of an example.
7. What is Window port-to viewport mapping? Explain with the help of an example.
8. Describe various types of Graphic standards used in Computer graphics.
9. Describe some basics of animation techniques. Explain different types of reflection used for animation.
10. Write short notes on any two of the following:–
 - (i) Random Scan
 - (ii) Raster scan
 - (iii) Scan Line algorithm
 - (iv) Hidden surface removal algorithms.



EXAMINATION PROGRAMME-2021
MCA, Part-II

Date	Papers	Time	Examination Centre
26.07.2022	Paper-IX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
28.07.2022	Paper-X	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
30.07.2022	Paper-XI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
01.08.2022	Paper-XII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
03.08.2022	Paper-XIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
05.08.2022	Paper-XIV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.08.2022	Paper-XV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
08.08.2022	Paper-XVI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
17.08.2022	Paper-IX (Practical)	11.30 AM to 1.30 PM	Nalanda Open University School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
18.08.2022	Paper-XIII (Practical)	11.30 AM to 1.30 PM	
20.08.2022	Paper-XIV (Practical)	11.30 AM to 1.30 PM	
22.08.2022	Paper-XV (Practical)	11.30 AM to 1.30 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XI
(Software Engineering)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define software engineering. Discuss the need of software engineering.
2. What is software process ? Explain System Development Life Cycle (SDLC) in detail.
3. Compare and contrast Waterfall model and Spiral model. Discuss the advantages of both the models.
4. What is Risk ? What are different types of Risk? Explain the process of Risk management.
5. Describe types of requirements used in software engineering. What is requirement gathering ?
6. Define testing. Discuss software testing level in detail.
7. Compare and contrast between Black box testing and White box testing with examples.
8. Describe various attributes of software quality with examples.
9. Define modularization ? Why it is important ? Explain coupling and cohesion in context of modularization.
10. Write short notes on any two of the following :—
 - (i) User Interface Design.
 - (ii) RAD model.
 - (iii) COCOMO.
 - (iv) Types of software.

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XII

(Management and Information System)

Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. What are the different methods of data collection? How the quality of the information can be measured? Discuss.
2. Define quality. List the most essential characteristics features for information quality.
3. Describe organizations functions? What are the characteristics of an organization?
4. Discuss Vertical and Horizontal organization structure. What is the need of organization structure?
5. Describe different types of Systems with examples.
6. Define MIS. Discuss the application of MIS in detail.
7. What are the criteria's that the system designer should look into for successful implementation of MIS.
8. What are the problems with the traditional file system? How database approach has helped in overcoming these problems.
9. Define Expert system. How it is beneficial in decision making of an organization.
10. Write short notes on any **two** of the following:—
 - (i) Object Oriented Database
 - (ii) Multimedia database
 - (iii) Data warehouse
 - (iv) Data mining.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER—XIII
(Operating System)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Explain different types of Operating System? What are the basic functions of an operating system?
2. Differentiate between process and thread. What do you mean by process creation and process termination?
3. What is process scheduling? Explain process control block.
4. What are system calls? Explain system call with the help of an example?
5. Define deadlock. Explain the methods for addressing the possibility of deadlock.
6. What are the states in which a process can exist? Explain with help of a diagram.
7. Define and describe different types memory hierarchy in computers. What is the role of memory in computers?
8. How an Operating System manages Disk space storage? Explain with the help of a diagram.
9. What is Direct Memory Access (DMA)? How does it affect the throughput of a system?
10. Write short notes on the following:—
(i) Virtual Machines (ii) Context Switch.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XIV
(Database Management Systems)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define DBMS. Explain the components of DBMS in detail.
2. What is a data model? Discuss different categories of data models with examples.
3. Define E-R diagram? Explain Aggregation, specialization and generalization. Give examples for each.
4. Write at least ten queries in SQL with their complete syntax and meaning.
5. Describe the following relational algebra operations with the help of an example:—
 - (i) Selection
 - (ii) Projection
 - (iii) Difference
 - (iv) Union
6. Why views of table created? Explain. Write the syntax to create a view of the table.
7. What are constraints? Describe various types of constraints used in DBMS.
8. Explain the concept of concurrent transaction with the help of an example. What are the SQL commands that support transaction?
9. Describe various locking techniques used in DBMS with examples.
10. Write short notes on any **two** of the following:—
 - (i) Limitation of File based system
 - (ii) DBMS architecture
 - (iii) Shadow paging
 - (iv) Data Security issues.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XV

(Object Oriented Programming using Java)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Explain various types of Object Oriented methodologies. What are the benefits of Object Oriented Programming (OOP)?
2. Define the concept of inheritance. Explain different types of inheritance with the help of examples.
3. Discuss various types of Java operators with examples. Write a simple Java program to print your message.
4. What is Polymorphism? Explain advantages of polymorphism. Differentiate between Overloading and overriding with the help of suitable example.
5. Differentiate the following, with the help of example:—
 - (i) Application and Applet
 - (ii) Structure Approach and Object Oriented Approach
 - (iii) String and String Buffer
6. Differentiate between Constructors and Methods. Write a program in Java using Constructors.
7. What is Stream Tokenizer? Explain the different instance variables defined in Stream Tokenizer. Also, explain use of Stream Tokenizer with the help of an example.
8. What is an abstract class? Explain with the help of an example. Differentiate between public and private access specifiers.
9. What is finalize() method in Java. Give an example to demonstrate its use. Explain use of super keyword in Java, with an example.
10. Write short notes on any **Two** of the following:—
 - (i) Applications of OOPs
 - (ii) Exception handling in Java
 - (iii) HTTP
 - (iv) Servlet.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XVI
(Computer Networking)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. What are the basic components of data communication? Describe the services provided by Internet Service Providers (ISP).
2. Describe Ring and Mesh topologies in LAN. Give the diagram, advantages and disadvantages of both the topologies.
3. Compare and contrast between OSI and TCP/IP reference model. What are the drawbacks of OSI and TCP/IP model?
4. What do you mean by modes of transmission? Describe different types of modes of transmission.
5. Why multiplexing of transmission channels required in networking? Explain different types of multiplexing with examples.
6. Why do you need encoding of data before sending over a medium? Explain the four possible encoding techniques.
7. What are the functions of Datalink Layer? Explain sliding window flow control with the help of an example.
8. Which layer of OSI model is responsible for routing and congestion control? Explain the reasons of Network congestion. How this congestion problem can be corrected?
9. Compare and contrast between Virtual circuit and Datagram subnet. Describe the various categories of internetwork addresses.
10. Write short notes on the following:—
 - (i) Transmission media
 - (ii) Frequency
 - (iii) Bandwidth
 - (iv) Baud.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–IX - Practical
(Internet Concepts and Web Design)
Annual Examination, 2021

Time : 2 Hours.

Full Marks : 20

Answer all the Questions. All questions carry equal marks.

1. Create the following table in HTML with Dummy data (Five records) :

Enrolment no.	Course code	Registration no.	Course Fee	Remarks.
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2. Write a JavaScript NB Script code to create a pull down menu box.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–IX - Practical
(Internet Concepts and Web Design)
Annual Examination, 2021

Time : 2 Hours.

Full Marks : 20

Answer all the Questions. All questions carry equal marks.

1. Create the following table in HTML with Dummy data (Five records) :

Enrolment no.	Course code	Registration no.	Course Fee	Remarks.
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2. Write a JavaScript NB Script code to create a pull down menu box.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XIII [Practical]
(Operating System)
Annual Examination, 2021

Time : 2 Hours.

SET–A

Full Marks : 20

Answer all the Questions.
All questions carry equal marks.

1. Write a shell program to find the sum and average of first "n" even numbers.
2. Write at least 10 commands in Unix with their complete syntax.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XIII [Practical]
(Operating System)
Annual Examination, 2021

Time : 2 Hours.

SET–B

Full Marks : 20

Answer all the Questions.
All questions carry equal marks.

1. Write a shell program to find the sum and average of first "n" odd numbers.
2. Write at least 10 commands in Unix with their complete syntax.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XIV [Practical]
(Database Management System)
Annual Examination, 2021

Time : 2 Hours.

SET–A

Full Marks : 20

Answer all the Questions.
All questions carry equal marks.

1. Create the following tables with the fields given below :

Book (ISBN, Title, Publisher_Name, Author_Name, Price, Year_of_Pub).

Author (Author ID, Author_Name, ISBN, Add1, Add2, City, State).

Select appropriate data types for each of the fields. Identify appropriate keys and input 10 meaningful records. Select an appropriate primary key.

2. For the above tables designed in Q.1, answer the following queries using SQL:
(a) List all the books published by Publisher_Name = "XYZ Publishers"
(b) List the Author Name of the book with ISBN No. "11234455".



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XIV [Practical]
(Database Management System)
Annual Examination, 2021

Time : 2 Hours.

SET–B

Full Marks : 20

Answer all the Questions.
All questions carry equal marks.

1. Create the following tables with the fields given below :

Supplier (S#, Sname, Status, City)

Parts (P#, Pname, Labour, Weight, City)

SP (S#, P#, Quantity)

Select appropriate data types for each of the fields. Identify appropriate keys and input 10 meaningful records. Select an appropriate primary key.

2. For the above tables designed in Q.1, answer the following queries using SQL:
(a) Display the weight of the part, whose P# = "11".
(b) Display the S#, SName and status who supplies from Hyderabad.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XV [Practical]

(Object Oriented Programming Using Java)

Annual Examination, 2021

Time : 2 Hours.

SET–A

Full Marks : 20

Answer all the Questions.

All questions carry equal marks.

1. Create an applet using Java, which take name of any person as input and display its reverse. Use appropriate GUI and layout in your applet.
2. Write a Java program to create Account class. Define appropriate constructor for this class. Define methods Display_Account_Detail and Account_Balance in Account class. Inherit Saving Account class from Account class. Define constructor for Saving Account class. Also override Display Account_Detail method in Saving Account class. Make necessary assumptions.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XV [Practical]

(Object Oriented Programming Using Java)

Annual Examination, 2021

Time : 2 Hours.

SET–B

Full Marks : 20

Answer all the Questions.

All questions carry equal marks.

1. Create an applet using Java, which take a number as input and display table of the number. Use appropriate GUI components and layout in your applet.
2. Write a Java program for multiplication of two matrices. Define appropriate class and methods in your program. Also make provision for exceptions handling in

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XVII (New)
 (Accounting and Financial Management)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. What is financial accounting ? Distinguish financial accounting from management accounting.
2. What is fund flow statement ? How is it prepared ? Give an example.
3. What is working capital ? Describe its sources.
4. Explain the objectives of inventory management.
5. Define financial management and describe its features.
6. Discuss the role of accountants in modern business organization.
7. Discuss the objectives and goals of financial management.
8. Define Accounting and throw light on its scope.
9. Write notes on any **Two** of the following :–
 (a) Negotiable Instruments
 (b) Letter of Credit
 (c) Capital Rationing.
10. From the following Balance Sheets of Sen & Co. prepare Cash Flow Statement for the year ended 31st December 2019.

Liabilities & Capital	2018 Rs.	2019 Rs.	Assets	2018 Rs.	2019 Rs.
Creditors	40,000	44,000	Cash	16,000	44,000
Outstanding Expenses	10,000	2,000	Debtors	30,000	22,000
Loan	20,000	10,000	Bills Receivable	10,000	—
Capital	2,16,000	3,36,000	Stock	40,000	56,000
			Fixed Assets	1,90,000	2,70,000
	2,86,000	3,92,000		2,86,000	3,92,000

During the year the proprietor introduced Rs. 40,000 as additional capital. The net profit for the year after charging Rs. 10,000 as depreciation on fixed assets, were Rs. 1,00,000.



EXAMINATION PROGRAMME-2020
MCA, Part-III [New Batch]

Date	Papers	Time	Examination Centre
12.03.2021	Paper–XVII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
13.03.2021	Paper–XVIII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
16.03.2021	Paper–XIX	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
17.03.2021	Paper–XX	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
19.03.2021	Paper–XXI	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
20.03.2021	Paper–XXII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
24.03.2021	Paper–XXIII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
25.03.2021	Paper–XVII (P)	12.00 Noon to 3.00 PM	School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
26.03.2021	Paper–XXIII (P)	12.00 Noon to 3.00 PM	
27.03.2021	Paper–XXIV (Tentative)	12.00 Noon to 3.00 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXI [OLD]
(MCS-041 : Operating Systems)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. What is an Operating system? Describe different types of Operating System with examples.
2. Define a Thread. How does a thread differ from a process? Explain various states of a process.
3. What is mutual exclusion? What is the role of critical section in mutual exclusion? Explain with help of an example.
4. Consider the page reference string: 2, 4, 2, 5, 4, 2, 6, 4, 8, 7, 9, 7, 8, 5, 4 and calculate how many page faults would occur for LRU and FIFO page replacement algorithms, when the number of frames is 4. Assume all frames are initially empty.
5. What is paging? How paging different from segmentation? Explain.
6. Define disk scheduling. Discuss disk scheduling algorithms with the help of examples.
7. What is a Deadlock? When does it occur? Discuss the necessary conditions of deadlock with the help of an example.
8. Describe UNIX Operating system. What are its advantages and disadvantages?
9. Write at least 10 commands in UNIX with their full syntax.
10. Give short notes on any **two** of the following:—
 - (i) Functions of Operating system.
 - (ii) Thrashing
 - (iii) RAID
 - (iv) Overlays and Swapping



EXAMINATION PROGRAMME-2021
MCA, Part-III [Old Batch]

Date	Papers	Time	Examination Centre
28.07.2022	Paper–XXI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
30.07.2022	Paper– XXII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
01.08.2022	Paper– XXIV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
03.08.2022	Paper–XXV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
05.08.2022	Paper–XXVII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.08.2022	Paper–XXVIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
08.08.2022	Paper–XXIX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
23.08.2022	Paper–XXIII (P)	12.00 Noon to 3.00 PM	School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
24.08.2022	Paper–XXVI (P)	12.00 Noon to 3.00 PM	
25.08.2022	Paper–XXX (Tentative)	12.00 Noon to 3.00 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XVIII (New)
 (Advanced Database Management System)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define DBMS. What is the role of data dictionary in DBMS? Differentiate between active and passive dictionary.
2. Define Normalization. What is functional dependency? How does it help in the process of Normalization of Database? Explain.
3. Define SQL. Write at least 10 SQL commands with their complete syntax.
4. What are stored procedures and triggers in database? Explain with the help of an example.
5. Explain in detail the Database Application Life Cycle. What are the criteria for selecting a DBMS for an organization?
6. Explain the levels of Security in Database. What is access control?
7. Define Transaction. Describe the ACID properties of a Transaction. Explain Time Stamp based protocol.
8. What is deadlock? Explain the process of handling deadlock in Database Management System.
9. Compare and contrast between OODBMS and Object Relational Database.
10. Write short notes on any Two of the following: –
 - (i) Recovery algorithms
 - (ii) Checkpoints
 - (iii) Lock Table
 - (iv) Multiple granularity.



EXAMINATION PROGRAMME-2021
MCA, Part-III (NEW)

Date	Papers	Time	Examination Centre
26.07.2022	Paper–XVII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
28.07.2022	Paper–XVIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
30.07.2022	Paper–XIX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
01.08.2022	Paper–XX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
03.08.2022	Paper–XXI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
05.08.2022	Paper–XXII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.08.2022	Paper–XXIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
23.08.2022	Paper–XVII (Practical)	11.30 AM to 1.30 PM	Nalanda Open University School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
24.08.2022	Paper–XXIII (Practical)	11.30 AM to 1.30 PM	
25.08.2022	Paper–XXIV (Project)	11.30 AM onwards	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXII [OLD]
(MCS-043 : Advanced Database Design)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Discuss in detail Enhanced ER (EER) tools with a suitable example.
2. What is Data Dictionary? What is the significance of creating Data Dictionary in DBMS? Explain the statistics stored in the Data Dictionary.
3. Define functional dependency? Explain 2NF and 3NF with examples.
4. Discuss classification as a tool in Data Mining. Describe the ID 3 algorithm for classifying data sets with a suitable example.
5. What are stored procedures and triggers in database? Explain with the help of an example.
6. What is UML? Discuss the features of automated database design and implementation tools.
7. What are views? What is the significance of views in DBMS? How are views managed in SQL?
8. What are recovery algorithms in database? Explain using a suitable example.
9. Explain the levels of Security in Database. What is access control?
10. Write short notes on any **Two** of the following:—
 - (i) Embedded SQL
 - (ii) Time Stamp based protocol
 - (iii) Lock Table
 - (iv) Multiple granularity.



EXAMINATION PROGRAMME-2021
MCA, Part-III [Old Batch]

Date	Papers	Time	Examination Centre
28.07.2022	Paper–XXI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
30.07.2022	Paper– XXII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
01.08.2022	Paper– XXIV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
03.08.2022	Paper–XXV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
05.08.2022	Paper–XXVII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.08.2022	Paper–XXVIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
08.08.2022	Paper–XXIX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
23.08.2022	Paper–XXIII (P)	12.00 Noon to 3.00 PM	School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
24.08.2022	Paper–XXVI (P)	12.00 Noon to 3.00 PM	
25.08.2022	Paper–XXX (Tentative)	12.00 Noon to 3.00 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XIX (New)
 (Compiler Design)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. What is a Compiler? Why Compiler is required? Describe phases of Compiler in detail.
2. Define tokens. Discuss the basic terms related to language theory and give examples for each.
3. Define regular expression? Explain the rules for writing regular expressions. Write some regular expressions and explain them.
4. Define DFA. Give some examples of DFA with their transition tables.
5. Define Grammar. Explain Chomsky classification of Grammar with examples.
6. Define Parse tree. Describe different types of parse tree with examples.
7. Discuss various types of memory allocation schemes used in Compiler design.
8. Define symbol table. Discuss in detail the attributes of symbol table. What is an Abstract syntax tree?
9. What is optimization of code? Explain Loop optimization and Peephole optimization.
10. Write short notes on any two of the following:
 - (i) Construction tools of Compilers
 - (ii) NFA
 - (iii) YACC automatic parser generator
 - (iv) Quadruple
 - (v) Semantic Analyzer.



EXAMINATION PROGRAMME-2021
MCA, Part-III (NEW)

Date	Papers	Time	Examination Centre
26.07.2022	Paper–XVII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
28.07.2022	Paper–XVIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
30.07.2022	Paper–XIX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
01.08.2022	Paper–XX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
03.08.2022	Paper–XXI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
05.08.2022	Paper–XXII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.08.2022	Paper–XXIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
23.08.2022	Paper–XVII (Practical)	11.30 AM to 1.30 PM	Nalanda Open University School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
24.08.2022	Paper–XXIII (Practical)	11.30 AM to 1.30 PM	
25.08.2022	Paper–XXIV (Project)	11.30 AM onwards	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXIV [OLD]

(MCS-51 : Advanced Internet Technologies)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Explain the underlying software architecture of EJB with the help of a diagram.
2. Assume there is a table named 'customer' in the "Bank" database with the following fields' cust_id, cust_name, dob, email. Write a code for servlet and JDBC to connect to the "Bank" database and display customer records.
3. What is meant by XML parsing? Describe the parsers involved with XML.
4. Explain different phases of life cycle of a servlet with the help of a diagram.
5. What is Java Naming and Directory Interface authentication? Explain it with a suitable example.
6. Describe the following HTTP authentication mechanisms for authentication of a user to a web server :—
 (i) HTTP Basic Authentication
 (ii) MT Client Authentication
7. How can two servlets share information using the system property list? In an inventory application, one servlet stores the stock of an item in a system property. Another servlet uses this property to find whether an order quantity can be fulfilled or must be declined. Show how this can be done through a Java program.
8. Explain any two capabilities of including files and applets in JSP documents
9. Explain the purpose of different types of JDBC SQL statements.
10. Differentiate between the following:—
 (i) Get and Post
 (ii) Stateful session bean
 (iii) SGML and XML
 (iv) HTTP Servlet.

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EXAMINATION PROGRAMME-2021
MCA, Part-III [Old Batch]

Date	Papers	Time	Examination Centre
28.07.2022	Paper–XXI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
30.07.2022	Paper– XXII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
01.08.2022	Paper– XXIV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
03.08.2022	Paper–XXV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
05.08.2022	Paper–XXVII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.08.2022	Paper–XXVIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
08.08.2022	Paper–XXIX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
23.08.2022	Paper–XXIII (P)	12.00 Noon to 3.00 PM	School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
24.08.2022	Paper–XXVI (P)	12.00 Noon to 3.00 PM	
25.08.2022	Paper–XXX (Tentative)	12.00 Noon to 3.00 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XX (New)
 (Design and Analysis of Algorithms)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. What do you mean by Growth of a function? Describe the concepts used to address the behavior of an algorithm.
2. Explain divide and conquer technique. Give some examples of Divide and Conquer algorithm.
3. Define Dynamic programming. Explain the steps of Dynamic programming approach.
4. Describe the branch and bound algorithm with the help of an example.
5. Compare and contrast between BFS and DFS algorithms. Give an example for each type.
6. Explain Ford-Fulkerson algorithm. How this algorithm implemented?
7. Discuss Fast Fourier Transform (FFT) and Number theoretic algorithm.
8. Describe RSA public-key cryptosystem with the help of an example.
9. Describe 2-SAT and 3-SAT algorithms in detail with the help of an example.
10. Write short notes on any **two** of the following:
 - (i) Recurrence
 - (ii) Backtracking
 - (iii) Random graphs.

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EXAMINATION PROGRAMME-2021
MCA, Part-III (NEW)

Date	Papers	Time	Examination Centre
26.07.2022	Paper–XVII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
28.07.2022	Paper–XVIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
30.07.2022	Paper–XIX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
01.08.2022	Paper–XX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
03.08.2022	Paper–XXI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
05.08.2022	Paper–XXII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.08.2022	Paper–XXIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
23.08.2022	Paper–XVII (Practical)	11.30 AM to 1.30 PM	Nalanda Open University School of Computer Education & IT,
24.08.2022	Paper–XXIII (Practical)	11.30 AM to 1.30 PM	

25.08.2022	Paper-XXIV (Project)	11.30 AM onwards	12th Floor, Bismaun Tower, Patna-80001
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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXV [Old]
(MCS-53 : Computer Graphics and Multimedia)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Differentiate between Computer Graphics and Animation. What is Random Scan display device?
2. Write Bresenham's line generation algorithm. Use it to draw a line segment joining (20, 10) and (25, 14).
3. Write midpoint circle drawing algorithm. Use it to draw a circle C having centre (5, 2) and radius = 10.
4. Explain different Shading Schemes with their advantages and disadvantages.
5. How are frame buffers used to control color and intensity of any image? You are required to support your answer with suitable diagrams and bit plane tables.
6. Discuss different types of projection with diagram.
7. Define DDA algorithm. Write DDA line drawing algorithm. Use this algorithm to draw a line between (0,0) and (3,3).
8. Explain the following terms: – (i) Z Buffer (ii) Aspect Ratio (iii) Video Conferencing (iv) Ambient light.
9. What is authoring tool? Explain different types of authoring tools.
10. Write short notes on any **Three** of the following:—
 - (i) Vector graphics
 - (ii) JPEG and GIF
 - (iii) Ray Casting
 - (iv) Hypermedia.

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EXAMINATION PROGRAMME-2021
MCA, Part-III [Old Batch]

Date	Papers	Time	Examination Centre
28.07.2022	Paper–XXI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
30.07.2022	Paper– XXII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
01.08.2022	Paper– XXIV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
03.08.2022	Paper–XXV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
05.08.2022	Paper–XXVII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.08.2022	Paper–XXVIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
08.08.2022	Paper–XXIX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
23.08.2022	Paper–XXIII (P)	12.00 Noon to 3.00 PM	School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
24.08.2022	Paper–XXVI (P)	12.00 Noon to 3.00 PM	
25.08.2022	Paper–XXX (Tentative)	12.00 Noon to 3.00 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXI (New)

(Artificial Intelligence and Knowledge Management)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Describe various application areas of AI. What are the goals of AI?
2. Differentiate between Inductive and Deductive reasoning. Give examples of each type. What is Turing test?
3. Describe any two searching strategies with examples.
4. Write at least eight LISP expressions using **car**, **cdr**, **member**, **setq** and evaluate it.
5. What is Constraint Satisfaction Problems? Explain the steps of solving Constraints Satisfaction Problems.
6. Explain the concept of Alpha-Beta cutoffs with the help of an example.
7. Discuss the Inference rules and their applications in Propositional Logic (PL).
8. Explain different types of operations on fuzzy logic with the help of an example.
9. What is resolution principle in AI? Explain.
Let **P: Humidity is high**,
Q: Sky is cloudy,
R: It will rain and
S : It is hot.

Symbolize the following sentences:—

- (i) It is not hot.
- (ii) The humidity is high or the sky is cloudy.
- (iii) If the sky is cloudy, then it will rain.
- (iv) If the humidity is high, then it is hot.

10. Write short notes on any **two** of the following:

PROLOG

- (i) Backtracking
- (ii) Forward chaining system
- (iii) Application areas of Expert system.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXVII [Old]
(MCSE-003: Artificial Intelligence and Knowledge Management)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define Artificial Intelligence (AI). Discuss the application areas of AI.
2. Define and describe the properties of LISP.
3. What is un-informed search? Describe some of the informed search strategies.
4. Evaluate and elaborate the following LISP expressions:—
 - (i) (lessp (18 151 76))
 - (ii) (car (a b c d))
 - (iii) (cdr (x y z))
 - (iv) (member 'a ' (a b c d))
 - (v) (list 'a '(b c))
5. What is the difference between Knowledge and Intelligence? Enumerate the various knowledge representation schemes, giving a brief description for each scheme.
6. What is Fuzzy logic? Discuss different types of operations on fuzzy logic with the help of examples.
7. Explain the following properties of Well Formed Formulas:—
 - (i) Valid/ Tautology
 - (ii) Satisfiable
 - (iii) Contradiction
8. Explain A* and AO* algorithms. Give suitable examples.
9. What is a supervised learning? How is it different from unsupervised learning? Discuss briefly the component of the generic Expert System.
10. Write short notes on the following:—
 - (i) Turing Test
 - (ii) Expert System



NALANDA OPEN UNIVERSITY

Master of Computer Application (MCA), Part-III

PAPER–XXII (New)

(Numerical and Statistical Computing)

Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.

All questions carry equal marks. Calculator is allowed.

- (a) Define (i) Floating Point, (ii) Absolute Error, (iii) Relative Error, (iv) Truncation Error.
(b) Round off the following numbers to four significant digits.
(i) 643.92 (ii) 98.32143 (iii) 7.2565 (iv) 6.4155 (v) 0.700132
- (a) Show that the equation $x^3 - 6x - 1 = 0$, has a root in the interval $(-1, 0)$. Obtain this root using the successive iteration method.
(b) Obtain the smallest positive root of $x^3 + x - 2 = 0$, correct to 2 decimal places with the help of Bisection formula.

- Solve the following linear systems of equations using the Gauss Elimination method

$$3x_1 + 2x_2 + 3x_3 = 5$$

$$x_1 + 4x_2 + 2x_3 = 4$$

$$2x_1 + 4x_2 + 8x_3 = 8$$

- Solve the Jacobi's method of the following system of linear equations

$$2x_1 - x_2 + x_3 = -1$$

$$x_1 + 2x_2 + x_3 = 21$$

$$3x_1 - 7x_2 + 5x_3 = 9$$

- Obtain the estimate of the missing figure in the following table :—

x	1	2	3	4	5	6	7	8	9
f(x)	1	4	9	–	25	–	49	64	81

- Estimate the sale of a particular quantity for 1935 using the following table :—

Year	1931	1941	1951	1961	1971	1981
Sales (in thousands)	25	33	39	47	59	68

- Evaluate the Integral $I = \int_0^1 \frac{dx}{1+x}$ using Gauss Legendre three point formula.

- (a) Evaluate the Integral $\int_0^6 (x^3 + 2x + 3) dx$ using Trapezoidal rule with $h = 1.0$.

- (b) Evaluate the Integral $\int_1^4 x^4 dx$ using Weddle's rule with $h = 0.5$.

- Using Runge Kutta method of order 4, find $y(0.2)$ given that $y' = 3x + \frac{y}{2}$, $y(0) = 1$ taking $h = 0.1$.

- Explain Binomial and Poisson distribution.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXVIII (Old)
(Numerical and Statistical Computing)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks. Calculator is allowed.

1. (a) Define (i) Floating Point, (ii) Absolute Error, (iii) Relative Error, (iv) Truncation Error.
(b) Round off the following numbers to four significant digits.
(i) 643.92 (ii) 98.32143 (iii) 7.2565 (iv) 6.4155 (v) 0.700132
2. (a) Show that the equation $x^3 - 6x - 1 = 0$, has a root in the interval $(-1, 0)$. Obtain this root using the successive iteration method.
(b) Obtain the smallest positive root of $x^3 + x - 2 = 0$, correct to 2 decimal places with the help of Bisection formula.
3. Solve the following linear systems of equations using the Gauss Elimination method
$$3x_1 + 2x_2 + 3x_3 = 5$$
$$x_1 + 4x_2 + 2x_3 = 4$$
$$2x_1 + 4x_2 + 8x_3 = 8$$
4. Solve the Jacobi's method of the following system of linear equations
$$2x_1 - x_2 + x_3 = -1$$
$$x_1 + 2x_2 + x_3 = 21$$
$$3x_1 - 7x_2 + 5x_3 = 9$$
5. Obtain the estimate of the missing figure in the following table :—

x	1	2	3	4	5	6	7	8	9
f(x)	1	4	9	–	25	–	49	64	81
6. Estimate the sale of a particular quantity for 1935 using the following table :—

Year	1931	1941	1951	1961	1971	1981
Sales (in thousands)	25	33	39	47	59	68
7. Evaluate the Integral $I = \int_0^1 \frac{dx}{1+x}$ using Gauss Legendre three point formula.
8. (a) Evaluate the Integral $\int_0^6 (x^3 + 2x + 3) dx$ using Trapezoidal rule with $h = 1.0$.
(b) Evaluate the Integral $\int_1^4 x^4 dx$ using Weddle's rule with $h = 0.5$.
9. Using Runga Kutta method of order 4, find $y(0.2)$ given that $y' = 3x + \frac{y}{2}$, $y(0) = 1$ taking $h = 0.1$.
10. Explain Binomial and Poisson distribution.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER—XXIII

(Application Development with .Net Framework)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define .NET Framework. Explain the architecture of .NET Framework.
2. What is garbage collection in .NET Framework? Discuss various phases of garbage collection.
3. Explain .Net class library. Also explain Common Type System (CTS) and Just In Time Compiler (JIT).
3. Explain ASP.NET 2.0 Features in detail.
4. Explain TextBox Controls and Image controls of Web server.
5. List and explain data types supported by VB.NET.
6. What is State management? Describe different types of states managed by ASP.NET.
7. Explain various looping statements in VB.NET. Discuss how errors are handled.
8. Explain the features of Object Oriented Programming concepts. List and explain the types of access modifiers.
9. Explain the concept of events, delegates and attributes with examples.
10. Write short notes on the following :—
 - (i) Exceptions in .NET.
 - (ii) Common Type System (CTS).



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXIX [Old]
 (Application Development with .Net Framework)
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Explain the architecture of .NET Framework with a diagram.
2. What is garbage collection in .NET Framework? Discuss various phases of garbage collection.
3. Explain how data access is done using ADO.NET architecture.
4. Define .NET Servers. Describe the roles performed by .NET server.
5. How can a User Control be created? Explain the process to use a User Control.
6. List four characteristics of ASP.NET. Discuss the basic platform required to start ASP.NET.
7. What are assemblies? Explain its versions. Differentiate between private and shared assemblies.
8. What is Query String? Explain it using an example. Discuss the limitations of Query String.
9. List the types of file extensions that are handled by ASP.NET. Explain the ASP.NET folder structure.
10. Write short notes on the following:—
 - (i) Exception handling
 - (ii) CLS.



EXAMINATION PROGRAMME-2021
MCA, Part-III [Old Batch]

Date	Papers	Time	Examination Centre
28.07.2022	Paper–XXI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
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01.08.2022	Paper– XXIV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
03.08.2022	Paper–XXV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
05.08.2022	Paper–XXVII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.08.2022	Paper–XXVIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
08.08.2022	Paper–XXIX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
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25.08.2022	Paper–XXX (Tentative)	12.00 Noon to 3.00 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XVII (New) - Practical
(Accounting and Financial Management)

SET-A

Annual Examination, 2020

Time : 3 Hours.

Full Marks : 20

Answer any Two Questions. All questions carry equal marks.

1. Give Journal Entries from the following transaction :—
 - (i) Ram introduced a capital of Rs. 4,00,000.
 - (ii) Purchased a goods of Rs. 49,000 from Das & Co.
 - (iii) Sold goods to Rahim Rs. 1,50,000.
 - (iv) Sold goods for Cash Rs. 60,000.
 - (v) Salary paid Rs. 8,000.
 - (vi) Purchased a Machinery Rs. 80,000.
 - (vii) Rent payable Rs. 4,000.
2. Prepare trial balance from the above transactions in Q.No. 1.
3. How you will create a company in Tally ? Write all steps.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XVII (New) - Practical
(Accounting and Financial Management)

SET-B

Annual Examination, 2020

Time : 3 Hours.

Full Marks : 20

Answer any Two Questions. All questions carry equal marks.

1. Give Journal Entries from the following transaction :—
 - (i) Ram introduced a capital of Rs. 3,00,000.
 - (ii) Purchased a goods of Rs. 39,000 from Das & Co.
 - (iii) Sold goods to Rahim Rs. 1,35,000.
 - (iv) Sold goods for Cash Rs. 55,000.
 - (v) Salary paid Rs. 6,000.
 - (vi) Purchased a Machinery Rs. 75,000.
 - (vii) Rent payable Rs. 3,000.
2. Prepare Balance Sheet from the above transactions in Q.No. 1.
3. How you will create ledger under a company in Tally ? Write all steps.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXIII (Old) - Practical
(Unix and Oracle)

SET-A

Annual Examination, 2021

Time : 3 Hours.

Full Marks : 100 (80+20)

Answer all the Questions. All questions carry equal marks.

SECTION-A (UNIX)

1. Write and execute the following commands in UNIX
 - (a) To count the characters in the text file.
 - (b) To set file permission of any file to r, w, x for all.
 - (c) To kill a process.

SECTION-B (DBMS)

3. Create a database with the following schema:

EMPLOYEE (ENo EName, Skill, Pa)

POSITION (Posting_No, Skill)

DUTY ALLOCATION (Posting_No, ENo, Day, Shift)

Create tables. Select appropriate data types for each of the fields. Identify appropriate keys.

Input meaningful data.

- 4) For the above tables in Q (3), answer the following queries using SQL:
 - (a) Display the Posting_No and shift of the employee if "Day" is given as input.
 - (b) List all the ENo's whose pay is greater than 1 lakh.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXIII (Old) - Practical
(Unix and Oracle)

SET-B

Annual Examination, 2020

Time : 3 Hours.

Full Marks : 100 (80+20)

Answer all the Questions. All questions carry equal marks.

SECTION-A (UNIX)

1. Write and execute the following commands in UNIX
 - (a) To change the ownership of a file.
 - (b) To run a program at lower priority.
 - (c) To compare two files and show their differences.
 - (d) To display the first 10 lines of a text file.
 - (e) To kill a process. Write a shell program to generate Fibonacci series up to "N" terms.

2. Write a shell program to write the initials of any given name.
For example:
Input: Rahul Mahindra
Output: RM

SECTION-B (DBMS)

3. Create a database with the following schema:
COMPANY (Com_ID, Com_Name, Com_Address, Com_City, P_ID)
PRODUCT (P_ID, P_Name, P_Size, P_Price)
SALE (P_ID, P-Target, P_Sold, Area_Code)
Select appropriate data types for all the fields. Identify appropriate keys. Also input 10 meaningful records.

4. For the above tables in Q(3), answer the following queries using SQL :
 - (a) To print the names of all the company.
 - (b) To display the city and address of the company whose Com_ID= 123.
 - (c) To display the name of the Product whose Price> 1000.
 - (d) To display all the company name, address and product name whose product_ID=111.
 - (e) To display product name, price, target and area_code of the product whose product_ID>111.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXIII (New) - Practical
(Application Development with .Net Framework)
SET-A
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 20

Answer all the Questions. All questions carry equal marks.

1. Design a form in VB.NET to add two numbers and display the total and average using proper tool.
2. Design a page in ASP.Net for creating your own resume.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXIII (New) - Practical
(Application Development with .Net Framework)
SET-B
Annual Examination, 2021

Time : 3 Hours.

Full Marks : 20

Answer all the Questions. All questions carry equal marks.

1. Design a form in VB.Net to calculate simple interest by using proper tool.
2. Design a board in ASP.Net using proper tools to display information of your choice.

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXVI (Old) - Practical
(Advanced Internet Technologies and Computer Graphics)

SET-A

Annual Examination, 2021

Time : 3 Hours.

Full Marks : 100 (80+20)

Answer all the Questions. All questions carry equal marks.

SECTION-A (Advanced Internet Technologies)

1. Write a program using JSP and JDBC to keep records of attendance of practical counselling classes of courses. The program should provide the percentage of attendance in counselling classes after taking student enrollment number as input. Make necessary

SECTION-B (Computer Graphics and Multimedia)

2. Write a program in C/C++ using OpenGL that draws a circle.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XXVI (Old) - Practical
(Advanced Internet Technologies and Computer Graphics)

SET-B

Annual Examination, 2021

Time : 3 Hours.

Full Marks : 100 (80+20)

Answer all the Questions. All questions carry equal marks.

SECTION-A (Advanced Internet Technologies)

1. Write a servlet program to manage savings bank account. This program should take account number as input and should display account details. Also program should have feature for updating contact details of account-holders. Make necessary assumptions.

SECTION-B (Computer Graphics and Multimedia)

2. Write a program in C/C++ using open GL that draws a rectangle.

