

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

(Problem Solving Using C)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Give some suggestions to be followed for designing an efficient algorithm. What are the various ways of algorithm analysis ?
2. Describe the characteristics of a good computer program.
3. What is a Flowchart ? Discuss the symbols used to draw a flowchart. Draw a flowchart to find the largest among three numbers entered by user.
4. What are keywords in C programming ? Explain at least 10 keywords used in C programming.
5. Explain different types of **data types** used in C programming with examples.
6. Discuss various decision making statements in C programming with examples.
7. Write a program of your own choice using **for** loop. How it is different from **do...while** loop ? Discuss using an example.
8. What is a storage class? Explain different types of storage class with examples of each.
9. Describe malloc(), calloc(), realloc() and free() functions with examples of each.
10. Write short notes on any **Two** of the following :—
 - (a) Identifiers in C.
 - (b) Logical Operators in C.
 - (c) Type conversion in C.
 - (d) Arrays.

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EXAMINATION PROGRAMME-2020
MCA, Part-I

Date	Papers	Time	Examination Centre
05.04.2021	Paper-I	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
07.04.2021	Paper-II	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
09.04.2021	Paper-III	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
12.04.2021	Paper-IV	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
15.04.2021	Paper-V	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
17.04.2021	Paper-VI	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
22.04.2021	Paper-VII	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
26.04.2021	Paper-VIII	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
28.04.2021	Paper-I (Practical)	12.00 Noon to 3.00 PM	Nalanda Open University School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
29.04.2021	Paper-VI (Practical)	12.00 Noon to 3.00 PM	
30.04.2021	Paper-VIII (Practical)	12.00 Noon to 3.00 PM	

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

(Computer Organization)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Convert the following :—
 - (i) $(100111001)_2 = ()_{10}$
 - (ii) $(AB21D)_{16} = ()_8$
 - (iii) $(2468)_{10} = ()_8$
 - (iv) $(7654)_8 = ()_{16}$
2. What are fundamental gates? Draw the symbols of each gate 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: **$F(A, B, C, D) = \Sigma(1, 2, 4, 6, 8, 10, 12, 14)$**
4. Simplify the expressions and draw the circuit diagram for the expressions given below:
 - (i) $AC' + (B+C) + A'B'C + ABC$
 - (ii) $A'BC + B'CD + AC'D$
5. What are Universal gates? Why they are called so? Draw all the fundamental gates using the Universal gates.
6. Compare and contrast between Combinational circuits and Sequential circuits. Give at least two examples of each.
7. Discuss **RS** flip flop with its circuit diagram. What are its limitations? How **D** flip-flop help to overcome the limitation of **RS** flip flop.
8. What is the role of memory in Computers? Discuss different types of memories.
9. What is a Control Unit (CU)? Discuss the architecture and types of Control Unit.
10. Write short notes on any two of the following:—
 - (a) Flip-flops
 - (b) Adders
 - (c) ALU
 - (d) Don't Care condition.



EXAMINATION PROGRAMME-2020
MCA, Part-I

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05.04.2021	Paper-I	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
07.04.2021	Paper-II	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
09.04.2021	Paper-III	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
12.04.2021	Paper-IV	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
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17.04.2021	Paper-VI	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
22.04.2021	Paper-VII	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
26.04.2021	Paper-VIII	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
28.04.2021	Paper-I (Practical)	12.00 Noon to 3.00 PM	Nalanda Open University School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
29.04.2021	Paper-VI (Practical)	12.00 Noon to 3.00 PM	
30.04.2021	Paper-VIII (Practical)	12.00 Noon to 3.00 PM	

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

(Discrete Mathematics)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define the tautology and prove that $\sim p \vee (p \vee q)$ is a tautology.
2. Use the mathematical induction to prove that $(n^2 + 2n)$ is divisible by 3, for $n \geq 1$.
3. Explain the OR Gate, AND Gate, NOT Gate, NAND Gate.
4. Define the following :—
 - (a) Subsets
 - (b) Power Set
 - (c) Universal Set
 - (d) Union of two sets
5. If $A = \{5, 6, 7, 8\}$ and $B = \{6, 8, 10, 12\}$ then find
 - (a) $(A \cap B) \times (A - B)$
 - (b) $A \times (A - B)$
 - (c) $(A \Delta B) \times (A \cap B)$
6. If ${}^{m+n}P_2 = 90$ and ${}^{m-n}P_2 = 30$ find the value of m and n.
7. From 7 Gentlemen and 4 Ladies a committee of 5 is to be formed. In how many ways can this be done so as to include at least one lady ?
8. (a) Find the 4th term in the expansion of $(2x + 3y)^5$.
(b) Find the independent term of $x \left(x^2 - \frac{2}{x^3} \right)^{15}$.
9. What is the probability of getting 3 white balls in draw of 3 balls from a box containing 5 white and 4 black balls.
10. (a) Find the Stirling number of S_5^3 .
(b) How many functions are there from an eight elements set on to a four elements ?



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-IV
(Communication Skills)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer all Questions.

1. Read the following passage and answer the questions given below :—
- Growing at an annual compound rate of 40% for the past five years, the Information Technology industry has become one of the largest foreign exchange earners in India. During this period, growth achieved by the IT industry seems unattainable for many others in the current economic scenario.
- The past five years have seen the Indian IT industry go through fundamental changes. Earlier, IT industry was equated with hardware, which was then the major bread earner. But now software accounts for more than half of the Industry's total revenue. The transition has not happened overnight. Some factors aiding to the downfall of the hardware sector have been the following: Lack of government spending, adverse policies and the Y2K problem which has pumped in millions of dollars into software. The hardware sector faced with huge tariffs was forced into a corner in the early nineties, when manufacturing became unviable. This goaded Indian hardware companies into joint ventures with international majors for marketing their products in India. The sector still faces stiff competition from the unorganized sector.
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|-----|--|----|
| (a) | Give a suitable title for the passage. | 5 |
| (b) | What is unique about the IT industry in the present economic scenario ? | 5 |
| (c) | Why did the IT industry go through a fundamental change ? | 5 |
| (d) | What are the major factors responsible for the downfall of the hardware sector ? | 5 |
| 2. | Define communication and highlight its importance. | 10 |
| 3. | Why is downward communication important ? Discuss its limitations. | 10 |
| 4. | What are the advantages and limitations of written communication ? | 10 |
| 5. | Explain characteristics and of group discussion benefits. | 10 |
| 6. | Discuss the classification of Reports. | 10 |
| 7. | Discuss the different types of editing. | 10 |



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

(Systems Analysis and Design)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Discuss all the phases of System Development Life Cycle (SDLC) in detail.
2. Draw Data Flow Diagram (DFD) and develop SRS for "Hospital Management System".
3. Describe different types of system with examples of each.
4. Who is a System Analyst ? What are the attributes of a good System Analyst ? Discuss the role and responsibilities of System Analyst in system development.
5. Explain various approaches of System development with examples.
6. Why documentation of the software important ? Discuss different standards for documentation.
7. Explain various Fact Finding techniques used during software development. Discuss advantages and disadvantages of each type.
8. What are different types of software design principles ? Explain with help of an example.
9. Define E-R diagram. Discuss the symbols used for drawing an E-R diagram. Draw an E-R diagram for "Library Information System".
10. Write short notes on any **Two** of the following :—
 - (i) Cost Benefit Analysis
 - (ii) Software quality
 - (iii) Feasibility study
 - (iv) DBMS

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

(Operating System Concepts and Networking Management)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. What are the rules for naming variables in C? Design an algorithm and draw a corresponding flowchart and write a C program to divide two numbers.
2. Explain different types of decision making statements in C with examples?
3. What are different types of operating system? Explain each type with the help of an example.
4. What are the functionalities of Graphical User Interface? Describe Batch Operating System.
5. Explain with examples all the built-in string functions of C language.
6. Describe the different types of Networks. What are the different types of Modems? What is Optical fiber? List the Advantages of Optical fiber.
7. Explain TCP/IP model of Networking with the functions of each layer. How it is different from OSI model?
8. Explain the following terms :—
 - (a) Packet Filters
 - (b) Trust Relationships in Windows 2000.
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) Structures
 - (b) Union
 - (c) Networking devices
 - (d) Network File Server.

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REVISED EXAMINATION PROGRAMME-2020
MCA, Part-I

Date	Papers	Time	Examination Centre
27.08.2021	Paper-VI	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
28.08.2021	Paper-VII	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
31.08.2021	Paper-VIII	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
07.09.2021	Paper-I (Practical)	12.00 Noon to 3.00 PM	Nalanda Open University School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
08.09.2021	Paper-VI (Practical)	12.00 Noon to 3.00 PM	
09.09.2021	Paper-VIII (Practical)	12.00 Noon to 3.00 PM	

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

(Object Oriented Analysis and Design)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Describe the characteristics of Object Oriented systems.
2. Discuss different types of inheritance with examples. What is abstraction?
3. Compare and contrast between overloading and overriding with examples.
4. Define modularization. Discuss coupling and cohesion. List some scenarios that illustrate varying types of coupling.
5. Draw a DFD for "School Admission System". Make assumptions wherever necessary. Draw the DFD's till level - 2.
6. What is UML? Discuss different components of UML with diagram.
7. Draw a use-case diagram for "Railway reservation system". Identify actors. How are constraints defined and implemented?
8. List and describe the elements of event diagram. Give examples.
9. Discuss different types of testing in OOAD. Also discuss the issues in Object Oriented Testing.
10. Write short notes on any **Two** of the following: —
 - (a) Aggregation
 - (b) Association
 - (c) Class
 - (d) Encapsulation.



REVISED EXAMINATION PROGRAMME-2020
MCA, Part-I

Date	Papers	Time	Examination Centre
27.08.2021	Paper–VI	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
28.08.2021	Paper–VII	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
31.08.2021	Paper–VIII	2.30 PM to 5.30 PM	A. N. College, Boring Road, Patna-800013
07.09.2021	Paper–I (Practical)	12.00 Noon to 3.00 PM	Nalanda Open University School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
08.09.2021	Paper–VI (Practical)	12.00 Noon to 3.00 PM	
09.09.2021	Paper–VIII (Practical)	12.00 Noon to 3.00 PM	

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

(Data and File Structures)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define algorithm. Discuss different types of algorithm complexity with examples.
2. Define array. Write an algorithm to multiply two arrays with 10 elements each.
3. Compare and contrast between Linked list and stack. Give examples of each with a diagram.
4. Write a procedure to create, insert and delete an element in queue.
5. Discuss different types of search methods used in data structure with an example of each type.
6. What recursion? Give at least two examples of recursion. Write a program in C to explain recursion.
7. Compare and contrast between bubble sort and quicksort algorithm with examples of each.
8. Write a procedure to sort the following sequence using merge sort:–
22, 17, 12, 37, 18, 77, 32, 45, 55, 20.
9. Describe some real life examples where data structure concept is being used.
10. Explain various types of file organization. Also discuss their advantages and disadvantages.

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PRACTICAL EXAMINATION PROGRAMME-2020
MCA, Part-I

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

Enrollment No.	Date	Papers	Time
190190001 to 190190095	07.09.2021	Paper-I (Practical)	11.00 AM to 2.00 PM
190190096 to 190190178 & All Old Batch Students	07.09.2021	Paper-I (Practical)	2.00 PM to 5.00 PM
190190001 to 190190095	08.09.2021	Paper-VI (Practical)	11.00 AM to 2.00 PM
190190096 to 190190178 & All Old Batch Students	08.09.2021	Paper-VI (Practical)	2.00 PM to 5.00 PM
190190001 to 190190095	09.09.2021	Paper-VIII (Practical)	11.00 AM to 2.00 PM
190190096 to 190190178 & All Old Batch Students	09.09.2021	Paper-VIII (Practical)	2.00 PM to 5.00 PM

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

(Internet Concepts and Web Design)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define Internet. Explain the concept of Internet domains with examples.
2. What is ISP ? Differentiate between Intranet and extranet.
3. What do mean by web-browser ? Explain web server, website, webpage and addressing system of web-address.
4. Define HTML. Explain the difference between HTML and DHTML with examples.
5. Define Java script. Differentiate between language and common programming language with examples.
6. Write a program in java script to display the series of natural numbers upto 20.
7. Explain the following terms :—
 (i) HTML tags
 (ii) HTML ordered lists
 (iii) URL
8. Describe various attributes of HTML. Differentiate between Block-level elements and Text-level elements.
9. What is a Style sheet? Discuss the properties of Style sheet.
10. Write short notes on any **Two** of the following :—
 (i) IP addressing
 (ii) Telnet
 (iii) Proxy server
 (iv) Email.



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

Date	Papers	Time	Examination Centre
28.01.2021	Paper-IX	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
30.01.2021	Paper-X	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
02.02.2021	Paper-XI	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
04.02.2021	Paper-XII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.02.2021	Paper-XIII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
09.02.2021	Paper-XIV	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
11.02.2021	Paper-XV	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
13.02.2021	Paper-XVI	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
15.02.2021	Paper-IX (Practical)	12.00 Noon to 3.00 PM	School of Computer Education & IT, 12 th Floor, Biscomaun Tower, Patna-800001
17.02.2021	Paper-XIII (Practical)	12.00 Noon to 3.00 PM	
18.02.2021	Paper-XIV (Practical)	12.00 Noon to 3.00 PM	
19.02.2021	Paper-XV (Practical)	12.00 Noon to 3.00 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER-X
 (Computer Graphics and Multimedia)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Describe CAD and CAM processes in computer graphics. What is scientific visualization?
2. Discuss various Input devices used in graphics.
3. What are the performance parameters of a monitor? Explain.
4. Discuss various software tools used for Image processing.
5. Explain Polygon filling techniques.
6. Explain Translation, Rotation and Scaling in terms of two dimensional (2D) transformation.
7. What is 3D rotation and shearing? Explain with help of a diagram.
8. Define Graphical Kernel System (GKS). Discuss GKS standards and GKS Inputs.
9. Define and describe Beizer Curve. What are the properties of Beizer curve.
10. Write short notes on any **Two** of the following :—
 - (i) Polylines
 - (ii) Poly-markers
 - (iii) 3D projections
 - (iv) Depth Buffer (z-Buffer) method.



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

Date	Papers	Time	Examination Centre
28.01.2021	Paper-IX	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
30.01.2021	Paper-X	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
02.02.2021	Paper-XI	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
04.02.2021	Paper-XII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.02.2021	Paper-XIII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
09.02.2021	Paper-XIV	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
11.02.2021	Paper-XV	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
13.02.2021	Paper-XVI	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
15.02.2021	Paper-IX (Practical)	12.00 Noon to 3.00 PM	School of Computer Education & IT, 12 th Floor, Biscomaun Tower, Patna-800001
17.02.2021	Paper-XIII (Practical)	12.00 Noon to 3.00 PM	
18.02.2021	Paper-XIV (Practical)	12.00 Noon to 3.00 PM	
19.02.2021	Paper-XV (Practical)	12.00 Noon to 3.00 PM	

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

(Software Engineering)
Annual Examination, 2020

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.

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

(Management and Information System)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define data and information. Discuss the attributes of Information.
2. Explain classification of Information based on characteristics and application.
3. Discuss Information system architecture with examples.
4. What are the six key elements required for designing an organizational structure? Explain.
5. Describe the different phases of growth of an organization. What are the reasons of failure of an organization?
6. What are the six major types of organization? Explain with the help of examples.
7. What is MIS? What are the objectives of MIS? Discuss.
8. Discuss the factors contributing to the success and failure of MIS in an organization.
9. What is Supply chain management? How Information systems can facilitate supply chain management.
10. Write short notes on any **Two** of the following :—
 - (i) Function oriented organization
 - (ii) Process oriented organization.
 - (iii) Hierarchical organization
 - (iv) Flat organization.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XIII
(Operating System)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define Operating System. Discuss different types of Operating System.
2. Explain the structure of Operating system. What are the functions of an operating system?
3. What is a process? Explain in detail the functions of process management in operating system.
4. Why process scheduling important? Discuss any two process scheduling algorithms with help of an example.
5. Define deadlock. Discuss the four conditions for deadlock. How can deadlock be avoided?
6. What is page replacement policy? Discuss FIFO and OPT algorithm with the help of an example.
7. Describe Distributed File system. Discuss its advantages and disadvantages.
8. Define UNIX. Write at least ten commands in UNIX and explain their functions.
9. Explain Windows 2000 architecture. How does it support memory management?
10. Write short notes on any ***Two*** of the following :—
 - (i) Process States
 - (ii) Paging
 - (iii) Segmentation
 - (iv) Inter-process communication.

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

(Database Management Systems)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. What is the need of DBMS ? Discuss the advantages and disadvantages of DBMS.
2. What is an E-R diagram ? What are its basic components? How these components are represented in a diagram ? Explain.
3. Write at least ten queries in SQL with their complete syntax and meaning.
4. What are Indexes in DBMS ? What is the utility of Indexes in DBMS? Under what situations B-tree Indexes are preferable over Binary Search Tree Indexes?
5. What do you understand by the term "Normalization" in DBMS? Write statement for second normal form (2NF), and discuss the insert, delete and update anomalies associated with 2 NF.
6. What is the role of Database Manager ? Explain the important components of database manager with the help of a diagram.
7. Explain the following terms with suitable example :—
 - (i) Lossless decomposition.
 - (ii) Dependency preserving decomposition.
8. Explain three views of Database Management System in detail. What is logical and physical independence of data?
9. Compare and contrast between OODBMS and RDBMS.
10. Write short notes on the following :—
 - (i) Database Administrator
 - (ii) Integrity Constraints.

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

(Object Oriented Programming using Java)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. What is Object Oriented Programming? Explain Object and Class with examples.
2. Explain Abstraction, Encapsulation and Inheritance with examples.
3. Describe the basic features of Java. Why it is called Platform Independent.
4. Describe at least 10 keywords used in Java with their functions.
5. Discuss various data types used in Java programming with examples.
6. Define and discuss arithmetic operators and relational operators used in Java with examples.
7. Discuss the Control statements in Java. Give some examples.
8. What are Iterative Statements? Explain using some examples.
9. What is an array? Explain one dimension and two dimension arrays with an example in Java. Explain with the help of an example.
10. Write short notes on any **Two** of the following :—
 - (i) Benefits of Object Oriented Programming
 - (ii) Method Overriding
 - (iii) Constructors.

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REVISED EXAMINATION PROGRAMME-2020
MCA, Part-II [New Batch]

Date	Papers	Time	Examination Centre
11.02.2021	Paper-XV	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
13.02.2021	Paper-XVI	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
15.02.2021	Paper-IX (Practical)	2.00 PM to 5.00 PM	School of Computer Education & IT, 12 th Floor, Biscomaun Tower, Patna-800001
17.02.2021	Paper–XIII (Practical)	2.00 PM to 5.00 PM	
18.02.2021	Paper–XIV (Practical)	2.00 PM to 5.00 PM	
19.02.2021	Paper-XV (Practical)	2.00 PM to 5.00 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XVI
(Computer Networking)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define Networking. Discuss the services, advantages and disadvantages provided by the network.
2. Explain OSI model of network. What the advantages of dividing the network into layers? Explain.
3. Describe LAN, MAN and WAN with examples of each type.
4. What are digital and Analog Transmission? Explain their characteristics and advantages.
5. What are different types of Wireless transmissions discuss wireless LAN.
6. Define Modulation. Discuss different types of modulations with diagram.
7. What is switching? Explain circuit switching, message switching and packet switching.
8. Explain Cycle Redundancy Check (CRC) codes for error detection with the help of an example.
9. What are the services provided by Transport Layer? Discuss the protocols at Transport layer.
10. Write short notes on any two of the following :—
 - (i) TCP/IP reference model.
 - (ii) Client/Server Architecture
 - (iii) ATM network
 - (iv) Router

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

(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.

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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–XVIII

(Advanced Database Management System)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. What are Enhanced ER tools ? Explain. Construct an E-R diagram for a School Management System. The School maintains records about Teachers, students, classes, assignments, results, Theory as well as practical class timings for each student. The number of subjects in which the student is enrolled and past performances in different subjects is recorded. Document all assumptions that you make about the mapping constraints.
2. Define Normalization ? Explain different normal forms with examples.
3. Differentiate between Multivalued dependency and Join Dependency with help of an example.
4. What are the steps for design of database system ? Explain in detail.
5. Explain the concept of Embedded SQL and Dynamic SQL with the help of example. Give at least two complete examples of each.
6. What is a data dictionary ? Describe its features. Discuss the advantages and disadvantages of data dictionary.
7. What are the basic steps in query processing ? How can the cost of query be measured ? What are the various methods adopted in select operation ?
8. Discuss some of the traditional and advanced transaction processing methods.
9. Why we use lock based protocol ? What are the pitfalls of lock based protocol ? Explain using examples.
10. Write short notes on any **Two** of the following :—
 - (i) UML based design tools.
 - (ii) Views.
 - (iii) Triggers.
 - (iv) Concurrency.



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 (Practical)	12.00 Noon to 3.00 PM	School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
26.03.2021	Paper–XXIII (Practical)	12.00 Noon to 3.00 PM	
27.03.2021	Paper–XXIV	11.00 AM to 2.00 PM	

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER–XIX
 (Compiler Design)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define Compiler. Discuss the structure of a compiler.
2. Discuss Language processing system in detail.
3. What is the concept of passes in Compiler ? Explain single pass and multi-pass compiler.
4. Discuss various construction tools of compilers.
5. What are the tasks performed by lexical analyzer ? Describe Lex Tool.
6. What is a regular expression ? Write at least 10 regular expressions and the languages formed by them.
7. Why Symbol table is used ? Explain the commonly used data structure for implementing symbol table.
8. Discuss Ambiguity with the help of an example. Compare and contrast between LL and LR with examples
9. Describe various attributes of grammar with examples.
10. Write short notes on any **Two** of the following :—
 - (i) Symbol Table
 - (ii) Preprocessor
 - (iii) Linker/Loader
 - (iv) Parse Tree.



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 (Practical)	12.00 Noon to 3.00 PM	School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
26.03.2021	Paper–XXIII (Practical)	12.00 Noon to 3.00 PM	
27.03.2021	Paper–XXIV	11.00 AM to 2.00 PM	

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

(Design and Analysis of Algorithms)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define Algorithm. Write an Algorithm to generate the series of even numbers up to given n terms.
2. Describe the concept of space and time complexity of an Algorithm. Discuss these complexities in context of a program written to generate the Factorial of a given number.
3. Discuss some greedy Algorithms with examples.
4. Explain Kruskal's method for finding Minimum Spanning tree of a Graph. Compare Prim's method with Kruskal's Method with example.
5. Explain Floyd-Warshall algorithm with proper examples.
6. Discuss in detail Number Theoretic Algorithms with examples.
7. Explain Approximation algorithm with Example.
8. Explain Chinese remainder theorem with example
9. Describe String Matching Algorithm with suitable example.
10. Write short notes on any **Two** of the following :—
 - (i) Divide and Conquer
 - (ii) Concept of Omega and Big – Theta
 - (iii) Master Theorem

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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
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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 (Practical)	12.00 Noon to 3.00 PM	School of Computer Education & IT, 12th Floor, Biscomaun Tower, Patna-800001
26.03.2021	Paper–XXIII (Practical)	12.00 Noon to 3.00 PM	
27.03.2021	Paper–XXIV	11.00 AM to 2.00 PM	

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

(Artificial Intelligence and Knowledge Management)
Annual Examination, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define Artificial Intelligence (AI). Discuss different types of Intelligence.
2. What is searching in AI? Differentiate between Breadth First Search (BFS) and Depth First Search (DFS). Discuss the advantages and disadvantages of both the searching techniques.
3. Discuss at least two informed searches with examples. Give some desirable properties of heuristic search algorithms.
4. Define Game. What are the components of a game? Discuss MIN-MAX search procedure with the help of example.
5. Differentiate between Valid and invalid argument with the help of example. Discuss the operators associated with propositional logic with example.
6. Discuss the operators used to represent FOPL. Represent the following using Universal and Existential operators :—
 - (i) Every man is mortal. Shyam is a man. Therefore, Shyam is mortal.
 - (ii) For every number x , there exists a number y , which is greater than x .
7. Explain and distinguish between the following :—
 - (i) Semantic Network
 - (ii) Frame Structure
8. Explain the concept of conceptual dependency with examples.
9. Define and describe fuzzy set. Explain Union, Intersection and Complement of Fuzzy Set with the help of an example.
10. Write short notes on any two of the following :—
 - (i) Application area of AI
 - (ii) Inference rules of FOPL
 - (iii) Tautology
 - (iv) Expert system

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

(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, 2020

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define event driven programming. Discuss the advantages and disadvantages.
2. Explain the process of working with form controls in .Net. Discuss exception handling with an example?
3. Create user defined function in VB .Net to enter any number and then display that whether it is prime or not.
4. Discuss event handling with web server. What are list controls. Explain.
5. How do you enable and disable View State? Explain the role of cookies.
6. Describe the design features of .Net framework. Discuss .Net class library.
7. Explain Web Form Life Cycle in details.
8. What is namespace? Explain different types of namespaces.
9. What is Query String? Explain it using an example. Discuss the limitations of Query String.
10. Write short notes on any **Two** of the following :—
 - (i) Just-in Time Compiler
 - (ii) Common Language Specification (CLS)
 - (iii) Garbage Collection

